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# 以語料庫為依據之期刊論文的研究結果撰寫之研究

# A Corpus-based Study on Reporting Results in Research Articles

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## 中文摘要

有鑒於英文在學術界的優勢地位以及學術英文(EAP)致力於發展更適合高等教育的教材和課程設計，學術英文近年來備受重視。自 Swales 在 1981 年發表以文類分析(genre analysis)方法探討學術文章之序論(Introduction)以來，此方法被廣泛應用分析各種不同學術寫作文類。期刊論文不但在學術上有重要的地位，同時也發展成一種複雜的文體而廣為研究。研究指出期刊論文各章節各自擁有結構和詞彙使用的特色。過去的研究除了探討期刊論文中的章節架構之外，電腦語料庫的使用讓學者得以藉由分析真實語料了解期刊論文中的細部語言使用特色以便提供適合的課程設計。

報告學術研究的結果是期刊論文最重要的目的。期刊論文的作者會在三個主要部份：摘要、研究結果、討論等三個部份中報告研究的結果。本研究藉由建構出自於資訊工程和應用語言學兩個領域之期刊論文之語料庫，結合語料庫與文類分析之方法研究兩種學術領域的期刊論文，並說明三個章節及兩個領域在報告研究結果上之差異。各獨立章節分別建構為子語料庫(subcorpus)並利用自然語言分析工具之協助以探討研究結果在期刊論文三個章節中言步(moves)結構與語言修辭之差異。

首先我們進行了期刊論文中的言步分析，發現 AS (結果之摘要)在全部文章中皆存在，表示這是在摘要中必使用的言步。之後可能由是 AI (結果之解釋)，或者 AA (結果之應用)伴隨並顯示一定之言步組合模式(move patterns)。在研究結果部分的主要言步為 RR (結果之報告)，RI (結果之解釋)，RL (圖表位置之指示)，

以及 RS (結果之摘要)。另外，這個章節中言步組合的分析顯示出言步不僅可以不同的順序呈現，同時也存在循環模式(cycles)。討論部分中常見的言步包含了 DS (結果之摘要)， DI (結果之解釋)，以及 DC (與文獻之比較)。言步組合的分析顯示 DS 通常置於 DI 或 DC 前並呈現循環。此外，討論部份還包含了高頻率的 DA (結果之應用)以及 DF (未來研究之建議)兩個言步。

這份研究的第二階段為內容分析(content analysis)，結果顯示摘要(Abstract)中研究結果的表達方式最為簡潔，詳細數據的描述，在報告的結果(Results)中呈現，而討論(Discussion)的詳細程度(level of generality)則介於摘要和結果之間。

語言使用的分析結果包括高頻率動詞，助動詞，字詞組成(lexical bundles)和語態。高頻率的動詞顯示 *use*、*show*、和 *find* 三個動詞在期刊論文這三個章節都很常使用。其他高頻率動詞與結果之摘要相關，如 *present*；資料指稱的 *see*；和加以解釋用的 *suggest*。在討論部份，助動詞的使用較其他兩部分為頻繁，表示作者於討論研究結果時，使用助動詞以表示可能性的語氣，顯示作者對結果的謙虛客氣。表達研究結果的常用字詞組成如 *in this paper*，*results show that*，*this study found*，*the results of this study*。此外，當作者指稱圖表數據，會使用 *shown in* + *名詞*或 *of the table*。語態的分析顯示出當報告結果時，主動句的使用遠超過被動句。同時我們也探討了期刊論文在應用語言學與資訊工程兩種領域之間是否有相似或不同的呈現方式。雖然這兩個學科領域在各言步使用頻率上表現出相似性，在言步組合上則略有不同。

有研究指出高等教育學生經常遇到的問題是研究報告的撰寫。本研究致力於讓學生了解如何撰寫各章節中的研究結果，同時教學上可提供課程和教材設計。例如，教師應說明各章節常用的言步和言步組合模式，以在不同章節中適當地呈現出研究結果。

## ABSTRACT

English for Academic Purposes (EAP) has attracted increasing attention among scholars, instructors, and learners around the globe since EAP pedagogy proposes learning materials and curriculum design to suit the needs of learners of higher education. The genre-based approach, ever since Swales' canonical study of the Introduction section of research articles (RAs) in 1981, has been widely applied to the analysis of various genres by EAP researchers. Studies investigating macro-level features of various sections in RAs, the most extensively investigated EAP genre, have pointed out that each section possesses a set of specific communicative purposes; in addition, corpus-based analyses of micro-level features in RA sections provide pedagogical implications for actual use.

Reporting research findings is the most crucial communicative purpose of an RA. In its three major sections—Abstract, Results, and Discussion, RA writers have to report the findings of their study. The present study, therefore, aims at exploring how reporting research findings is realized in these sections in two disciplines by integrating genre analysis with corpus-based text analysis. To achieve this goal, a corpus of 48 RAs in the fields of applied linguistics (AL) and computer science (CS) was constructed. Genre analysis was conducted using a scheme of move codes based on previous studies, and NLP tools were used to analyze partially the macro- and micro-level features in reporting research findings.

Move analysis revealed that in Abstract, the move AS (summarizing results) occurs in all 48 RAs, indicating this is an obligatory move in Abstract. The move AS may be followed by either AI (interpreting results and findings) or AA (indicating implications/applications). Common moves in Results are RR (reporting findings), RI (interpreting results and findings), RL (locating data), and RS (summarizing results),

all of which are related to reporting overall or specific results. In addition, analysis of move patterns in this section showed that moves occur not only in a variety of sequences but also in cyclic patterns. Common rhetorical moves in Discussion include DS (summarizing results), DI (interpreting results and findings), and DC (comparing results to literature), and it was found that DS may be presented in cyclic patterns of DS→DI or DS→DC. Except for the three moves, Discussion section also contains a relatively high frequency of DA (indicating implications/applications) and DF (need/suggestions for future studies).

The second stage of this study was content analysis, which revealed that in terms of generality and language use, research results are reported in the most concise and general manner in Abstract. On the other hand, detailed description of data and reference to factual evidence, such as visual data or interview excerpts, are included in Results. Finally, the level of generality of the Discussion section lies between Abstract and Results, focusing on interpretation, implications of results, and comparison with other studies.

Analysis of micro-level features in reporting results includes high-frequency verbs, modal verbs, lexical bundles, and voice. Examination of high-frequency verbs showed that *use*, *show*, and *find* are commonly used in all three sections. Other high-frequency verbs are related to summarizing results (*present*), locating data (*see*), and interpreting data (*suggest*). With respect to modal verbs, they are used more frequently in Discussion than the other two sections, indicating that writers often qualify statements when discussing findings and making claims by using modal verbs to show tentativeness. Investigation of lexical bundles showed that to report findings, bundles like *in this paper*, *results show that*, and *this study found* are frequently used. In addition, when writers try to make reference to factual data, bundles like *shown in + noun* and *of the table* are used to refer to graphics or excerpts. Finally, analysis of

voice revealed that when reporting results, active sentences greatly outweigh passive sentences. Disciplinary variations were also explored to learn whether RAs in applied linguistics and computer science report results in a similar or different manner. While RAs of both disciplines show similar patterns in frequency rankings of moves, move patterns in the two disciplines show slight variations.

Studies have pointed out that graduate students often encounter problems when writing about research findings in the various sections of their RAs. It is essential that we offer students information about how the different sections report research results differently. This thesis study provides not only valuable pedagogical implications for EAP practitioners but empirical data showing specific moves, move patterns, and linguistic expressions frequently used in reporting research results in the various sections as well. For example, instructors should indicate the common or obligatory rhetorical moves and move patterns in each section to the learners.

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# CHAPTER ONE

# INTRODUCTION

## Background

With the development of English as the lingua franca in the academic world, writing scholarly English for publication has become a survival skill for both native and non-native researchers. Non-native speakers (NNS), compared to native speakers (NS), encounter even greater challenge in special language use in their disciplines as they lack an extensive training of language use conventions in academic discourse communities. Therefore, English for Academic Purposes (EAP), the teaching of English with the aims of helping learners of higher education to study, do, and write research in various academic disciplines, has received much attention among researchers and instructors in the past three decades (Flowerdew & Peacock, 2001; Hamp-Lyons, 2001; Hyland, 2003; 2006; Hyland & Hamp-Lyons, 2002). EAP research and pedagogy put emphasis on the development of communicative skills that learners need in order to be able to actively participate in the academic discourse community.

Of various approaches to EAP, the genre-based approach has been widely recognized as an effective method to analyze academic discourse for research and pedagogical purposes. Genre, according to Swales (1990), is a class of communicative events that share some sets of communicative purposes. After Swales (1981) proposed genre analysis for examining the generic structure of Introduction in research articles, researchers in this field have investigated various academic genres, exploring their distinctive organizational as well as linguistic features. Common written academic genres include research articles, textbooks, term papers, laboratory reports, and the like while common spoken academic genres entail academic lectures, teacher-student

conferencing, and others. Genre analysis explores not only the rhetorical functions and linguistic features of text but also its socio-cultural context, distinguishing itself from traditional text analysis, which only takes the written product into consideration.

Developing learners' understanding toward academic genres means not only to enrich their understanding of the social practices of their specific disciplines, but also to enable them to become aware of the functions of texts and how these functions are accomplished. The academic genre that has received the widest attention was the research article (RA), regarded as a key genre that develops its distinctive generic features characterizing the communicative purposes of the academics. Studies on RAs have mostly focused on two aspects of this genre: rhetorical structures (Brett, 1994; Hopkins & Dudley-Evans, 1988; Hyland, 2000; Lorés, 2004; Samraj, 2002; Swales, 1990; Williams, 1999; Yang & Allison, 2003; 2004), identified in terms of moves, in Swales' terms, and lexico-grammatical features (Bhatia, 2002) in the various sections of RAs. A move, or a rhetorical move, refers to a semantic unit in a specific genre that the author uses for a certain communicative purpose or for the performance of a rhetorical function. In Swales' (1981) well-known analysis of the Introduction section of RAs, the CARS (Creating a Research Space) model represents a robust model that captures the functions and purposes of text by categorizing the text into moves and steps. Move analysis, therefore, has become one of the major approaches to examining genres, and of course, to the analysis of research articles to identify the necessary information units that need to be included in this key academic genre.

Most RAs follow the framework of Abstract, Introduction, Method, Results, Discussion/Conclusion, namely the IMRD structure (Bruce, 1983). Over the past three decades, following Swales' canonical study (1981) on the Introduction section of RAs, researchers in this field have investigated each of these major sections (Brett, 1994; Hopkins & Dudley-Evans, 1988; Hyland, 2000; Lorés, 2004; Samraj, 2002;

Swales, 1990; Williams, 1999). These studies analyze the schematic structure of a section in terms of moves and steps, and how each move/step is realized linguistically. The move structures are closely associated with the communicative purposes or rhetorical functions of the section in concern. For instance, Abstract provides a concise summary of the study; Introduction focuses on background information, literature review, and purposes as well as rationale of the study, possibly followed by specific research questions; Method describes the way the study is carried out, tools being used, criteria of selecting subjects or texts, and research procedure ; the Results section aims at presenting and interpreting the major findings by giving descriptions of both verbal and non-verbal data; and finally, the Discussion/Conclusion section and/or other sections that end an RA entail a detailed discussion of the implications of results, comparison of the data they obtained with other studies, limitations as well as contributions of the study, and possibly suggestions for the future.

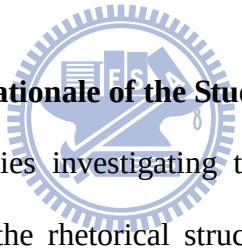
However, as revealed from a couple of studies which have explored more than one section of RAs (Posteguillo, 1998; Yang & Allison, 2003), some sections in RAs share similar rhetorical purposes with different emphases. For example, Posteguillo's study (1998) on the schematic organization of computer science RAs identified the move "statement of data/results" existing in both the Results and Conclusions sections. In addition, Yang and Allison's analysis (2003) of Results, Discussions, and Conclusions of applied linguistics RAs showed that the move of "reporting results" occurs across the three sections with different emphases. In fact, genre analysis of Abstract (Bhatia, 1993; Lorés, 2004; Samraj, 2005) also shows that the move of "reporting/summarizing results" is an obligatory move in this part of RAs. In some specific disciplines such as computer science, reporting results may even occur in the Introduction section (Posteguillo, 1998; Samraj, 2005). As many RA sections all include this move, it is of great interest for us to know whether it performs different

rhetorical functions in different sections and how this move is linguistically realized across these sections.

In their popular textbook of academic writing, *Academic Writing for Graduate Students*, Swales and Feak (2004) mentioned the differences among sections of Abstract, Results, and Discussion in terms of levels of generalization. They claimed that statements of results are presented in specific and closely tied to the data in the Results section, restricted to a high level of generality in Abstract, and something between these two levels in the Discussion section. However, they provided neither empirical data nor linguistic realizations for such cross-sectional variations of a single move. Pedagogically, one of the major problems of RA learners is to differentiate how the move of reporting results should be presented in these sections. Specifically, they do not know how the same move is realized differently in correspondence with the communicative purposes or rhetorical functions of each section.

To explore these variations, it is essential for us to firstly identify the communicative purposes of these RA sections. Abstract, according to Samraj (2001), is a part that entails the major information, especially the findings, of a study and provides an advance indicator of the content of the study so that the RA reader is able to determine whether he or she needs to read the whole RA. The Results section not only highlights but also interprets and comments on the new findings by focusing on detailed and specific results, usually involving informative data presentation (Brett, 1994; Posteguillo, 1999; Weissberg & Buker, 1990; Williams, 1999; Yang & Allison, 2003). Discussion and Conclusion, being positioned after the Results section and being the last part of an RA, are aimed rhetorically to examine the results in a larger research context. Thus, the writers must make implications and generalizations of research results and indicate the significance and contribution of these results to their academic disciplines (Holmes, 1997; Hopkins & Dudley- Evans, 1988; Swales &

Feak, 2004; Yang & Allison, 2003). From the communicative purposes of these sections, we may observe that these sections are all related to reporting research findings; nevertheless, each emphasizes specific aspects of the findings and elaborates these aspects in order to accomplish their respective communicative purposes in the RA. From a genre perspective, as indicated in Swales' definition of genre (1990), the communicative purposes of a genre "constitute the rationale for the genre", which in turn "shapes the schematic structure of the discourse and influences and constrains choice of content and style." (p.58) It would be beneficial to analyze these sections and investigate the possible differences or similarities in both the schematic structure and the choice of content and style which are used to realize the communicative purpose of "reporting research findings" across the sections.



**Rationale of the Study**

Although prior genres studies investigating the macrostructure of RAs have provided valuable insights into the rhetorical structures of individual RA sections, most of them are still limited in a number of aspects. For instance, as mentioned earlier, most of them focus on investigating only one section of RAs (Brett, 1994; Holmes, 1997; Hopkins & Dudley-Evans, 1988; Lorés, 2004; Williams, 1999). Some studies, though analyzing the schematic structure of the whole RA (Posteguillo, 1999; Yang & Allison, 2003, 2004), did not delve into a specific move that occurs across different RA sections. Though Swales and Feak (2004) mentioned that these three sections differ in levels of generality, their claim, as mentioned earlier, lacked the support of empirical data and thus shows the need to explore the variations of this move in these sections.

In addition, as Hyland (2000) pointed out, disciplinary variations are often obscured by the practicalities of EAP, which has tended "to emphasize genre rather

than discipline, and similarity rather than difference" (p.4). As a matter of fact, different disciplines, especially disciplines in hard and soft sciences, can show different rhetorical conventions to a certain degree as a result of the nature of their research and their disciplinary culture.

Considering the importance of the communicative purpose of "reporting research results" and the possible disciplinary variations in realizing the purpose, it is critical to examine how it is presented in moves and realized linguistically in the three RA sections of Abstract, Results, and Discussions/Conclusions based on a reasonable size of corpus of RAs in different disciplines.

## Purpose of the Study

Taking a genre-based and corpus-informed approach, the present study intends to explore how results or findings of a study, the most crucial element in an RA, are presented across RA sections, including Abstract, Results, and Discussion/Conclusion, in two disciplines that are different in nature. A corpus of research articles from the fields of applied linguistics (AL) and computer science (CS) is compiled and analyzed with a genre analysis of the moves related to reporting results and a text analysis of the linguistic realizations of these moves.

The specific research questions are posited as follows:

1. How is reporting results presented in moves across the sections of Abstract, Results, and Discussion?
2. How are the rhetorical moves of reporting results realized linguistically in these sections?
3. To what degree is reporting results presented and realized differently in hard sciences and soft sciences?

# CHAPTER TWO

# LITERATURE REVIEW

As EAP pedagogy started to propose learning materials and curriculum development to high education learners around the globe, it became necessary for EAP researchers to investigate the organizational and linguistic features of academic discourse to enable learners in different social settings to acquire appropriate knowledge and skills for both study and research purposes. Genre-based analysis of research articles, the central genre in the academic community of knowledge production, has attracted a lot of interest of scholars in this field. Much research has been conducted in the past three decades, exploring the generic patterns and language use (Brett, 1994; Nwogu, 1997; Posteguillo, 1999; Swales, 1981; Yang & Allison, 2004). On the other hand, with the development of computer technology, corpus-based research centered on linguistic investigations using research-oriented specific corpora (Flowerdew, 2001). This approach to RA as a genre, by examining a large amount of authentic data and using natural language processing (NLP) tools, can not only reveal recurrent features of the genre for linguistic descriptions, but also retrieve examples of specific language use in their discourse contexts, providing materials, and pedagogical implications for EAP curriculum.

As indicated in the previous chapter, the present study intends to investigate the linguistic realizations of reporting research findings across different sections of research articles taking both a genre-based and corpus-based approach. Therefore, in this chapter, an extensive review of important studies in related areas is given. First, background information of EAP is presented. The development as well as the state of art of EAP is explicated. The second part of review focuses on genre analysis, specifically the definitions and theoretical concepts of genre and genre analysis

proposed by important researchers. The last and most detailed part of this chapter deals with studies investigating research articles, especially those on the information structures and linguistic features of Abstract, Results, and Discussion/Conclusion sections.

## English for Academic Purposes

English for Academic Purposes (EAP), the teaching of English with the aim of facilitating learners at higher education, usually pre-tertiary, undergraduate, or postgraduate levels to study or do research in various academic disciplines, has gained great attention among researchers and instructors in recent years as English has become the lingua franca in the academic discourse community (Flowerdew & Peacock, 2001; Hyland, 2006; Hyland & Hamp-Lyons, 2002). The term EAP did not appear until the 1970s as a branch of English for Specific Purposes (ESP), which is a larger field that deals with research and teaching for specific purposes such as business English, technical English, and use of English in other areas.

While early research of EAP only dealt with participants and situations observed in inner circle countries where English is used as a first and official language, it is now increasingly being offered to both native and non-native teachers and students in the global academic community so that they could be equipped with the conventions of language use shared within the academic discourse community. As Hyland (2006) indicated in the introduction of his recent book *English for Academic Purposes: An advanced resource book* (2006), EAP "is today a major force in English language teaching and research around the world." (p.1) Student populations are more complicated and diverse than before with the growth of technology and globalization of academic community, foreign students who differ from native speakers of English (NS) in both their cultural and linguistic background enter tertiary education programs

have to adapt themselves to the challenges to successfully survive, graduate, and then incorporate the communication skills in the workplace. Later in the book, Hyland pointed out that nowadays EAP has become a "specialized English-language teaching grounded in the social, cognitive and linguistic demands of academic target situations, providing focused instruction informed by an understanding of texts and the constraints of academic contexts." (p.2) In addition, he noted that the learning needs of these learners focus on acquiring the communicative competencies to develop disciplinary communication skills, such as delivering and comprehending lectures in English, participating in meetings and conferences, carrying out administrative work, and most important of all, conducting and publishing research using English.

Elsewhere, Hyland and Hamp-Lyons (2002) addressed the state of art of EAP, commenting that while EAP started as a practical affair, current EAP "draws on a range of interdisciplinary influences for its research methods, theories, and practices." (p.3) In other words, EAP nowadays is no longer just a branch of ESP that deals with research and teaching perspectives in academic settings of ESL countries but has incorporated theoretical insights and research findings from other disciplines to establish its own theories and research methods. As EAP rapidly expanded to play the role of disseminating academic knowledge, several journals, such as *Journal of English for Academic Purposes* and *English for Specific Purposes* were published to record and develop theories and pedagogic uses in this field.

Around the world, as English has become the most dominant language in the academic community, more and more non-native speakers in higher educational programs, regardless in ESL or EFL settings, perceive the need to receive training in academic English in order to be capable of writing postgraduate theses or dissertations and publishing in international professional journals or their degrees or academic career. This need speeds up the growth of EAP research and pedagogy exploring the

structures and linguistic realizations of various academic genres (Hyland, 2006).

Investigation into different aspects of academic text has been carried out in the past three decades (Flowedew & Peacock, 2001; Swales, 1990, 2001; Hamp-Lyons, 2001; Hyland, 2006; Hyland & Hamp-Lyons, 2002). Early EAP studies in the 60s mostly focused on linguistic and textual features that are descriptive in nature; in addition, the studies did not account for the social contexts in which various types of texts were developed or produced. Hyland (2001) further noted that early EAP research was "textual, with no contamination or complication asking authors why they wrote as they did." (p.44) They relied on analytic grammar to investigate "restricted languages and special registers." Register analysis has been criticized a lot for being incapable of providing explanatory and sufficient descriptions of functions of text. Later on, in the early 70s, researchers offered more sophisticated categorization of register varieties and linguistic analyses for the syntactic structures of academic texts. Throughout these two decades, researchers proposed different types of text analysis in the hope of providing a more explanatory description of academic texts. After Swales proposed his work on genres in 1981 and 1990, "a focus on genre redrew the map of academic discourse by replacing rhetorical modes such as exposition or registral labels as scientific language with text types" (Hyland, 2001, p.47) such as college textbooks, conference papers and abstracts, notes of academic lectures, term papers, and journal articles. The genre-based approach to academic texts was concerned more with the macrostructure, communicative purposes, and rhetorical functions of a specific genre.

Another line of EAP research is concerned with the specialized content of text. Strevens (1988) pointed out the need to relate content and themes of learning materials to particular disciplines, occupations, and activities. As EAP learners usually deal with specialized materials,, it is necessary to provide them discipline-specific

content to ensure better relevance and immediate success. In addition, Strevens also emphasized the importance of centering on appropriate language conventions in terms of syntax, lexis, discourse, semantics, and analysis of discourse. Studies in the past have examined these features in different EAP materials, such as EAP textbooks (Hyland, 2003), theses and dissertations (Swales, 1990; Kwan, 2006), and journal articles (Hopkins & Dudley-Evans, 1988; Brett, 1994; Lorés, 2004; Yang & Allison, 2003, 2004). Therefore, EAP teachers should make use of these resources and teach learners the required macro and micro structures in text. Strevens' (1988) also indicated the difference of EAP courses from General English courses- in terms of authenticity and language conventions, immediacy of effects, and specific needs of the target learners.

In addition to Strevens' insightful overview of EAP-related pedagogy, Flowerdew and Peacock (2001) added some more factors that should be taken into consideration when designing EAP courses. They pointed out that it is necessary to include "authentic texts, communicative task-based approach, custom-made materials, adult learners, and purposeful courses." (p.13) Therefore, it can be observed that EAP instruction should not only focus on raising learners' awareness of the conventions of academic genres that are crucial in EAP settings by using authentic materials and task-based approach but also adopt discipline-specific materials for learners of different academic fields. As a result, EAP researchers made use of authentic academic genres to explore the features useful for academic learners and EAP courses to equip learners with useful knowledge toward the academic genres. One of the most widely-used text analysis would be genre analysis, which is discussed and reviewed in the next section.

## Genre Analysis

Since the 1980s, researchers and language teachers, especially those concerned about EAP, have shown an increasing interest in investigating academic text with a genre-based approach. The emergence and development of this approach is much of a result from Swales' canonical study of the Introduction section of research articles in 1981 and later, the well-accepted book on genre analysis in 1990.

Genre refers to a type of discourse occurring in a particular setting, which has both distinctive and recognizable patterns and norms of organization and structure. In other words, it refers to a group of texts that share similar features so that both writers and readers are aware of what to expect when writing or reading such a text (Hyland, 2006; Richards & Schmidt, 2003; Swales, 1990; Tarone et al., 1981). Different scholars have various definitions of the term *genre*; for example, *typification of rhetorical action*, as shown in Miller (1984) and Berkenkotter & Huckin (1995); *regularities of staged, goal oriented social processes*in Martin, Christie, and Rothery (1987) and Martin (1993); Most of the genre studies, such as Samraj (2002), Bhatia (1993), Kwan (2001), Yang & Allison (2003, 2004), however, follow the definition proposed by Swales (1990), in which genre refers to

> a class of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community, and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the discourse and influences and constraints choice of content and style. Communicative purpose is both a privileged criterion and one that operates to keep the scope of a genre as here conceived narrowly focused on comparable rhetorical action. In addition to purpose, exemplars of a genre exhibit various patterns of similarity in terms of structure, style, content and intended audience. If all high probability expectations are realized, the exemplar will be viewed as prototypical by the parent discourse community (Swales, p.58).

Such a definition of genre emphasizes "shared set of communicative purposes," "examplars of genres varying in their prototypicality," and "discourse community's nomenclature and rationale of a genre." (pp. 45-58) From the definition, genre analysis not only accounts for the linguistic aspects of academic texts, but also emphasizes the communicative purposes that constitute the rationale, which in turn shapes the schematic structure of the genre. In addition, as the conventions of a genre are largely exemplified in the generic texts by expert members of the discourse community, it is essential for researchers to examine these examplars of genres in order to reveal various patterns of similarity, which can be viewed as prototypical of the genre (Swales, 1990: 58).

The need for an effective research method for analyzing academic text was also indicated in the study by Hopkins and Dudley-Evans (1988) who examined the Discussion section of research articles. They pointed out that while early ESP research dealt with practical issues for classroom needs, there is "an increasing awareness … that much more research needs to be done … to prepare students for the tasks they need to carry out in English. [Thus] ESP work needs a system of analysis that is able to … differentiate between different types of text [and] provide useful information about the nature of different types of texts that is of pedagogic value." (p.113) In other words, they perceived the need to describe organizations of different types of texts so that both teachers and learners develop an understanding of different text types, namely genres.

According to Bhatia (2001), genre analysis refers to the study of "situated linguistic behavior in institutionalized academic or professional settings." (p.22) To investigate the features of distinctive genres, it is necessary to study how writers conventionally sequence and organize their texts to achieve particular communicative purposes. Bhatia further concluded that genre analysis is "narrow in focus and broad

in vision (p.24)" as it takes both language use and specific realization of language into consideration. Therefore, it may be concluded that genre analysis provides a rather objective viewpoint while taking not only the text, but also the discourse community into consideration. As Swales (1990) noted that every discourse community has its unique convention of language use; it is thus necessary to pay special attention to the conventions of academic genres and investigate the similarities and/or differences of these genres across disciplines.

Genre analysis has developed in a number of different directions in the past two decades. Some researchers have examined spoken genres, such as seminars or academic lectures (Dudley-Evans, 1994; Weissberg, 1993); more studies have aimed at exploring detailed analyses of written genres, such as research articles, theses, dissertations, and others. Most of the studies have focused on the rhetorical structure of a genre in concern. For instance, genre studies on research articles have explored the schematic structure of this genre in a particular discipline or one of its major sections, such as Introduction (Swales, 1981, 1990; Samraj, 2005), Method (Kwan, 2001), Results (Brett, 1994; Williams, 1999), Discussion (Holmes, 1997; Hopkins & Dudley-Evans, 1988;), and Abstracts (Lóres, 2004; Martín, 2003; Samraj, 2002, 2005). In investigating the macrostructure of a genre, researchers usually take a corpus-based empirical approach so that a larger amount of authentic text can be actually examined in one single study. Moves (small discourse units that represent a rhetorical function) and steps (smaller segments that serve more specific functions and subcategories of moves) are used by researchers to indicate the information units of text. They also reflect the communicative purposes of a section or a genre. An early move analysis model was a 4-move model, the so-called CARS model proposed by Swales (1981) to describe research article Introduction. Later studies that took a genre-based approach also used such a system (i.e., moves and steps) to describe the information structures

of different academic genres. As a result, genre analysis has had significant impacts on later EAP studies. In addition, genre analysis enables researchers to provide not only the information structure but also lexico-grammatical usages of academic genres, especially research articles (Brett, 1994; Holmes, 1997; Hopkins & Dudley-Evans, 1988; Kwan, 2001; Lóres, 2004; Martín, 2003; Nwogu, 1997; Posteguillo, 1999; Samraj, 2002, 2005; Swales, 1981, 1990, 2004; Swales & Feak, 2004; Williams, 1999; Yang & Allison, 2003, 2004).

Recently, the research focus of research articles has shifted to variations within a particular genre, such as abstracts of research articles in different disciplines (Hopkins & Dudley-Evans, 1988; Hyland, 2000) or research articles from different journals in a single discipline (Brett, 1994; Lorés, 2004; Posteguillo, 1999; Samraj, 2001; Yang & Allison, 2003, 2004). Studies of research articles from different disciplines showed disciplinary variations. Although it has been considered that research articles from similar disciplines should be presented in similar layout and fashion, some studies found that this is not necessarily the case as journal articles from the same discipline could also show different uses in terms of moves or lexical variations (Samraj, 2001; Yang & Allison, 2003, 2004).

As many studies have focused on examining the generic features of research articles, it has become one of the academic genres that have received the most attention among researchers. In the following section, the importance of research articles and studies on this genre are discussed and reviewed to provide various views of the researchers and information about what has already been investigated and discovered about this genre.

## Research Articles

EAP researchers have tried to examine the features of various academic genres, particularly research articles (RAs), the genre that has received the most attention. A line of studies on RAs investigated the macrostructures of the major sections of RAs of different fields, such as applied linguistics, business, sociology, or computer science. These studies analyzed the information structure of one major section (Bhatia, 1993; Brett, 1994; Hopkins & Dudley-Evans, 1988; Samraj, 2005; Swales, 1981), several sections of RAs (Yang & Allison, 2003, 2004), or the rhetorical organization of the whole RA (ElMalik & Nesi, 2008; Kanoksilapatham, 2005; Nwogu, 1997; Posteguillo, 1999). A second line of research examined the micro-level features of RAs, namely the lexico-grammatical linguistic features, such as verb tenses, uses of voice, modals, and so on, which characterize special language use in either the whole RA or in a specific section. Still a third line of research tried to link the macro- and micro-features of the academic genre; in other words, specific lexico-grammatical uses closely related to the macrostructures or discourse-level features of RAs, such as metadiscourse, hedges, or reporting verbs. As RAs are a highly conventionalized genre, the results of existing research have already revealed much about the rhetorical moves and linguistic features of the genre.

Studies analyzing the macrostructures of RAs have revealed that information patterns or moves can occur across sections; for example, the CARS model proposed by Swales (1981) for the Introduction section was found to be adaptable to the Abstract of certain RAs (Bhatia, 1993; Lorés, 2004; Swales & Feak, 2004). In addition, the move of "summarizing/reporting major findings" is also a move that usually occurs across several sections, namely Abstract, Results, Discussion and Conclusion. What's more, it is observed that the Discussion and the Conclusion sections have many moves in common (Yang & Allison, 2003). Since each section of

an RA performs a number of rhetorical functions, for example, Abstract plays the role of providing a concise overview of the whole RA, it is of interest for us to know whether the same move occurring across several sections performs the same or different rhetorical functions and whether there are different linguistic realizations of the same move in different RA sections.

As the purpose of the present study is to investigate the move of "reporting research findings" across sections in RAs, it is essential that studies on the various sections, namely Abstract, Results, Discussion and/or Conclusion sections, where this move often occurs are reviewed so that the role this move plays in the sections in concern can be identified. In this section, a detailed review of the studies on these sections is thus given, focusing on the move structure of each section, particularly the rhetorical functions or linguistic realizations of "reporting research findings" that have been found.

**Abstract**

Abstract is an advance indicator of RAs. It provides the readers with a brief preview or summary of the study (Bhatia, 1993; Hyland, 2000; Martín, 2003; Lorés, 2003; Samraj, 2002; Swales, 1990; Swales & Feak, 2004; Van Bonn & Swales, 2007; Weissberg & Buker, 1990). In other words, this very beginning part of an RA must appeal to readers, showing that it is worth for them to continue reading the complete RA (Hyland, 2000; Weissberg & Buker, 1990). Abstract, therefore, is promotional in nature. As Hyland (2000) argues, Abstract "selectively sets out the stall, highlighting important information and framing the article that it precedes, but it does so in such a way as to encourage further examination and draws the reader into the more detailed exposition. (p.63-64) Hyland's remarks pinpoint the importance of Abstract in influencing readers' decision about reading or not reading the complete RA. To

accomplish this communicative purpose, it is essential for a writer to demonstrate the significance of the findings of his/her study in Abstract. However, with the limitation of space, Abstract writing must be very concise.

As Abstract is concise in nature and considered as a miniature of the whole study, it has been found that it often consists of four basic information units corresponding to the four major sections of RAs, namely Introduction, Method, Results, and Conclusion (Bhatia, 1993; Martín, 2003; Samraj, 2002; Swales & Feak, 2004; Weissberg & Buker, 1990). However, there were also studies that separated the Introduction move into move of Introduction and move of Purpose (Hyland, 2000) or used other names for the moves. The studies investigating the macrostructure of Abstract have identified the moves as presented and summarized in Table 2.1.

Table 2.1. *A list of rhetorical moves in RA Abstract* (summarized from studies reviewed)

| **Move** | **Function** |
|---|---|
| Introduction/Background | Provides background information of the current academic society and establishes context of the paper. |
| Purpose | Indicates the purpose, hypothesis, and features of the study. |
| Method/Procedure | Provides information of the research method and procedure of the study. |
| Product/Results | States main findings, results, or what has been accomplished. |
| Conclusion | Summarizes the results obtained, draws inferences, or points out significance. |

As seen from Table 2.1, some researchers might have used the move "Background" (Weissberg & Buker, 1990) as a variation for "Introduction" (Hyland, 2000; Martín, 2003), "Procedure" (Weissberg & Buker, 1990) for "Method" (Hyland, 2000), or "Products" (Hyland, 2000) for "Results" (Martín 2003; Samraj, 2002). Although different scholars might use different terminologies, they all agree that Abstract is itself a shorter version of an RA.

Bhatia (1993) investigated the macrostructure of RA abstracts and pointed out that an abstract is itself "a description of factual summary of the much longer report … [providing] the reader an exact and concise knowledge of the full article" (p.78) and includes descriptions of what the author did, how the author accomplished it, what the author found, and how the author made conclusions from the obtained findings. To examine how information of these aspects is summarized in a concise manner, Bhatia presented four moves to answer the four questions: introducing purpose, describing methodology, summarizing results, and presenting conclusions. This study provided useful insights of the macrostructure of RAs, showing that Abstract is just like a miniature of the whole RA that entails the information units of IMRC.

After Bhatia's study on the overall organization of RA abstracts, Samraj (2002) compiled a small text corpus of 20 RA abstracts from two disciplines, conservation biology and wildlife behavior, to examine not only the macrostructure but also the linguistic features of this section. For text analysis, she assigned each sentence into a move, and sentences that included two moves with a main sentence and a subordinate clause were coded for both moves, namely a combination of two moves. The macrostructure identified includes: situating the research, purpose, methods, results, and conclusion. However, she further noted that even though the same moves were found in most abstracts, there were subtle variations, such as the frequency and the space these moves occupy in an Abstract. This minor difference, according to Samraj, could be related to the different disciplines the articles were selected from; in other words, there may be disciplinary variations. As a whole, it can be observed that the move of "Results" seems obligatory across disciplines serving the function of highlighting research findings for the purpose of attracting readers' attention.

Although there seems to be a general agreement about the macrostructure of RA Abstract from the studies reviewed above, the study by Lóres (2003) showed a slightly different result. She agreed that while most RA Abstracts tend to follow the sequence of IMRC in macrostructure, she pointed out that there could be even more variations in the macrostructure while she examined 36 abstracts from four journals in the field of applied linguistics and found that almost a third of the samples in her study (30.5%) did not follow the rhetorical structure of IMRC; instead, they followed the structure described by Swales's (1990) CARS (Creating a Research Space) model. The CARS model specifies three moves/steps for the Introduction section of RAs, namely establishing a territory, establishing a niche, and occupying the niche. This type of abstract, according to Lorés, mirrors the structure found in the Introduction section (Swales, 1990) instead of the IMRC.

Moreover, Lóres found that besides the conventional IMRC structure and the CARS model, a few abstracts (three out of the 36 abstracts in the corpus) did not match either of the two structures but showed a combination of both types, starting with a CARS structure in which an IMRC structure is embedded. "The final section [of the abstract] usually announces the principal findings or the way in which the research is going to fill the gap found or questions raised; [in other words, it] indicates the scope of the paper and outlines some general findings." (p.284)

Swales & Feak (1994; 2004) also mentioned two different types of abstracts, indicative and informative abstracts. The CARS model-type abstracts, according to Lóres, match indicative abstracts as indicative abstracts only point out what type of research was carried out and provide general findings; on the other hand, informative abstracts, also known as results-driven abstracts, focus on the findings, particularly supported by informative data (Lóres, 2003; Swales & Feak, 2004; Weissberg & Buker, 1990). The combinatory type of abstracts found in Lóres' study does not match

either the indicative or the informative abstracts, but corresponds to, according to Lóres, the mixed type of indicative-informative abstracts. To sum up, though these studies indicated that the functions, linguistic realizations, and rhetorical structures might influence the organization and type of abstracts, they did not mention if any disciplines prefer to use one type of abstract or another. Therefore, more representative data of these three types of abstracts and disciplinary preference should be investigated.

Another line of researchers used these findings as a basis and examined the move sequences/structures in this section (Hyland, 2000; Samraj, 2002; Martín, 2003). Most studies agreed that the move "Product/Results" can be regarded as an obligatory move in abstracts as this move occurs in a high frequency in their studies (Hyland, 2000; Samraj, 2002). In addition, studies that investigated the move sequences/structures of RA abstracts found that regardless of indicative or informative abstracts, most of them tend to follow the sequence of stating the author's introduction, followed by a brief description of the methodology being used, and then the presentation of research findings (Hyland, 2000; Lóres, 2003; Samraj, 2002).

Samraj's study (2001) on the macrostructure of RA abstracts from two sub-disciplines in biology found that the move of "Results" occurs consistently in abstracts of RAs from both disciplines as this part demonstrates the most crucial contribution of the studies to the disciplines. This result shows that it is necessary to include the element of reporting research findings in RA abstracts. Similarly, Hyland's study (2000) of a corpus of 800 abstracts from eight disciplines tried to identify the common communicative purposes. In his study, he made a similar claim to the studies by Samraj (2002), stating that a very high percentage of papers (94%) in his corpus included the move of "Product," a move presenting the findings or what the study has accomplished.

However, Martín (2003) found that the move of "Product/Results" was not obligatory in his corpus of Spanish abstracts. He assembled 160 RA abstracts written in both English and Spanish in the area of experimental social sciences and found that the structural unit that occurred the least frequently was the Results element, with an occurrence rate of 86.25% in English abstracts and 41.25% in Spanish abstracts, respectively. Though he did not specifically provide an explanation of the finding, it could be inferred that this phenomenon was probably related to the English RAs that Spanish writers read; in other words, as Spanish writers read English abstracts, they memorized and eventually used the language conventions observed during reading, which thus affected their writing when they constructed abstracts in English. Though we may not have a clear understanding of the convention of Spanish Abstracts, it may be concluded that while Spanish researchers wrote their RAs in English, they tended to follow the conventions they obtained and observed while reading RAs in English. It is still not known if the move of "Results/Product" is obligatory or not, or whether the occurrence of this move might be influenced by different disciplines or even various languages. In the present study, the occurrence of this move and its linguistic realizations will be investigated to get a more insightful view of these features when reporting researching findings.

Studies on the common move sequence/structure have tried to examine what combinations of moves are prevalent in this section. Hyland's (2000) five-move framework (I-P-M-Pr-C), including Introduction, Purpose, Method, Product, and Conclusion, was used to identify the common move sequences of abstracts in his study. He concluded that among the different move sequences identified, two-move structures, P-M-Pr and I-P-Pr, were common, both including the move of presenting the results. Similarly, Samraj's (2002) study on abstracts from biology followed a similar move sequence, stating that though the author might start with either a move

of situating the research or of connecting to a problematic real world, it was eventually followed by what has been found and what conclusions may be drawn from the findings. Moreover, Samraj noted in her study that the method element, which only occurred in a frequency of 50%, was often omitted and followed by statement or information related to results and conclusion. Therefore, common move sequences in Samraj's study can be represented as P-Pr-C or I-Pr-C.

The informative-indicative abstract in Lóres' (2003) study usually followed the sequence of the CARS model with an IMRC structure embedded. An excerpt of abstract in her study consists of three sections: the first section corresponds to "establishing a territory" of CARS and includes "the general purpose" of IMRC; the second section corresponds to "establishing a niche" of CARS and incorporates "the methodology" of IMRC; the final section is found to correspond to "occupying a niche" with the findings summarized and presented. Since only three abstracts in her study belong to this type of abstracts, it is hard to make generalizable conclusions. Although the excerpt in Lóres' study seems more indicative than informative, more data are needed to draw a reliable conclusion of the move sequence of informative-indicative abstracts. To sum up, the linear sequences of IMR or IRC from IMRC structure seem to be more popular regardless of indicative or informative abstracts.

In addition to the macrostructure of RA abstracts, a variety of linguistic features have also been explored, such as verb tenses, hedges, metadiscourse, voice, and uses of parts of speech (Martín, 2003; Samraj, 2002; Van Bonn & Swales, 2007).

In Samraj's study (2002) on abstracts of two journals of biology, he found that "usually the purpose, methods, and results moves are in the past tense while the background and conclusion moves are in the present tense [with] the transition from the results to the conclusion move clearly revealed by the tense switch" (p.49-50).

Samraj (2002) found that modal verbs, such as *suggest*, "constitute about half the hedging devices employed … and most of [them] are found in the conclusions move" (p.51-52). As for hedges occurring in the results move, Samraj pointed out that this occurs when authors make interpretations of numerical figures. Therefore, it may be concluded that modal verbs are usually used either to qualify the interpretations of numerical data or the conclusions/implications of results. The final aspect investigated in her study was the use of pronoun. The use of first-person pronouns in Samraj's study revealed variation between the two journals; abstracts of one journal showed a frequency of 21% in the use of first-person pronouns as the subject of a sentence, abstracts from the other journal eschewed the use of pronouns. Therefore, it might be concluded that this variation is related to the nature of the two journals.

Another study investigating linguistic features of abstracts is conducted by Martín (2003). He examined the linguistic features of the results unit. The "Results" move, in which authors make new knowledge claims, aims to report the main results obtained or observed in the study. According to Martín, results "are stated most frequently … by means of a sentence initiated with an inanimate noun (e.g. *the findings, the analyses, the results*, etc.) in subject position and followed by … verbs such as *show, reveal,*[and] *indicate*. (p.36; Italics in original)" (p.37). Results elements in English abstracts in Martín's study were found to use verbs in the past/passive voice (*showed/was found, was observed*) frequently. Thus it can be concluded that the Results element would be stated in a more concise way using passive voice due to the terse nature of RA abstracts. In addition, another study by Van Bonn & Swales (2007) that tried to compare bilingual abstract pairs of English and French found that the reporting verbs in French were more assertive than those used in English, indicating that hedges is more frequently used when writers try to draw conclusions from the data they obtained.

In the studies reviewed, there are variations in RA abstracts in terms of macrostructure and linguistic features in different or similar disciplines (Lóres, 2003; Martín, 2003; Samraj, 2002; Van Bonn & Swales, 2007). Among the disciplinary variations of linguistic features, Hyland (2000) specifically pointed out that the move of "Product" is stated differently in soft science and hard science. The statement in the former focuses on discussions or arguments of a topic, while in the latter puts emphasis on reporting research findings. This observation is worth further exploration when RA Abstracts from disciplines of both hard and soft sciences are examined.

To sum up, studies investigating the macrostructures and linguistic features of abstracts have revealed the macrostructure of this shortest part of an RA. Although they showed disciplinary variations and possible differences between different types of abstracts, reporting results seems a near-obligatory move in an abstract no matter which discipline it belongs to. However, a few questions need further exploration; for example, as different researchers found that there are three types of abstracts, namely informative, indicative, and informative-indicative abstracts, is there a tendency that some certain studies with similar methodologies or within similar disciplines prefer to adopt one type of abstract to another? In addition, as this section acts as an indicator of the whole RA, how do researchers report their findings linguistically different? These are all aspects that are worth to be considered when examining RA Abstracts from either similar or different disciplines.

**Results**

The Results section of RAs is a part in which researchers report, interpret, and comment on what they have found or observed from the study they conducted. Studies related to this section investigated only this section (Brett, 1994; Williams, 1999) or examined the schematic structures of RAs which included the Results

section (ElMalik & Nesi, 2008; Kanoksilapatham, 2005; Nwogu, 1997; Posteguillo, 1999). Moreover, there were also studies that tried to investigate sections that share similar macrostructures, namely Results and Discussion sections (Yang & Allison, 2003). EAP textbooks for academic writing or RA writing also discussed related issues to inform learners what to include and what to be careful about when constructing the Results section of an RA (Swales & Feak, 2004; Weissberg & Buker, 1990).

The main communicative purpose of this section, according to textbooks published by Weissberg & Buker (1990) and Swales & Feak (2004), is to highlight the major findings of research supported with analysis and explanation and accompanied by appropriate data commentary, which interprets data and indicates significance. Graphics are often used to present data while the past tense is more frequently used than the present tense as RA Results should report research activities that were completed in the past. While early researchers claimed that the Results section should simply report the data, later researchers argued for appropriate interpretations and comments in order to convince the readers of the reliability of the results obtained and to provide the researchers' own view of the data and results. For example, Swales & Feak (2004) mentioned that the strength of data commentary is a crucial skill needed when writers try to discuss the data of the study. They suggested that there are two types of danger in making data commentary: either simply repeating the nonverbal data in words so that only description rather than commentary is offered, or interpreting the data too much and making unjustified conclusions. Writers should learn how to qualify results in their papers. Therefore, it can be concluded that the Results section can be very difficult to write for novice academic writers.

Studies investigating the macrostructure of the Results section have also tried to identify the obligatory and optional moves in this section. A list of the rhetorical

moves from prior studies (Brett, 1994; ElMalik & Nesi, 2008; Kanoksilapatham, 2005; Nwogu, 1997; Posteguillo, 1999; Williams, 1999; Yang & Allison, 2003) can be summarized as shown in Table 2.2.

Table 2.2. *A list of rhetorical moves in RA Results*. (summarized from studies reviewed)

| **Move** | **Function** |
|---|---|
| Preparatory information | Provides relevant information of the investigation. |
| Reporting results | Presents both the verbal and non-verbal data obtained in the study. |
| Interpreting results | Suggests the interpretation of the results. |
| Commenting on results | Establishes the meaning and significance of results. |
| Summarizing results | Summarizes results. |

Brett's study (1994) on the Results section of RAs is one of the frequently cited studies. He examined 20 RAs from the field of sociology with a genre-based approach, following Swales' (1990) IMRC framework. It was shown that the Results section is the largest section (40%) in the length of a paper, with an average of 5.6 pages out of RAs with an average of 14 pages. Brett further investigated the communicative purposes of this section in sociology RAs and found that "sociologists claiming new knowledge claims have to be able to use a set of communicative options which enable them to reconstitute statistical data into meaningful statements about people and human behaviors" (pp.50-51). This claim might be useful when examining RA Results in disciplines that investigate people and human behaviors; in addition, it might also be worth examining if disciplines that do not deal with such issues still show similar language conventions.

The three communicative categories in this section, as proposed in Brett (1994), include metatextual categories, which indicate the order and type of data to be discussed; presentation categories, which put emphasis on describing the procedure and hypothesis, a series of statements of findings, and discussion of data; and

comment categories, in which writers make explanation, comparison, evaluation, and implications from the data, which is followed by a summary of the results. In short, the communicative categories can be classified as indicating method and procedure, presenting data and research findings, and commenting on data.

In addition to identifying the common moves of the Results section, Brett's study also pointed out that these moves were organized cyclically. The most frequent pattern which was found in all articles was "pointer → statement of finding → substantiation of finding" (p.55), a pattern that might occur several times in the Results section of a single RA. This pattern shows that writers tend to present several groups of data. For each group of data, they first indicate what type of data is to be presented, followed by the presentation of data and finding, and then the explanation and interpretation of finding. As one study usually has more than one group of data and finding, the author might use this pattern several times to present the findings in an organized and coherent manner, which leads to the repetition of this cycle. In other words, the pattern of a Results section might be presented as: pointer 1 → statement of finding 1→ substantiation of finding 1 → pointer 2 → statement of finding 2 → substantiation of finding 2 → … → comment, with the last move relating to a set of results instead of individual ones. Brett's study provided useful insights so that later studies on the Results section often followed or modified the moves and patterns identified by Brett.

Williams (1999) based his classification of moves on Brett's (1994) rhetorical categories. He investigated the rhetorical organization of the Results section in biomedical RAs. It was observed that this section in his corpus appears to show greater variety than sociology RAs in Brett's study. Thus he modified Brett's model trying to produce an analytical model that is "sensitive enough to account for this variety, yet simple enough to be used by students who are not applied linguists"

(p.348). Although Williams finally found that the results in biomedical reports were presented in a linear fashion, showing that variation in disciplines does not affect the rhetorical organization of this section, he indicated that different subsections within this section can have a strong effect on the organizational structure and pattern of the Results section. Williams concluded that Brett's model is "an adequate basic model of the rhetorical categories of Results sections for interdisciplinary analysis" (p.362). To sum up, as Williams based his classification of moves on the study by Brett, he added a few more moves and made similar claims to Brett's study even though he examined RAs from a different discipline compared to Brett.

Another study examining the Results section taking Brett's (1994) model as a reference was the study by Posteguillo (1999), who examined the schematic structure of 40 RAs in the field of computer science. He also found that cycles of moves are common in the Results section. The cyclical pattern in his study can be presented as "*procedural-pointer-statement of data* or *procedural-pointer-evaluation of data*" (p.148). The reason why the "procedural" move is included, as Posteguillo explained, is that in computing RAs, which differ from sociology and medical RAs, the procedural moves act as a substitute for an independent RA Method section. In other words, Methods and Results are often combined in a series of sections in computer science RAs. Although this finding is slightly different from the cyclic pattern proposed by Brett (1994), these two patterns are quite similar in their linear sequence as the writer first addresses the procedure, then presents the data, and finally evaluates or comments on the data. Another new finding by Posteguillo is that the move of "announcing principal findings" is a frequent application (70%) in computer science RAs. To briefly sum up, these studies on the Results section of RAs have found that all the moves in this section are related to reporting research findings; among these moves, the move of "presenting research findings" is obligatory. Also, moves in this

section follow a linear sequence of introducing-presenting-commenting data, with possible slight disciplinary variations.

Another study concerned with the rhetorical structures of RAs in a different discipline was the study by Kanoksilapatham (2005), who compiled a corpus of 60 biochemistry RAs of five journals. She identified four moves in the Results section (moves 8-11): stating procedures, justifying procedures or methodology, stating results, and stating comments on results. A major difference from other previous studies is that biochemistry RAs focus more on the illustration and justification of the procedure and methodology applied. Although Kanoksilapatham did not specifically give an explanation of this phenomenon, it can be inferred that this is related to the nature of research in the discipline—researchers need to explain why they use the methodologies and why they carried out the experiment in the procedure they proposed. As for the sequence of moves in the Results section, according to Kanoksilapatham, there is no rigidly fixed pattern, allowing for various possible variations. However, she also pointed out that moves in this section show cyclic pattern "with Move 8 and Move 9, and Move 10 and Move 11" (p.283). In other words, as Moves 8 and 9 are about the statement and justification of the methodology and procedure, they occur in the cyclic pattern; similarly, Moves 10 and 11 are related to stating and commenting on results, thus these two moves are also presented cyclically. Moreover, she pointed out that "Move 10 is the core of a cycle and is repeated until the discussion of the data is exhausted" (p.283), indicating that statement of results is the most crucial move in this section.

Another line of research that did not adopt Brett's model tried to use a different scheme of analysis for the Results section. One of the examples would be Nwogu's (1997) study on the theoretical organization, namely moves, of thirty complete medical RAs. Nwogu's study identified two moves in the Results section: indicating

consistent observations (overall observation and all other significant observations that impinge on the objectives of the study) and indicating non-consistent observations (negative results not conforming to expected outcomes before conducting the study) with the former as an obligatory move across all RAs in his study. Though it seems that Nwogu had a completely different approach from other studies that followed Brett's (1994) model, the move of indicating consistent observations is actually similar to reporting results while one of the elements in this move—accounting for observation—corresponds to commenting on results in Brett's model. In addition, though Nwogu used the term "observation" instead of findings, results, or data used in other studies, this might be attributed to the nature of research, as medical reports usually aim at observing patients' conditions.

While most studies on the Results section of RAs investigated either only this individual section or the overall thematic structure of the whole RAs, there have been, however, only a limited number of studies that have related similar moves occurring across several sections. One of these exceptions is the study by Yang and Allison (2003), who compiled a corpus of 40 RAs of four journals in the discipline of applied linguistics. From the original corpus of 40 RAs, they selected 20 RAs and compiled a subcorpus to investigate the features of the Results section. They indicated that the Results section possesses three dominant moves: preparatory information (reminder and connector between sections and presentation of results), reporting results (present the results of the study), and commenting on results (establish the meaning and significance of the results); in addition, these moves were identified to occur in a cyclical pattern, showing similar findings to prior studies (Brett, 1994; Kanoksilapatham, 2005; Nwogu, 1997; Posteguillo, 1999).

After examining studies that have investigated the moves and move patterns of the Results section from different disciplines, we may conclude that the Results

section in any discipline tends to have the communicative categories of locating, presenting, and commenting on obtained results, and that these categories are presented in a cyclic pattern with variations due to disciplinary differences.

Besides analysis of the macrostructures of the Results section, some researchers have also examined the linguistic features of this section. Studies investigating the micro-level features have tried to identify verb tenses and voice (Brett, 1994; Nwogu, 1997), common lexical signals (Brett, 1994, Nwogu, 1997), and hedges (Hyland, 1996; Nwogu, 1997). Both Brett and Nwogu agreed that findings in this section are usually reported in the past tense; moreover, when referring to visuals, such as figures and tables, present simple and/or present passive voice are more frequently used. As for common lexical signals, Brett (1994) and Nwogu (1997) identified the common verbs or phrases to report research findings, such as *appear to, suggest, indicate, show, be shown*, and so on. Nevertheless, researchers also pointed out that hedging devices are often used to qualify the findings. However, as most of the studies examining linguistic features are limited to one single discipline, it is necessary to investigate if the linguistic realization of reporting research findings may be different in the Results section in hard and soft sciences.

**Discussion**

The Discussion section is usually presented as a mirrored image of the Introduction section; in other words, presenting the content in a manner from specific to general while referring back to the research context and research questions made in the Introduction section (Swales, 1990; Swales & Feak, 2004; Weissberg & Buker, 1990). Since it is a section after the Results section, it functions to discuss and elaborate on results, such as making generalizations and implications, comparing with other studies, and indicating significance and limitation.

One of the earliest studies on the Discussion section was the study conducted by Hopkins & Dudley-Evans (1988), who examined the features of this section in dissertations and published articles from biology. Their detailed move analysis of this section found eleven moves, including background information, statement of results (S.O.R.), (un)expected outcome, reference to previous research (for comparison), explanation of unsatisfactory result, exemplification, deduction, hypothesis, reference to previous studies (for support), recommendation, and justification. They found that Moves 2 to 10 (S.O.R. to recommendation) occurred in cyclic pattern in published articles. On the other hand, dissertation writers, who are graduate students, made use of Move 3((un)expected outcome), Move 4 (reference to research), and Move 5 (explanation of unsatisfactory result) if their results showed unsatisfactory or unexpected. If their results are satisfactory, they would move onto Moves 7 and 8 (deduction and hypothesis), and to support them with Moves 9 and 10 (reference to support and making recommendations). These moves and move patterns show the Discussion section is complicated in organization. Specifically, learners might encounter difficulties when writing this section as they may lack the idea of how results are presented differently in Results and Discussion sections. Similarly, Bitchener & Basturkmen (2006) pointed out that students have limited understanding of the functions of the two sections and that they are limited in proficiency to successfully draw interpretations and conclusions from the results obtained in their studies.

To get a more thorough understanding of the differences between Results and Discussion sections, researchers have tried to identify macrostructures of RAs of different disciplines to examine the variations. Among the studies, some investigated the rhetorical moves and common move patterns of the Discussion section (ElMalik & Nest, 2008; Kanoksilapatham, 2005; Nwogu, 1997), others explored the

organizational features of the Discussion section in various disciplines (Holmes, 1997), still others aimed to investigate RAs that do not contain a Discussion section, but a Conclusion section (Posteguillo, 1999). In addition, Yang & Allison (2003) compared moves occurring across several sections.

Nwogu's study (1997) included thirty medical journals and identified three moves for the Discussion section, including highlighting overall research outcome, explaining specific research outcomes, and stating research conclusions. Highlighting overall research outcome, according to Nwogu, "represents the first segment of information in the Discussion section [as] the main function of Move 9 is to confirm or refute the attainment of the main research objective." (p.132). This move, according to Nwogu, serves as a connecting unit that consists the main findings of the study. Nwogu further indicated that explaining specific research outcomes "is the most elaborate move in the Discussion section [as] it restates the main observations made in the study, indicates their significance, interprets and justifies them by reference to procedures adopted in the study." (p.132) He pointed out that information in this move often occurs in a cyclic pattern which can be illustrated as: stating outcome → interpreting outcome → indicating significance of outcome → contrast previous and present outcomes → indicating limitation of outcomes. By comparing the findings about this section with those for the Results section reviewed in the previous section, it can be observed that the Discussion section focuses more on the interpretation and evaluation of results while the Results section addresses what and how data are obtained, accompanied by explanation of the data. From the rhetorical moves identified in Nwogu's study, the different communicative purposes of Results and Discussion can be inferred.

Similarly, Kanoksilapatham (2005) examined 60 RAs of biochemistry journals and identified four moves for the Discussion section, inclusive of contextualizing the

study, consolidating results, stating limitations of the present study, and suggesting further research. By making a comparison between the moves identified by Nwogu (1997) and those by Kanoksilapatham (2005), it can be observed that Kanoksilapatham's move framework focuses more on the significance and limitations of the study that could become useful references for future studies while Nwogu's moves end with drawing conclusions and indicating limitations from findings of the present study, lacking the part of making suggestions for future research. Although there were variations in the studies reviewed, it could possibly be attributed to the fact that Nwogu included Conclusion in the Discussion section in his study, thus showing variations in findings. Therefore, when examining RAs that contain both Discussion and Conclusion sections, it would be worth considering if this type of Abstract would show a similar result as in Nwogu's study.

A later study by ElMalik & Nesi (2008) investigated 20 medical journal RAs and followed Nwogu's (1997) classification of moves. They identified variations in the obligation of moves between RAs written by British and those by Sudanese researchers. Although all RA writers included the information unit of highlighting main findings in ElMalik & Nesi's study, native British and Sudanese researchers showed a different percentage in stating research conclusions (100% and 70% for British and Sudanese researchers, respectively). They concluded that this might be related to the nature of the study as medical RAs focus on interpreting the significant findings or cultural differences between British and Sudanese writers. The three studies by Nwogu (1997), Kanoksilapatham (2005), and ElMalik & Nesi (2008) are closely related to one another as they applied similar frameworks to their analysis and identified the common obligatory moves to be included in this section, although ElMalik & Nesi further tested if writers from different cultural backgrounds showed variations in their writing. However, none of them have indicated whether the moves

are presented in a linear or cyclic pattern, as indicated by studies on the Results section.

As indicated by academic textbooks by Weissberg & Buker (1990) and Swales & Feak (2004), there are different uses of headings within RAs. According to them, some writers use Conclusion instead of Discussion in their RAs; in other words, these RAs have a Conclusion section but not a Discussion section. In contrast, some RAs have Discussion but not Conclusion. Still other RAs have both sections. In a study on computing RAs, Posteguillo (1999) identified eight moves in Conclusion: background information, statement of results, (un)expected outcome, reference to previous research, explanation, exemplification, deduction and hypothesis, and recommendation for further research. Posteguillo found that the move of "explanation" accompanies the move of "(un)expected results" while the former is a subsequent to the latter. What's more, he pointed out that the moves of "statement of results" and "deduction and hypothesis", and also "statement of results" and "recommendations for further research" occurred in cyclic patterns. In other words, computing RAs writers tend to either add a comment or make hypothesis or suggestions after each result is presented. This phenomenon in Conclusion is different from what has been identified in the Results section, as writers tend to make interpretation of the data instead of making suggestions or forming a hypothesis, as shown in the Conclusion section in Posteguillo's (1999) study. Therefore, it can be inferred that Results and Conclusion, though both involve the results of the study, should have different focuses in their communicative purposes.

As the headings used for Discussion and Conclusion seem to be confusing, some researchers tried to provide possible explanations. For example, Weissberg and Buker (1990) pointed out that the last major section of a report, usually titled Discussion, is a section in which writers "step back and take a broad look at findings and study as a

whole." (p.160) In other words, in this section, writers "examine their work in the larger context of their field" (p.160) in a specific-to-general manner. They also mentioned that "sometimes this section is called 'conclusions' instead of discussion" (p.160). Swales and Feak (2004) believed that the difference of headings "is partly conventional, depending on traditions in particular fields and journals," (p.268) thus treating them as one section that ends an RA. In the present study, Discussion and Conclusion are regarded as one section not only because they share similar rhetorical functions (Yang & Allison, 2003) but also because it is then possible to analyze RAs which have either one of the sections or both sections for the research purpose of this study.

In addition to Discussion and Conclusion sections, Yang and Allison (2003) found that in the field of applied linguistics, RAs often have a section or subsection dealing with pedagogic implications. They identified and compared the moves occurring in these sections following the Results sections of RAs, namely Discussion, Conclusion, and Pedagogic Implications, and discussed the differences and similarities among them in terms of moves and steps. The moves they identified are presented in Table 2.3.

Table 2.3. *Rhetorical moves in Discussion, Conclusion, and Pedagogic Implications* (based on Yang & Allison, 2003)

| **Discussion section** | **Conclusion section** | **Pedagogic implications** |
|---|---|---|
| Background information | | |
| Reporting results | | |
| Summarizing results | | |
| Commenting on results | | |
| Summarizing the study | Summarizing the study | Summarizing the study |
| | | Pedagogic issues |
| Evaluating the study | Evaluating the study | Evaluating the study |
| Deductions from research | Deductions from research | Deductions from research |

From Table 2.3, it can be observed that these three sections all could include the last three moves—summarizing, evaluating, and making deductions from the study. The difference lies in that Discussion may have moves of background information, reporting results, summarizing results, and commenting on results while Pedagogic Implications further addresses how the results can be put into practice in a classroom setting; that is, the move of pedagogic issues. This explains why these three sections can occur in various forms of combination in a single or more sections in RAs (Yang & Allison, 2004). On the other hand, the transition from a discussion of the more specific results to a summary of the whole study can be observed. Thus, there are differences in terms of focus in their discourse functions. If we combine all these sections into one with the heading of Discussion, all possible moves that may occur in it could be summarized as presented in Table 2.4.

Table 2.4. *A list of rhetorical moves in RA Discussion*. (modified from Yang & Allison, 2003)

| **Move** | **Function** |
|---|---|
| Background information | Providing a brief review of the investigation. |
| Reporting results | Reporting the findings of the study, with evidence -or support. |
| Summarizing results | Providing a short summary of the main findings of the study. |
| Commenting on results | Establishing meaning and significance of research results. |
| Summarizing the study | Providing a summary of what the study has done and found. |
| Pedagogic Issues | Indicating change and implications for classroom practice. |
| Evaluating the study | Indicating the significance and limitations of the study. |
| Making deductions | Making suggestions for what needs to be done in future work. |

Swales (1990) indicated in his book that the last three sections in the IMRC pattern (Results, Discussion, and Conclusion) differ in their communicative purposes. Similarly, Yang & Allison (2003) found that the "Discussion and Conclusion sections of applied linguistics RAs differ in terms of primary communicative purposes. The Discussion [focuses] on 'Commenting on results' by interpreting, accounting for,

evaluating or comparing with previous work. The main purpose of a Conclusion is to summarize the research by highlighting the findings, evaluating and pointing out possible lines of future research as well as suggesting implications for teaching and learning. Adjacent sections differ more in emphasis than in kind, so that Moves can also recur across sections" (p.380). In other words, these sections share common Moves, though they may differ in their respective communicative purposes.

Even though Yang and Allison's study (2003) provided useful insights into the move structures of Discussion, Conclusion, and Pedagogic Implications and found a number of moves that occur across these sections, there has been little research on how reporting research results is realized across Abstract, Results and Discussion, not just the sections discussed above. In addition, although Swales and Feak (2004) did mention the difference, they did not provide empirical evidence or data showing how the move is realized differently linguistically in different sections. Moreover, since reporting research results is closely related to how writers make knowledge claims, which is the most important communicative purpose of the genre of RAs, the need for a systematic analysis of the related moves in the sections of an RA where they occur as well as the linguistic realizations of these moves is perceived. Moreover, research on relating different sections of RAs can provide useful insights into the rationale of the information structure of RAs as a genre. Finally, pedagogic implications can be made to help learners become more aware of what aspects to emphasize and what requirements to fulfill when constructing their academic reports.

# CHAPTER THREE

# METHODOLOGY

To explore how reporting the results of research is realized in Abstract, Results, and Discussion sections of RAs, the present study integrated genre analysis with corpus-based text analysis. The former is used to examine the organizational structure of the three sections of RAs in order to identify the common moves and move structures used to present results, while the latter is aimed at investigating the linguistic features of these moves by compiling an RA corpus and using software for a more quantitative analysis of text. This chapter starts with a discussion of the corpus compilation and criteria for selecting RA samples, followed by an explanation of the coding scheme developed in the present study. After that, the process of move coding and tagging is presented. The next section then reports how linguistic realizations of the moves of reporting results are analyzed with the help of computer software. Finally, explication of the qualitative comparison of the discourse contexts where different moves can occur is presented.

## Data Collection

The data for the present study include text of three main sections of research articles, namely Abstract, Results, and Discussion, which includes the Discussion section and/or other sections following Discussion or ending an RA. Forty-eight research articles reporting empirical research are selected from four prestigious journals, two in applied linguistics (AL) and two in computer science (CS).

The journals in applied linguistics are *Applied Linguistics* (AL) and *TESOL Quarterly* (TQ), two SSCI journals that are well-established and exert great influence on both research and pedagogy in this field. Both are published on a quarterly basis.

To ensure unity of the RAs selected, the first empirical study in each issue of the two journals from 2005 to 2007 was selected. As some issues focus more on reviewing books or presenting special topics with no empirical studies included, the issues before 2005, in a reversed manner, were selected for replacement in order to have 12 articles from each journal. An example of this is the third issue of *TESOL Quarterly* in 2005, which mainly deals with research and teaching perspectives toward pronunciation and which does not include any empirical studies. As a result, the first empirical study in the fourth issue in 2004, the latest issue before 2005, was selected to make up for the 2005 issue that lacks empirical studies.

The field of computer science is developing rapidly as computer technology keeps improving. Many journals in this discipline, therefore, are published on a monthly or more frequent basis. To retain unity in terms of time of publication, two major computer science journals that are also published on a quarterly basis were used. The two journals in computer science are *ACM Transactions on Computer-Human Interaction* (CH) and *ACM Transactions on Information and System Security* (IS), the former emphasizing software, hardware and human interactions with computers, and the latter devoted exclusively to the study, analysis, and application of information and system security.

Sections for analysis were identified on the basis of the authors' uses of headings in the articles. There was no problem to identify Abstract; however, the Results and Discussion sections were sometimes troublesome. Some of them, according to Yang and Allison (2003), use conventional functional headings (e.g. *Results*), varied functional headings (e.g. *Findings* or *Results and Discussion*, corresponding to *Results*), and content headings that report the main findings but lack evident markers of results in the headings. The sections, in the present study, were first identified according to their functional headings; in other words, Abstract, Results, and

Discussion. As Yang and Allison (2003, 2004) pointed out, not necessarily all the RAs possess and/or end with a Discussion section, they may use varied functional headings such as *Conclusion, Discussion and Conclusion,* or *Pedagogical Implications*. As a result, the Discussion section and/or other sections that follow or end an RA were all included and treated as one Discussion section in the present study. Besides the combination of headings as proposed by Yang and Allison (2003), authors might use topic-related headings. Therefore, if the authors used topic-related headings within their RAs, the overall organization of the RA were carefully read and broadly examined before they are categorized into Results and Discussion sections.

As the main focus of the present study is to investigate how research findings are reported across the three sections of Abstract, Results, and Discussion, taking a corpus-based approach, these three sections were selected from the original electronic file (*.pdf) and converted into three text files (*.txt). Three corpora were then compiled: an Abstract corpus, a Results corpus, and a Discussion corpus, respectively, for further analysis. During the converting process, non-verbal data, such as tables, figures, pictures, charts, algorithms, or diagrams, were deleted as they could not be shown in pure text format; however, the titles and notes above or below the non-verbal data were retained so that in the phase of text analysis, where non-verbal data are located in the text could be identified. The treatment of data generally followed Sinclair's clean-text policy (1991), a process used to remove non-verbal graphics and other codes so as to keep the text unprocessed and clean of any other codes.

## Data Analysis: Move Analysis

The next phase is a genre analysis of the various sections in concern. A coding scheme (see Table 3.1) was developed based on previous studies on these sections

that are reviewed in the last chapter. However, some modifications were made. First of all, only moves, but not steps, were used in the coding scheme. Second, as the present study aims to investigate the presentation of results across RA sections, all the results-related moves across sections, as proposed by previous studies, are included; in other words, some moves may occur in one section but not in another. Such a coding scheme is thus more suitable for comparing the moves in the three sections so that common moves across sections and moves that are distinctive in only one of the three sections can be identified. The coding scheme was modified throughout the process of coding in hope of developing a more feasible system to reflect the information structure of presenting research findings in the three RA sections.

Table 3.1. *The coding scheme applied for the analysis of RAs*.

| | Abstract | Results | Discussion |
|---|---|---|---|
| **Summarizing Results**<br>Indicating the main findings in a general way. | AS | RS | DS |
| **Locating Data**<br>Indicating the position of the raw data. | AL | RL | DL |
| **Reporting Findings**<br>Reporting raw data (numbers, graphs, tables, or figures) | AR | RR | DR |
| **Interpreting Results and Findings**<br>Interpretation and/or suggestions of obtained data. | AI | RI | DI |
| **Providing Reasons/Explanations for Results**<br>Stating why the data show a certain trend or indicating the cause of results. | AP | RP | DP |
| **Evaluating Results**<br>Indicating the value of the findings (may also include the value of the study). | AE | RE | DE |
| **Comparing Results to Literature**<br>Relationship with studies carried out in the past. | AC | RC | DC |
| **Indicating Limitation/weaknesses**<br>Stating the limitations and shortcomings of the study. | AB | RB | DB |
| **Indicating Implications/Applications**<br>Pedagogical implications or possible applications derived from obtained results. | AA | RA | DA |
| **Need/Suggestions for Future Studies**<br>Stating possible suggestions for future studies. | AF | RF | DF |

As shown in Table 3.1, in total, ten possible moves can be used to represent different rhetorical functions of reporting results in the three sections. The code for a specific move was then tagged at the beginning of a part of text where a move starts. A move may consist of one or more than one sentence. However, as English is itself a language with sophisticated sentence structures, it is possible to include more than one rhetorical function in a sentence by using complex sentence structures. Some studies coded such a sentence with two moves (Samraj, 2002), while some other studies coded the sentence with the most salient purpose (Yang & Allison, 2003). In the present study, for sentences with more than one rhetorical function, it was coded for its most conspicuous purpose; in other words, only the main move is coded. An inter-rater, a graduate student who has received training in academic writing at both undergraduate and graduate levels participated in the analysis with an inter-rater reliability of 89.4%.

With the tagging of the move codes onto the text of the three corpora, we then retrieved and calculated the frequencies of the moves as well as the move patterns in the three sections. Therefore, it was possible to examine whether the three sections follow the same move patterns or possess any distinctive move patterns. In addition, by using "Word List" in AntConc, as shown in Figure 3.1, a natural language processing software, the obligatory and optional moves could be identified according to their frequencies and distributions in the three sections. AntConc is a free software that entails several data management functions that are helpful to text analysis. These functions include Concordance, Concordance Plot, File View, Clusters, N-Grams (part of Clusters), Collocates, Word List, and Keyword List.

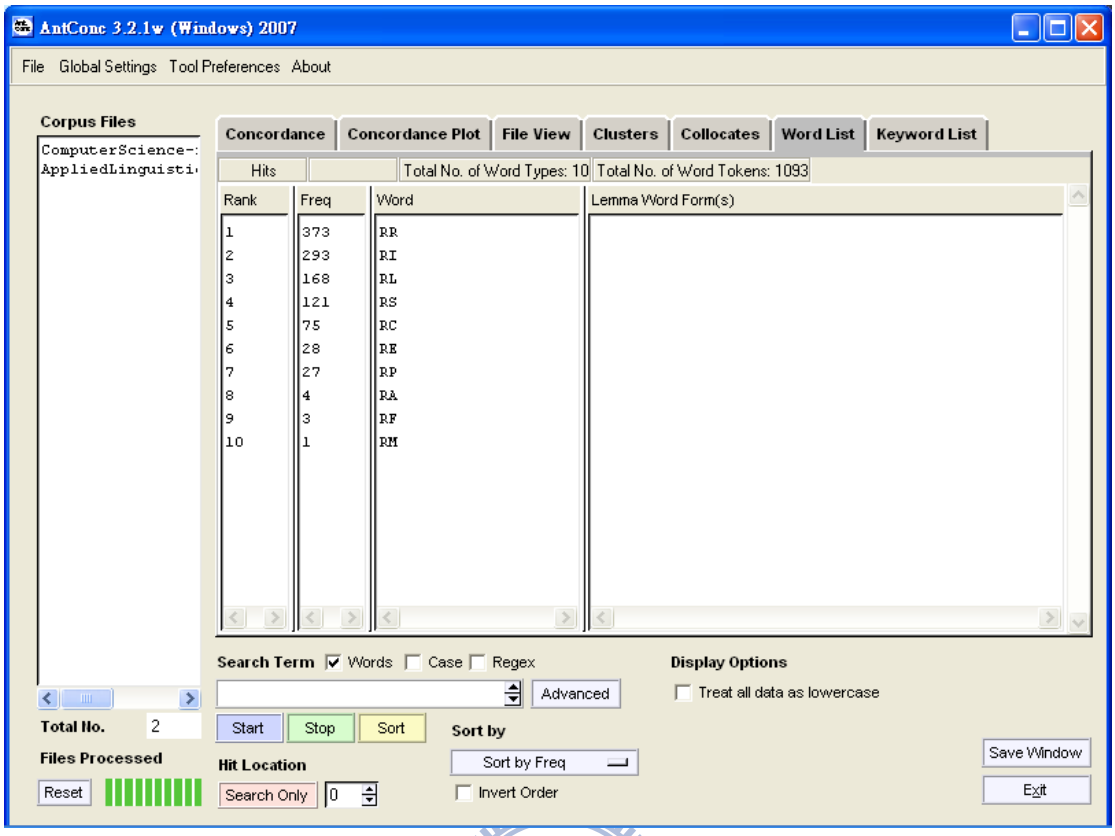



*Figure 3.1.* AntConc to obtain list of move frequency in the corpus.

To examine move patterns, the moves of each section were listed in a text file, which were examined using the function of "N-grams" under "Cluster" in AntConc to identify possible move patterns or move cycles in each separate section, as shown in Figure3.2.

## Data Analysis: Content Analysis

After examining texts from a more quantitative perspective, it is beneficial to investigate them qualitatively; in other words, to examine the contexts where moves of reporting research findings occur in the various sections of a single RA. For example, Swales and Feak (2004) indicated that reporting research findings is presented in different levels of generality across sections. For example, one excerpt taken from *TESOL Quarterly* could show this variation in levels of generality.

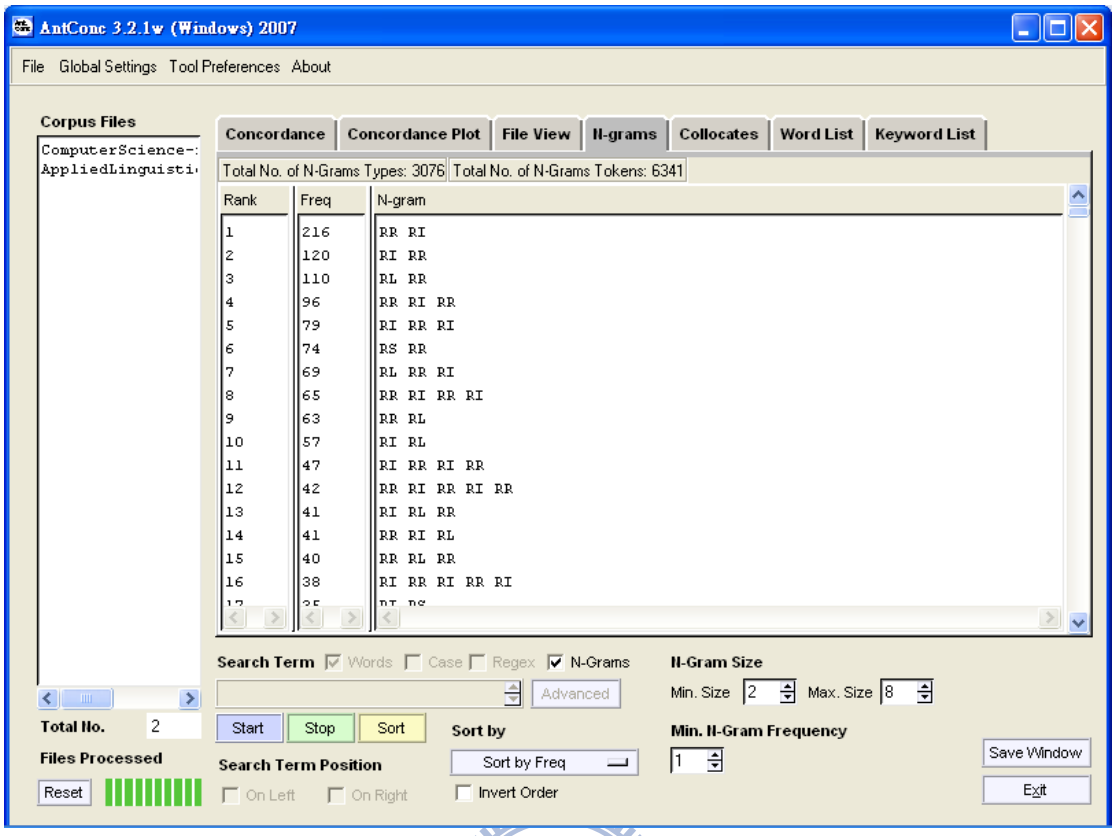



*Figure 3.2.* AntConc to obtain list of move patterns in the corpus.

//AR// Results indicated that when listening to speech with correct primary stress, **participants recalled significantly more content**. (TQ03, Abstract)

Subjects listening to Version A remembered a significantly greater number of ideas than subjects listening to Version B (p = .001) or to Version C (p = .02). //RR// **Subjects listening to Version A remembered significantly more main ideas than subjects listening to Version B (p = .001) or to Version C (p = .05)** (TQ03, Results)

//DR// The mean scores for each experimental group on the recall task …: **Group A scored higher than Group C, which in turn scored higher than Group B.** (TQ03, Discussion)

From the excerpt above, it can be seen that excerpts taken from one single study can show different levels of generality in the three sections. Research findings are stated in the most general way in Abstract as this section focuses only on the most vital information that attracts readers' attention. As for the Results section, the research data are presented in the most specific manner by providing statistical or

empirical evidence to describe and prove a certain phenomenon. The Discussion section draws conclusion from the data in a less specific yet not too general manner, namely between the former two sections mentioned before. Therefore, language use in reporting research findings across sections should reveal language use from specific (Results), to less specific (Discussion), and eventually to the general way (Abstract). From this qualitative perspective, sectional variations and disciplinary variations were both identified. Therefore, when examining the data in the present study, a similar coding process would be adapted to the excerpt quoted above.

**Data Analysis: Linguistic Realizations of Reporting Research Findings**

After the coding process, linguistic realizations, including high-frequency verbs, high-frequency modal verbs, lexical bundles, and use of voice, to report results were analyzed. Computer software AntConc was used to retrieve words or sentences with similar structures from the RA texts.

Data management, including frequency analysis, concordance, and move patterns, was carried out for the corpora of the three sections. For example, to get the high-frequency verbs used in these three sections; more specifically, what verbs and modal verbs are more frequently used to report research findings, "Word List" was used to identify the frequency list of words. However, as some word forms may exist as both verbs and nouns, the concordance lines under the function of "Concordance" were examined to ensure only the frequencies of verbs. In addition, "N-grams" was used to examine the high-frequency word chunks, or lexical bundles, used in reporting results, as shown in Figure 3.3. For a more detailed description of how these words or phrases are used in the discourse contexts of the corpora, "Concordance" provides the KWIC (key words in context) and shows the words and/or phrases occurring before

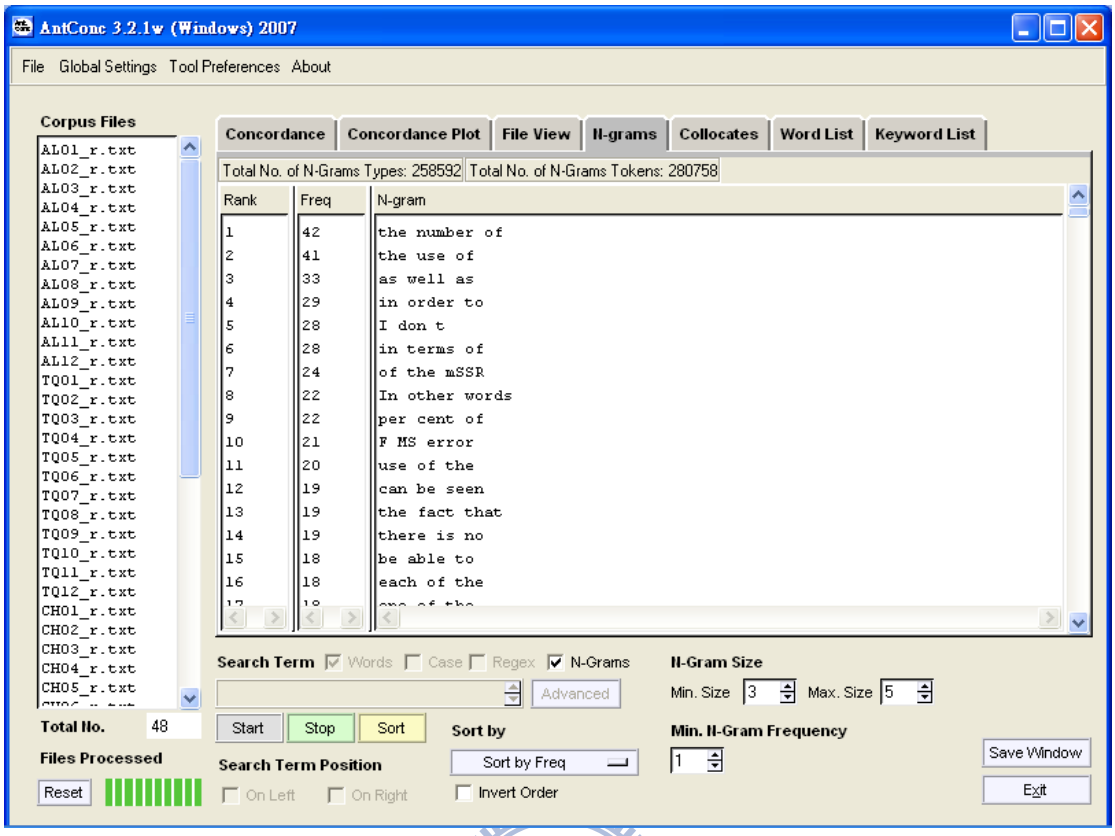



*Figure 3.3.* AntConc used to identify the lexical bundles in the corpus.

and after a specific word or word chunks. In this way, not only a list of the frequently used verbs and phrases to report results but also sentence structures and specific text contexts that accompany these words and phrases were obtained.

After the high-frequency words and lexical bundles were examined, the RA corpus was divided into three subcorpora of Abstract subcorpus, Results subcorpus, and Discussion subcorpus, which were respectively examined in terms of use of active versus passive voice in the main clauses by applying the NLP tool of Sentence Extractor provided on the website of Compleat Lexical Tutor (http://www.lextutor.ca/tools/ex_sentences/). The tool separated all the sentences so that individual sentences could be identified in terms of use of voice (See Figure 3.4). Examination of active and passive sentences was done by hand, and each sentence was coded with either active or passive according to the use of verb used in the main clause.

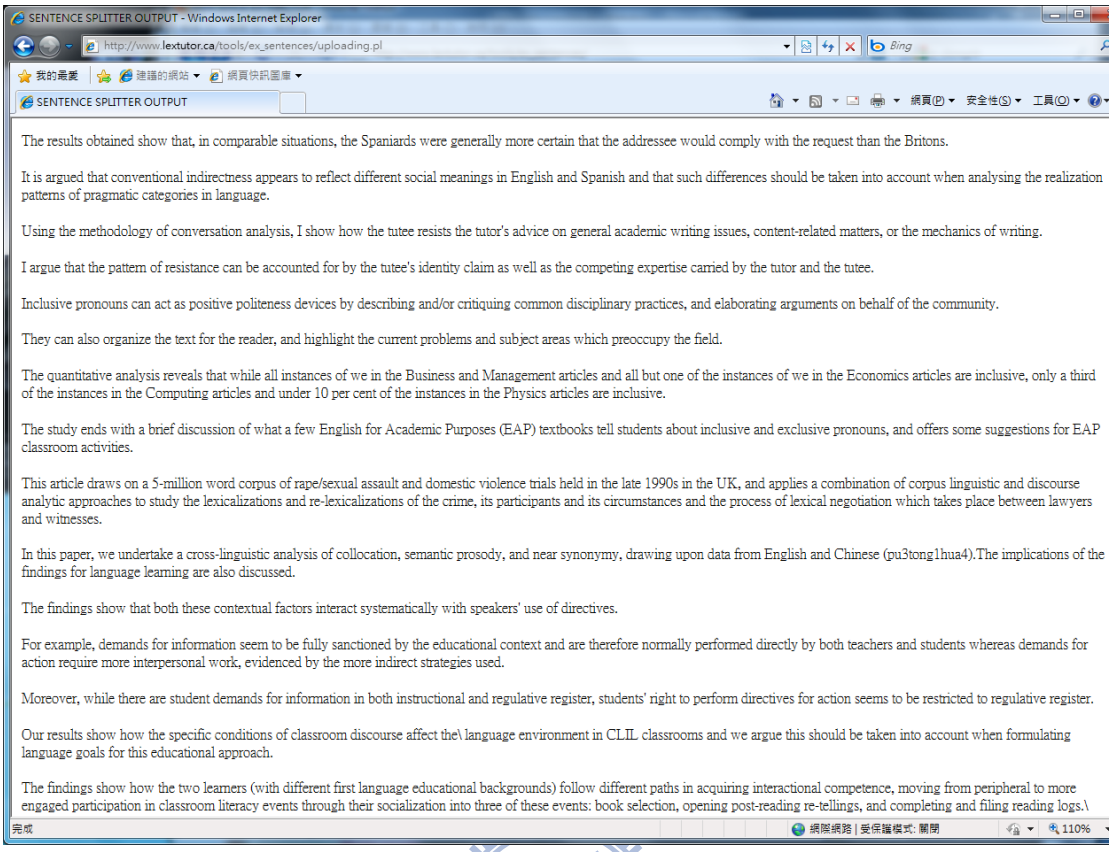



*Figure 3.4.* Sentences of Abstract extracted by Sentence Extractor.

## Data Analysis: Disciplinary Variations in Reporting Results

As the present study focuses on RAs from two disciplines, the final step was to compare the findings of both disciplines in hope of retrieving similarities as well as differences in terms of reporting research findings in the two disciplines of applied linguistics and computer science.

First of all, the RA corpus was divided into an AL subcorpus and a CS subcorpus, each consisting of 24 RAs. To examine disciplinary variation in reporting research findings, the frequency of moves, move patterns, and high-frequency verbs were analyzed following similar steps as mentioned earlier in this section. The results of analyses from the two subcorpora were then compared.

# CHAPTER FOUR

# RESULTS

In this chapter, the findings of the three research questions presented at the end of the first chapter are presented and discussed. The three research questions in the present study include:

1. How is reporting results, the most important communicative purpose of RAs, presented in moves across the sections of Abstract, Results, and Discussion?
2. How are the rhetorical moves of reporting results realized linguistically in these sections?
3. To what degree is reporting results presented and realized differently in RAs of hard sciences and soft sciences?

Therefore, to provide detailed illustrations and answers to the research questions, this chapter is presented in the following sequence. First of all, a move analysis, including occurrences and frequencies of moves as well as move patterns in the three sections are illustrated and discussed. After that, a content analysis, including the investigation of various moves to report research findings in single research articles are presented. After that, a section illustrating the linguistic features in terms of use of main verbs, modal verbs, lexical bundles, and use of voice are entailed to provide a more detailed examination of reporting research findings in RAs. Finally, this chapter ends with a section elaborating on the similarities as well as differences across RAs of the two disciplines.

## Move Analysis

To investigate how reporting results in the major sections of an RA is presented in moves, and whether and how these sections are different in presenting results, it is first necessary to identify and count the occurrences of the moves related to the presentation of results. Since Abstracts, as mentioned in previous chapters, provide an overview of the whole study, only the sentences related to and after presentation of results and findings are included in the Abstract corpus. The Results corpus in the present study entails all the illustrations of data but excludes tables, figures, as well as other non-verbal presentation of data. Finally, the Discussion corpus includes the Discussion and possible Conclusion sections that end an RA. Based on the modified coding scheme of moves, as shown and illustrated in the previous chapter, the results from a move analysis of the various sections in the 48 RA samples are shown in Table 4.1.

Table 4.1. *Frequency of moves in the 48 RAs in the present study.*

| | **Abstract** | | **Results** | | **Discussion** | |
|---|---|---|---|---|---|---|
| | **freq** | **%** | **freq** | **%** | **freq** | **%** |
| **(S)** summarizing results | 48 | 46 | 122 | 11 | 146 | 25 |
| **(L)** locating data | 0 | 0 | 168 | 15 | 5 | 1 |
| **(R)** reporting findings | 0 | 0 | 373 | 34 | 37 | 6 |
| **(I)** interpreting results/findings | 17 | 16 | 293 | 27 | 106 | 18 |
| **(P)** providing reasons/explanations | 0 | 0 | 27 | 2 | 25 | 4 |
| **(E)** evaluating results | 4 | 4 | 28 | 2 | 50 | 9 |
| **(C)** comparing results to literature | 3 | 3 | 75 | 6 | 101 | 17 |
| **(B)** indicating limitations/weaknesses | 0 | 0 | 0 | 0 | 19 | 3 |
| **(A)** indicating implication/application | 32 | 31 | 4 | 0.4 | 60 | 10 |
| **(F)** suggestions for future studies | 0 | 0 | 3 | 0.3 | 37 | 6 |
| **Total** | 104 | | 1,093 | | 586 | |

*Note.* freq = frequency of moves, %: percentage of moves within various sections

From Table 4.1, it can be observed that the three moves that occurred most frequently in the Abstract section were moves AS (summarizing results), AA (indicating implications and/or applications), and AI (interpreting results and findings), with the first move—AS as an obligatory move that occurs in all the 48 RAs after the range of occurrences is checked. In addition, it is also essential to note that in Abstract, the shortest and most concise section of an RA, writers tend to not only highlight the major findings of the whole study but also support them with possible interpretations and/or further indicate their implications or applications, as shown in the following examples:

> [4.1] //AS// In this paper, we undertake a cross-linguistic analysis of collocation, semantic prosody, and near synonymy, drawing upon data from English and Chinese (pu3tong1hua4). //AA// The implications of the findings for language learning are also discussed. (AL05, Abstract)
> [4.2] //AS// This alternative web implies the use of a simplified web browser and an adequate web design. //AI// Discussion of the need to have several levels of cognitive accessibility, equivalent (although not identical) content for this collective and the need for testable protocols of accessibility that support these people's needs is also included. //AA// This article finishes with conclusions about the potential impact of accessible pages in the daily life of people suffering from cognitive deficits, outlining the features to be considered within a user profile specification that support cognitive difficulties and with reflections about the suitability of SemanticWeb Technologies for future developments in this field. (CH11, Abstract)

Example 4.1 shows the organization of the paper provided by the writers and an illustration of what has been found and what will be discussed in the final section of the paper. Similarly, in example 4.2, authors provided an illustration of the main findings, followed by the layout of the RA so that potential readers can clearly know what are being discussed in the final Discussion section.

However, several moves in the coding scheme do not occur in the Abstract at all, including AL (locating data), AR (reporting findings), AB (indicating limitation/weaknesses), and AF (need/suggestions to future studies), which can be explained by the very nature of Abstract to concentrate only on the most crucial findings as a result of the limitation of space.

Analysis of the moves in the Results section shows that the three moves with the highest frequency in the Results corpus are RR (reporting findings), RI (interpreting results and findings), and RL (locating data), indicating that the results section, compared to Abstract section, focuses more on presenting as well as interpreting the data obtained from the study although the move of summarizing results (RS) also occur frequently. In addition, these four major moves of this section constitute nearly 90 percent (87%) of all the moves in this section. Moves that rarely occur, those with a frequency as low as 4 or lower, or even do not occur in the Results include RB (indicating limitations/weaknesses), RA (indicating implications/applications), and RF (need/suggestions for future studies). This finding can be related to the major communicative purposes of the Results section, that is, to present and interpret the results instead of indicating limitations or implications/applications of the study, or suggesting future research.

Taking a closer look at the moves in Results, the top high-frequency moves in this section follow a possible cyclic pattern of RR followed by RI, which is then followed by another cycle of RR and RI, suggesting that the data and/or findings of a study are usually presented in the form of a move pair—first presenting the data, and then interpreting the data. A second pair of finding together with its interpretation will follow the first pair. The cyclic patterns that occur frequently are either RL→RR→RI→RR→RI or RR→RI→RR→RI, as shown in the following example:

[4.3] //**RL**// Table 7 displays the descriptive statistics for the language analysis test. //**RR**// The direct meta group had the highest mean score and the control group the lowest. //**RI**// However, a one-way ANOVA revealed that these differences were not significant, $F(2, 88) = 1.09$, ns. The results of the repeated measures ANCOVA showed that there was a significant effect for aptitude as the covariate, $F(2, 88) = 4.95$, $p < 0.05$ … //**RR**// However, the ANCOVA also showed that there was still a significant effect for CF after controlling for the effect of aptitude, $F(2, 88) = 2.45$, $p < 0.001$. //**RI**// That is, the learners' test performance changed over time after removing the effect of their language analysis ability. (TQ10, Results)

Example 4.3 illustrates the move pattern of RL→RR→RI→RR→RI, an example illustrating the move sequence of directly interpreting data before presenting a new set of data. In this way, readers may understand writers' interpretation as well as explanation of data before a new set of information is presented and discussed. A common 3-move pattern observed in the Results section is RS→RR→RI, which demonstrates that RA writers tend to provide an overview of the main, or general, findings before going into the specific presentation and interpretation of data, thus showing a cyclic pattern of RS→RR→RI→RS→RR→RI, as shown in the following example:

[4.4] //**RS**// To address this question, two separate sets of analyses were conducted for each dependent measure: proportion of correct recall, and proportion of correct and modified recall … //**RR**// This pattern on the first dependent measure (the mean proportion of correct recalls) approached but did not reach significance at $p < .05$ for several tests according to recast type, with the test for correct recall of all recasts and the test for correct recall of short recasts showing differences due to literacy level that fall between $p = 0.05$ and $p = 0.10$. //**RI**// However, the impact of literacy level on the second dependent measure (the mean proportion of correct and modified recall) produced much lower p values, two of which reached significance at the $p < .05$ level … //**RS**// To address this question, two new dependent measures were calculated by subtracting the proportion of recall (correct, or correct and modified) for short recasts from the proportion of recall for long recasts. The average difference in

proportion of correct recall was – 0.037 (SD = 0.21). //**RR**// An exact permutation test (Good, 2001) was conducted by computing the mean difference score for all 256 possible assignments of negative and positive signs to the absolute values of the difference scores. //**RI**// The resulting one-tailed p value ($p = 0.344$) suggests there is no statistical evidence that, for the group as a whole, the participants' proportion of correct recall was dependent on the length of the recast. (TQ09, Abstract)

[4.5] //**RS**// The completion-time results are summarized in Figure 8 for trials ending in successful completion. //**RR**// An analysis of variance revealed that the number of objects in each set (n) contributed significantly to task completion time ($F(5, 56) = 72.41$; $p < 0.001$). Most relevant to our model however, was an interaction between the number of objects and the navigation mechanism (n × m) that also contributed significantly to task completion time ($F(5, 56) = 12.16$; $p < 0.001$). //**RI**// As predicted by the model, there was a crossover in efficiency between the two navigation methods between 3 and 4 items per set. //**RS**// This was substantiated by individual analyses of variance for each level of n as summarized in Table I. //**RR**// There was a small but significant interaction between blocking of verbal working memory and the navigation mechanism ($F(1, 26) = 10.91$; $p < 0.01$) … //**RI**// This interaction suggests that verbal working memory is used as an additional resource in the zoom condition, but not in the multi-window condition. (CH06, Results)

Example 4.4 and 4.5 show a three-move patterns in which writers first provide an overview of the data to be presented, followed by specific and factual data, which is eventually succeeded by interpretation of writers. Therefore, it could be concluded that the four most common moves in the Results section not only occur frequently but are also presented in a cyclic pattern that are presented similarly in various disciplines. In contrast to Abstract, no cyclic patterns of moves were observed in the Abstract corpus.

In the Discussion section of RAs, as shown in Table 4.1, it can be observed that the major moves of this section are still DS (summarizing results) and DI (interpreting results/findings). However, the frequencies of four other moves, DE (evaluating results), DC (comparing results to literature), DA (indicating implications/

applications), and DF (need/suggestions for future studies) are also high, especially when compared to their frequencies the previous two sections discussed above. This suggests that in the Discussion section, writers, after summarizing and interpreting the results of their study, often want to go further, evaluating their findings in a larger research context. Therefore, to evaluate the results, compare them with what has been found in other studies, indicate their implications and applications, or show possible future research would become possible moves in this section. On a brief look, it can be observed that the Discussion section is more similar to the Abstract section as the former not only provides an overview of the main findings but draws possible implications and/or applications from the retrieved data. However, as the Abstract is much shorter in length, only the most crucial aspects could be presented, while in the Discussion section, authors have more flexibility in presenting the values as well as the contributions of their studies.

When taking a closer look at the move patterns in the Discussion section, it can be observed that common move patterns in this section include DS→DI→DS→DI and DS→DC→DS→DC, with the former similar to the most common move pattern in the Abstract section and the latter similar to the patterns found in the Results section, as shown in the following examples:

> [4.6] **//DS//** In Experiment 1, participants were presented with sentences of the kind often used in previous research on implicit causality, for example 'John defied Ted.' Only the verb is informative in these sentences … **//DI//** Specifically, readers consistently preferred adjectives matching the verb in evaluative valence to describe stimuli or agents, and adjectives that were less positive or less negative to describe experiencers or patients in the same sentences … **//DS//** In the second experiment, participants chose verbs given information about nouns in the sentences … **//DI//** Evidently, the use of these adjectives led most participants to choose experiencer verbs rather than action verbs for most sentences. (AL10, Discussion)

[4.7] **//DS//** Aggregating the results across all scenes tested, we found that awareness cues were first identifiable between blur levels 3 and 5 … **//DC//** The levels we found for providing awareness are somewhat more filtered (2 to 3 levels) than those found by Boyle et al. [2000]; thus, in our study, participants were able to garner awareness cues from blurrier scenes. We believe this difference is a result of using videos of a greater fidelity than Boyle et al. [2000]. **//DS//** Blur levels 1 and 2 are the only levels that adequately preserve privacy for all scenes … **//DC//** This is consistent with the Boyle et al. [2000] result, which found overlap for what we consider here to be mundane scenes. (CH05, Discussion)

In examples 4.6 and 4.7, writers first provide an overview of what has been found in the study before interpreting or comparing to previous studies to indicate the values as well as significance of their studies. It, therefore, seems plausible to assert that the rhetorical purpose of the Discussion is, in nature, between the Abstract and Results as it not only provides an overview of what has been found but also provides authors' interpretation as well as evaluation of the obtained data.

After investigating the occurrences of moves in the three sections, Table 4.1 further illustrates the frequencies as well as percentage of moves in the whole RA corpus. It can be observed that the three most frequently-used moves constitute more than half (64%) of the moves in the three sections. In other words, the moves of -S (summarizing results), -R (reporting findings), and -I (interpreting results and findings) are not only the most dominant moves in reporting results across the three sections of Abstract, Results, and Discussion, but they are usually presented in a cyclic pattern in the latter two sections with high number of occurrence. The move analysis in this section indicates the use of moves in reporting results, and in the next section, Content Analysis, features of reporting research findings in the same research article, is carried out to provide a more detailed interpretation to realize the features of reporting results in RAs.

## Content Analysis

Although move analysis in the previous section reveals how Abstract, Results, and Discussion differ from one another in terms of moves related to reporting results, it is limited in providing detailed comparison across the three sections within a single article. Therefore, content analysis of the three sections in a single RA was further conducted to showcase how research findings are presented differently in the three sections in terms of level of generality and language use. To accomplish this goal, each RA in the present study was carefully examined to retrieve sentences in each of the three sections that report similar research results. In the following, examples in both RAs from applied linguistics and computer science are given for demonstration and interpretation.

### Levels of Generality

It has been pointed out that various sections in an RA present information in different manners as these sections not only differ in length but also in their communicative purposes. As RA writers only present the most crucial findings in Abstract, data is presented in the most concise and general manner due to the limitation of text length. The Results section, which aims to present as well as interpret specific findings, would include the most specific illustration of data. And finally, in the Discussion section, RA writers not only give an overview of what they have found in the study but also provide possible implications as well as applications and suggestions for future studies. Therefore, the level of generality in this section is between the prior two sections. The following example from a single RA in the field of applied linguistics illustrates this variation in generality:

[4.8.1] //AS// Results indicated that when listening to speech with correct primary stress, the participants recalled significantly more content. (TQ03, Abstract)

[4.8.2] //RR// Subjects listening to Version A remembered a significantly greater number of ideas than subjects listening to Version B (p = .001) or to Version C (p = .02). Subjects listening to Version A remembered significantly more main ideas than subjects listening to Version B (p = .001) or to Version C (p = .05) …Results (see Table 5) indicated a significant overall effect for condition (version of the text) [F(2, 87) = 2.442, p = .001]. (TQ03, Results)

[4.8.3] //DS// The mean scores for each experimental group on the recall task … : Group A scored higher than Group C, which in turn scored higher than Group B … //DI// The differences among the three groups of subjects were statistically significant for the recall (comprehension) data and nearly all of the ICES items … //DA// The results of this study complement current literature advocating the inclusion of primary stress in an ESL pronunciation curriculum … For example, students could practice identifying the primary stress in recordings of spoken discourse. Comparing speech samples with correct, misplaced, and missing primary stress may also help learners perceive primary stress and its meaning. (TQ03, Discussion)

From the example above, it can be observed that when reporting the research finding about listening to speech with correct primary stress, the writers use the most general expression “recalled significantly more content” in example 4.8.1 in Abstract without providing any specific data to support or any justification or interpretation. In contrast, in Discussion, for the corresponding finding, the writers discuss the scores of different experimental groups for the purpose of discussing how the findings of the study could be applied in classroom settings in an ESL pronunciation curriculum—entailing a classroom activity that enables students identify and compare use of stress to perceive meanings, as shown in example 4.8.3. The same result in the Results section, presented in example 4.8.2, is again presented in a different manner. The Results section presents it in the most detailed manner: different versions of listening materials and statistical tests are given to show the performance of the

participants in the three versions. By doing this, readers of this research article are able to know the details of the experiment, that is, the research procedure from which the results are obtained and whether the results, in this case, various versions, are significant statistically. Thus, the illustration of the same finding in the Results section is more specific than in Abstract or Discussion. The various levels of generality, as demonstrated above, reflects the different communicative purposes of the three sections in the research article, with Abstract providing a summary of the findings, Results indicating specific data as well as statistical tests, and Discussion entailing the summary of findings and link to possible pedagogical implications.

While RAs from the field of applied linguistics show the feature of presenting findings with various levels of generality, the question of whether computer science RAs also demonstrate the same feature has been investigated. In the following, illustrations related to reporting findings within an RA in computer science are shown:

> [4.9.1] //AS// We show how a systematic comparison of expected, sensed, and desired movements, especially with regard to how they do not precisely overlap, can reveal potential problems with an interface and also inspire new features. (CH01, Abstract)
>
> [4.9.2] //RS// These are natural physical movements that cannot be sensed by the computer … //RI// The potential problem with such movements is that they may confuse readers. For example, an interface may appear to stop working as it moves out of sensing range. The user is performing natural movements but suddenly is getting no response. … //RA// However, we further suggest that movements are expected but not sensed can present designers with opportunities as well as problems. (CH01, Results)
>
> [4.9.3] //DS// We have introduced a new framework that encourages designers to tackle this problem head-on by analyzing and comparing expected, sensed, and desired movements. Our framework focuses on boundaries between these, drawing on analytic and inspirational approaches, and treating mismatches as opportunities as well as problems. //DA// We have applied our framework to three example interfaces … (CH01, Discussion)

The example demonstrated that authors tried to indicate how comparing expected, sensed, and desired movements can not only reveal problems but also inspire new features by giving a general statement to highlight the significance of the study in Abstract, as shown in example 4.9.1. Example 4.9.2, retrieved from the Results section, includes no precise data to support the findings, but entails descriptions of specific problems as well as possible benefits obtained from the study stated in a more specific way compared to the illustration made in Abstract. Finally, in the Discussion section of the same RA, as shown in example 4.9.3, the authors explained the focus of results and extended the findings to possible applications by summarizing what has been carried out in the study. In the above examples 4.8 and 4.9, it can be concluded that the level of generality in reporting results in the three sections in Computer Science RAs follows a similar pattern to that of applied linguistics RAs.

Therefore, in terms of level of generality, it seems in both fields there is a convention that Abstract has the highest level of generality, focusing on a summary of the major findings; Results provides the most specific and detailed research findings with support; and Discussion has a level of generality between the two, further interpreting findings, providing possible comparison to literature, implications or applications for classroom or practical use. In the following, language use in reporting research findings and interpreting findings in the three sections of a single RA are presented and compared.

**Language Use in Reporting Results**

Since the level of generality varies in reporting research findings across various RA sections, the focus has been shifted to how this feature is realized in language use. In the following example, again, reporting of similar research results are extracted from the three sections of a single RA:

[4.10.1] //AS// Although both groups showed significant change in oral English proficiency over pretest scores, an analysis of covariance … indicated the phonological awareness group showed greater change than did the story-reading group. (TQ02, Abstract)

[4.10.2] //RR// The mean correct responses for students in the phonological awareness group on the oral English proficiency pretest was 2.10 points higher than for those in the story-reading group (phonological awareness group: M = 24.68, SD = 14.22; story-reading group: M = 22.58, SD = 13.54) … //RS// Results indicated that the groups did not significantly differ on pretest scores … //RR// Results of a paired samples t-test indicated significant differences between pre- and posttest scores for both the phonological awareness group, $t(39) = 5.72$, $p < .01$, and the story-reading group, $t(39) = 3.31$, $p < .01$. //RI/ Therefore, both groups showed a significant increase in mean raw scores on oral English proficiency from pre- to posttest (//RL// see Figure 1) … //RR// The within-group pre- and posttest effect size for receptive English vocabulary for the phonological awareness group, .74, was larger than that of the story-reading group, .59. //RI// Therefore, although both treatment groups showed a significant increase in mean raw scores on the receptive English vocabulary measure, the phonological awareness group showed a greater effect size … //RS// Results showed significant group differences at posttest … //RR// The effect size was .58 for the phonological awareness intervention on oral English proficiency. //RC// Cohen 's U3 for this effect size indicated that approximately 68% of the students in the phonological awareness group scored above the mean of the story-reading group (Cohen, 1977). (TQ02, Results)

[4.10.3] //DS// Results indicated that children in the phonological awareness group showed greater gains in oral English proficiency scores than did the children in the story-reading group … Because the three indicators of change in phonological awareness (blending, segmenting, and elision residual scores) were intercorrelated, the contribution of each variable was considered independently of the others in three backward elimination regression analyses. //DR// Change in blending accounted for 12% of the variance in oral English proficiency residual change scores, segmenting accounted for 11%, and elision accounted for 8% … //DC// Despite variety in measures used and populations studied, the indications are that the results of this study were not consistent with the results of Service (1992) and Service and Kohonen (1995) … //DE// This study was conducted in the absence of sufficient longitudinal evidence of the relations between phonological awareness instruction and story-reading experiences on L2 development. //DA// This study bridges the gap between phonological awareness

> and SLA and lends support to the hypothesis that phonological awareness instruction is more effective than story reading in the development of oral English proficiency for young, native Spanish-speaking children who, as a group, are primarily LEP. //DE// Furthermore, this study supports the hypothesis that change in oral English proficiency can be attributed in part to change in phonological awareness. (TQ02, Discussion)

From example 4.10, it can be observed that the illustration of research findings in Abstract, shown in example 4.10.1, entails only the move of AS—summarizing results, in which writers indicate "both groups showed significant change in oral English proficiency over pretest scores" to show that the treatment in the study was effective. Moreover, writers also pointed out in example 4.10.1 that "analysis of covariance … indicated the phonological awareness group showed greater change than did the story-reading group" to pinpoint one group of participants performed better than the other group, without referring the tasks carried out in the study, nor indicating what types of changes were involved in the study.

Example 4.10.2 shows illustration of findings in the Results section of the same RA. In the Results section, writers directly started with the illustration indicating that participants of both groups did not show significant difference in terms of proficiency when carrying out the pretest. Afterwards, writers pointed out the significant increase of scores in the posttest by providing statistical data, "$t (39) = 5.72, p < .01$" for the phonological awareness group and "$t (39) = 3.31, p < .01$" for the story-reading group. Afterwards, writers used several move cycles of RR→RI to indicate the precise differences both groups of participants showed in the study. Therefore, it can be observed that language use of reporting research findings differ in Abstract and Results, the former including only one sentence illustrating the main findings and the latter entailing various move cycles to illustrate specific data and interpretation of data so that readers may get a clearer idea by observing from factual data.

Finally, example 4.10.3, sentences related to present research findings retrieved from Discussion section from the same RA, shows that writers started the Discussion section with an overview of the main findings, a statement serving a similar function to the overview provided in Abstract. After that, statistical data of the findings, less specific compared to the statements in Results, are provided and linked to the comparison of their study to what has been found in previous RAs examining similar features. After the comparison with the literature, writers pointed out the value and significance of the study, which is then eventually linked to possible pedagogical implications concluded from retrieved data and findings. To sum up, this RA shows the language use of reporting results across three sections of the same RA, indicating that illustration of reporting results entails only a brief description using a comparative structure, while the detailed findings, accompanied with statistical data and writers' interpretations are used in the Results section. The description of reporting results in Discussion section includes not only an overview of the findings, but also the transition of findings to evaluation of the significance of the study, comparison to the literature, and indication of pedagogical implications.

After examining language use of reporting results in an RA of applied linguistics, RAs of computer science were also investigated to examine language use of reporting results in RAs of computer science. An example of reporting results in three sections within one single computer science RA is presented in the following example:

> [4.11.1] //AS// In this paper, we propose an improved role administration model named ARBAC02 to overcome the weaknesses of ARBAC97. ARBAC02 introduces the concept of organization structure for defining user and permission pools independent of roles and role hierarchies, with a refined prerequisite condition specification. In addition, we present a bottom-up approach of permission-role administration in contrast to the top-down approach in ARBAC97. (IS06, Abstract)

[4.11.2] //RS// Figure 11 shows the components of ARBAC02 model, which is based on ARBAC97 model with two new components, named user pool (OS-U) and permission pool (OS-P). Both OS-U and OS-P have hierarchical structures … URA02 adopts the same notations of can-assign and can-revoke as URA97. The difference between URA97 and URA02 is that prerequisite roles in URA97 are replaced by a user organization structure (OS-U) … Following the enhanced prerequisite conditions, an example of can-assign in URA97 *can-assign* (*PSO1*, *E*1∩*QE*1, [*PE1*, *PE1*]) can be defined in URA02 as *can-assign* (*PSO*1, *@PJ*1∩*QE*1, [*PE1*, *PE*1]) … PRA02 follows the same notations of *can-assignp* and *can-revokep* as PRA97. Further, PRA02 uses permission pools, where the prerequisite roles are replaced by a permission organization structure … Table VIII shows the refined can-assign predicates in PRA02 using the *OS-P* shown in Figure 13 according to Table III. One of the weaknesses of PRA97 is the top-down approach for permission-role administration. PRAC02 adopts a bottom-up approach … //RS// As a summary, ARBAC02 overcomes the identified shortcomings of URA97 and PRA97. It supports flexible composition of user and permission pools … //RE// ARBAC02 is suitable for any areas requiring RBAC model. However, the concept of organization structured-based user pools and permission pools is not limited to RBAC systems. //RS// As shown in Figure 21, *OS-U* and *OS- P* can be supporting components in an organization and used with other access control models. (IS06, Results)

[4.11.3] //DS// In this paper, we described ARBAC02, an improved administrative RBAC model. Our motivation is based on shortcomings of ARBAC97 caused by unnecessary coupling between user/permission pools with roles and role hierarchies. To overcome the shortcomings, we introduce organization structure-based user and permission pools independent from the roles and role hierarchy in an organization. Figure 24 shows the main difference between ARBC97 and ARBAC02. In addition, we use a bottom-up inheritance for permission-role administration, instead of the top-down manner in ARBAC97. Independent user and permission pools give strong flexibility for URA and PRA administrations and overcome the identified weaknesses in RRA. //DA// At the same time, we illustrate the applications of *OS-U*/*OS- P* in other access control models, such as ACL and LBAC. //DE// This shows that *OS-U*/*OS- P* is a comprehensive solution of security administration for different access control models. (IS06, Discussion)

In example 4.11, writers tried to improve the weaknesses with an existing model, ARBAC97, with a new model called ARBAC02. In example 4.11.1, illustrations reporting research findings in Abstract indicated a comparison between the original and the proposed model, accompanied by different approaches utilized by both models. In other words, the writers in this RA point out means and approaches utilized to improve the existing prior model of ARBAC97.

Example 4.11.2 shows the illustration of statements included in the Results section of the same RA. Although this example does not include specific illustration of statistical data of both models, it can be observed that writers clearly pointed out the parts they have maintained from the old model in their study, such as "URA02 adopts the same notations of can-assign and can-revoke as URA97" and "PRA02 follows the same notations of *can-assignp* and *can-revokep* as PRA97." In addition, the writers also pinpointed the components and algorithms they modified and improved in their study, such as "One of the weaknesses of PRA97 is the top-down approach for permission-role administration. PRAC02 adopts a bottom-up approach" and "ARBAC02 overcomes the identified shortcomings of URA97 and PRA97. It supports flexible composition of user and permission pools." In short, in the Results section of the RA, writers specifically point out the modification carried out, accompanied by experiments conducted to examine the new model. Finally, example 4.11.3, collected from the Discussion section, shows writers first start this section with an overview of what has been done and carried out in the study, which is then eventually followed by possible applications as well as evaluations of the study.

To sum up, as observed from examples 4.10 and 4.11, use of language in reporting research findings in Abstract includes only short illustrations of the main findings obtained from the studies, while the Results section entails specific illustrations of factual as well as statistic data so that readers are well aware of the

findings. Finally, the same feature in Discussion is presented with an overview, followed by applications and evaluations toward the study.

In the first section of this chapter, move analysis was carried out to investigate the communicative purposes of various sections. In addition, move patterns carried out in the previous section indicated that the features of reporting research findings follow certain cyclic patterns in both Results and Discussion sections. In this section, content analysis was applied to investigate levels of generality as well as language use in reporting research findings to present how research findings are presented differently in the three sections, providing a more thorough illustration of realizing this feature. In the next section, analysis in terms of linguistic features of reporting research findings in RAs are carried out and presented.

**Linguistic Realizations of Reporting Research Findings**

In the previous two sections, results obtained from move analysis and content analysis reveal how various result-reporting moves as well as move patterns occur in Abstract, Results, and Discussions of RAs, with the former mainly from a quantitative point of view and the latter from a qualitative view. In the following section, I move to the linguistic realizations of these rhetorical moves related to reporting results. To investigate the linguistic features of the moves in the three sections, respectively, the RA corpus is further divided into three subcorpora, including the Abstract corpus, the Results corpus, and the Discussion corpus, for various analyses, using AntConc, a natural language processing software including data management functions for text analysis.. The linguistic features investigated include high-frequency verbs and modal verbs, lexical bundles, and use of voice.

**High-Frequency Verbs in Reporting Results**

To know what kinds of vocabulary, particularly verbs, are frequently used in reporting research findings, a frequency list was obtained based on a frequency analysis of each of the three corpora conducted on AntConc. The occurrences of main verbs were then examined to identify high-frequency main verbs. The number of occurrences of all derivational variations of a verb, including simple tense, present tense, progressive tense, perfect tense, and passive voice were counted and added together to obtain the frequency of the verb in terms of lexeme. The top 10 high-frequency verbs, as well as their normalized frequency (occurrences per 1,000 words), are listed in Table 4.2.

Table 4.2. *The top 10 high-frequency verbs.*

| Rank | Abstract | | | Results | | | Discussion | | |
|---|---|---|---|---|---|---|---|---|---|
| | verb | frequency* | normalized frequency** | verb | frequency* | normalized frequency** | verb | frequency* | normalized frequency** |
| 1 | show | 25 | 5.8 | use | 450 | 3.8 | use | 261 | 4.1 |
| 2 | suggest | 13 | 3.0 | do | 439 | 3.7 | have | 174 | 2.7 |
| 3 | use | 13 | 3.0 | have | 395 | 3.7 | make | 115 | 1.8 |
| 4 | provide | 7 | 1.6 | show | 324 | 3.4 | provide | 113 | 1.8 |
| 5 | support | 7 | 1.6 | see | 267 | 2.8 | show | 110 | 1.7 |
| 6 | have | 6 | 1.4 | expect | 254 | 2.3 | suggest | 106 | 1.7 |
| 7 | perform | 6 | 1.4 | mean | 241 | 2.2 | see | 92 | 1.4 |
| 8 | present | 6 | 1.4 | make | 219 | 1.9 | find | 89 | 1.4 |
| 9 | describe | 4 | 0.9 | find | 178 | 1.5 | need | 79 | 1.2 |
| 10 | find | 4 | 0.9 | report | 88 | 0.7 | support | 79 | 1.2 |

*The number in this column shows the raw frequency of the verb in individual section corpora.

**The number in this column shows normalized frequency; in other words, occurrences of the verb per 100 words.

As shown in Table 4.2, the verb “use” is the most frequently used verb to present research findings in Results and Discussion, and ranks third in Abstract. *Use* is a very popular verb, probably because it can be used to refer to the methodology, materials,

or process as well as procedures adopted by which a certain result is obtained. On the other hand, as the concordance lines of *use* were further examined, it was found that some occurrences of *use* actually refer to what the subjects *use* in a specific step in the research process, rather than what the researchers *use* in the study, as shown in the following examples:

> [4.12] //AS// Analysis reveals that (a) overall, the rate of success was low even when learners **used** the strategies and knowledge sources they had at their disposal. (TQ01, Abstract)
> [4.13] //RR// Of all the knowledge sources, students **used** world knowledge most frequently (46.2%), followed by morphological knowledge (26.9%). (TQ01, Results)

In examples 4.12 and 4.13, the verb *used* illustrates the tasks and strategies applied by the participants. The verb *use* was also found to occur commonly in illustrating statistical tools as well as procedures applied to analyzing their data, as shown in the following examples:

> [4.14] We **used** two dependent variables. (CH03, Results)
> [4.15] //AS// **Using** different methodologies and with varying sizes of word samples, it is shown that judgements by professional linguists do not correlate highly with corpus-based frequency counts. (AL11, Abstract)

In addition, the verb *use* was also found to be commonly used in an explanation or interpretation in Discussion to refer to what has been adopted in the study, as shown in the following examples:

> [4.16] We **use** the term identities to refer to the complex intersection of multileveled and shifting affiliations that are in play in the classroom (Foucault, 1998; Hall, 1997). (TQ11, Discussion)
> [4.17] In addition, we **use** a bottom-up inheritance for permission-role administration, instead of the top-down manner in ARBAC97. (IS06, Discussion)

Another verb that is frequently used in the three RA sections is the verb *show*, a popular verb that can be used to indicate summarized findings in these sections:

[4.18] //AS// The results obtained **show** that, in comparable situations, the Spaniards were generally more certain that the addressee would comply with the request than the Britons. (AL01, Abstract)
[4.19] //RS// Our data **show** clearly that teacher directives in instructional register are more common in those classrooms that have more teacher-fronted activities in which the flow of interaction typically goes from the teacher to the whole class. (AL06, Results)
[4.20] //DS// As a rule, our data **show** that teachers as well as students have a right to be quite direct when performing requests for information. (AL06, Discussion)

Examples 4.18 to 4.20 show that the verb *show* can be used to illustrate main findings obtained in a study, Moreover, it was found that *show* can be used to refer to what is presented or revealed in graphic data in the Results section, as shown below:

[4.21] //RL// Tables 3 and 4 **show** these frequencies by both MI and t-scores. (AL04, Results)
[4.22] //RL// Figures 3 through 7 **show** more detailed views of the same data in graphical form. (CH09, Results)

Therefore, it can be concluded that the verb *show* is mainly used to illustrate general findings in all the three RA sections while it can also refer to specific graphic data included in tables or figures. In addition to *use* and *show*, *have* used as a main verb, is one of the high-frequency verbs that occur in all three sections. *Have* can be used to illustrate possession as well as effects:

[4.23] //AS// The results **showed** that written CF targeting a single linguistic feature improved learners' accuracy, especially when metalinguistic feedback was provided and the learners had high language analytic ability. (TQ10, Abstract)

[4.24] //RS// As we have seen, in this setting the information users and librarians **have** few points of contact. (CH02, Results)
[4.25] //DS// The findings indicate that the two CF types **had** differential effects: direct correction with metalinguistic comments was superior to direct correction without metalinguistic comments. (TQ10, Discussion)

As can be seen from the three examples above, in the first two examples, *have* is used to illustrate what the subjects in the study possess or own; only in Example 4.25 does *have* refer to a result.

Still another verb commonly used in all three RA sections is the verb *find*, a verb used to indicate the main findings of a study, which is frequently used to serve the communicative purpose of summarizing results in RA sections, as shown in the following examples:

[4.26] //AS// In the course of this analysis, we **found** some ambiguities and minor problems, such as limitations in identity protection, but we mostly obtain positive results about JFK. (IS11, Abstract)
[4.27] //RS// With this wider exploration, I **found** that "eruption(s)", either in hard news or academic texts, is predominantly used to refer to volcanoes. (AL09, Results)
[4.28] //DS// This study **found** that multiple sentence-completion exercises produce better vocabulary retention than writing original sentences when time on task is controlled. (TQ07, Discussion)

The three examples above show clearly the findings of studies. In example 4.26, writers point out with a general illustration that "some ambiguities and minor problems" were found. Example 4.27 shows the result of a study which aims at examining the feature of the word "eruption." Finally, example 4.28 demonstrates not only a summary of the main findings, but also writers' evaluation of "multiple sentence-completion exercises." Moreover, the verb *find* can also be used to illustrate writers' comparison of results in their studies to those in literature, as shown below:

[4.29] //DC// This finding contrasts with Ellis et al. (2001a), who **found** that complex FFEs occurred very infrequently but were more likely to elicit successful uptake than simple FFEs. (TQ04, Discussion)

Other verbs among the top 10 high-frequency verbs, as observed from Table 4.2, can be separated into two categories: those occurring in two sections and those occurring in only one section. The first category includes suggest, provide, support, (in Abstract and Discussion) see and make (in Results and Discussion); the latter category includes perform, present, describe (in Abstract), do, expect, mean, report (in Results), and need (in Discussion).

Examining the concordance lines of suggest, provide, and support, the use of these verbs in Abstract and Discussion were found to be often related to writers' interpretation of results, comparison of results to literature, or implications of results, as shown in the following examples:

[4.30] //AI// The study **suggests** that integrative antiracism education can support immigrant language learners' intersectional and multilevel understandings of discrimination. (TQ08, Abstract)

[4.31] //AI// These findings **provide** insights into how using primary stress affects international TAs' intelligibility. (TQ03, Abstract)

[4.32] //DC// This view is **supported** by studies of oral CF. Carroll and Swain (1993) found that a group who received more explicit and informative CF (i.e., direct metalinguistic CF) outperformed groups who received other types of CF in a study investigating the acquisition of English dative verbs. (TQ10, Discussion)

The verbs occurring frequently in both Results and Discussion sections are *see* and *make*. *Make* is often used with nouns like assumption, generalization, evaluation, and so on to illustrate writers' interpretation or assessment of findings, as shown below:

[4.33] //RI// In sum, then, a generalization can be **made** that performing directives for information directly seems to be accepted linguistic behaviour by both teachers and students and well in accordance with the pragmatic principles of CLIL classrooms. (AL06, Results)
[4.34] Another assumption we **made** was that the center of the target was in the center of the distribution when calculating probabilities. (CH03, Discussion)

*See* in RAs is a special verb used to refer to graphics, other part of the RA, or other studies. As a result, it occurs frequently in Results and Discussion where graphics are used to present research results or where comparison with other studies are necessary. Following are examples showing these words in context:

[4.35] //RS// As can be **seen** from Table 6, speakers appeared to be more certain of request compliance when no softening devices were used. (AL01, Results)
[4.36] //DC// As can be **seen** in the evolution of cognitive modeling architectures such as ACT-R and EPIC [Kieras and Meyer 1997], there is considerable overlap in basic assumptions about the way that perceptual-motor constraints should be modeled [Byrne 2001; Kieras 2002], and so it is not unreasonable that the models produce similar predictions. (CH09, Discussion)

The remaining verbs among the top 10 high-frequency verbs can be divided into categories related to various communicative purposes. Those purposes include presenting an overview of main findings (*perform*, *do*, *describe* and *present*), interpreting data (*mean* and *report*), and those providing evaluation, implications, or suggestions for future studies (*expect* and *need*).

Before indicating the main findings of the study, writers often briefly describe what they have done. They can use verbs like *perform*, *do*, *describe*, and *present*, as shown in the following examples:

[4.37] //AS// We **present** our participatory design process, describe the user interface, and report on an exploratory field study in three households of an extended family. (CH07, Abstract)

[4.38] To determine whether change in oral English proficiency could be attributed to change in phonological awareness, multiple regression analyses were **performed** (see Table 2). (TQ02, Results)

To interpret or illustrate specific results, writers may rely on verbs like *mean* and *report*, as shown below:

[4.39] //RI// This **means** that PAY and at on one hand, and cost(s) and price(s) on the other hand, are equally likely to denote a neutral literal meaning or a negative metaphorical meaning. (AL05, Results)
[4.40] //RR// More lab groups (58%) **reported** that they did not meet beforehand to plan work for the remote/simulated lab, as compared to the hands-on lab (44%). (CH10, Results)

Finally, verbs like *expect* and *need*, the former aimed at providing evaluation of the study and the latter one at making suggestions for future studies, as shown in the examples below:

[4.41] //RE// We may **expect**, then, that such low imposition items can be directly performed. (AL06, Results)
[4.42] //DF// Whilst this gives somewhat more confidence in the applicability of these results, further studies would **need** to be conducted to see whether different judgement and word selection procedures, as well as different languages, would give different results. (AL11, Discussion)

In short, a brief analysis of the top 10 high-frequency verbs in the three sections suggests that these words are not discipline-specific verbs, but popular verbs with meanings very generally related to the presentation, interpretation, evaluation, and implication of research results. They are words closely linked to the main communicative purposes of each RA section.

In addition to verbs, throughout the process of examining the main verbs of the three subcorpora, it was found that modal verbs also play a significant role in

reporting and interpreting results. Therefore, the use of modal verbs in these three sections is further investigated in the next section.

**Use of Modal Verbs in Abstract, Results, and Discussion**

During the process of identifying the main verbs used in the three RA sections, it was found that some modal verbs also had relatively high frequencies, especially in the Discussion section. In addition, in the second section of this chapter, in which levels of generality as well as language use of reporting research findings were discussed, it was indicated that statements in the Results section are most specific as well as closely related to the data; on the contrary, statements in the Abstract section are presented in high level of generality as this section is limited in space and can only entail the most general and crucial findings of a study. Statements in the discussion section, however, would be presented in a generality level between the prior two. Therefore, the use of modal verbs in terms of reporting research findings was investigated to further understand the use of modal verbs in RAs across the three sections. In this section, use of modal verbs in the three subcorpora are presented and discussed.

To retrieve the modal verbs of the three subcorpora, a similar process to that of identifying the main verbs was carried out to explore the frequencies and occurrences of the modal verbs, and the frequencies of them are presented in Table 4.3.

From Table 4.3, it can be observed that on a whole, modal verbs have a much higher frequency of occurrence in Discussion than the other two sections, indicating that RA writers tend to show an attitude of tentativeness when reporting research findings. The frequent use of modal verbs “would” and “should,” which qualifies statements as reasonable interpretation or prediction, in all three sections also reveals that writers would further elaborate on results, such as making reasonable

Table 4.3. *Frequency of Modal Verbs in Each Section*

| Verbs | Abstract | | Results | | Discussion | |
|---|---|---|---|---|---|---|
| | frequency* | normalized frequency** | frequency* | normalized frequency** | frequency* | normalized frequency** |
| can | 18 | 4.19 | 293 | 0.25 | 245 | 3.82 |
| could | 0 | 0.00 | 141 | 0.12 | 112 | 1.75 |
| may | 2 | 0.47 | 165 | 0.14 | 235 | 3.67 |
| might | 1 | 0.23 | 101 | 0.09 | 52 | 0.81 |
| must | 0 | 0.00 | 31 | 0.03 | 33 | 0.51 |
| ought to | 0 | 0.00 | 1 | 0.00 | 1 | 0.02 |
| shall | 0 | 0.00 | 11 | 0.01 | 4 | 0.06 |
| should | 5 | 1.16 | 60 | 0.05 | 109 | 1.70 |
| will | 2 | 0.47 | 98 | 0.08 | 131 | 2.04 |
| would | 1 | 0.23 | 226 | 0.19 | 146 | 2.28 |

* The number in this column shows the raw frequency of the modal verb in individual section corpora.

** The number in this column shows normalized frequency; in other words, occurrences of the modal verb per 100 words.

interpretation and indicating values of results. In addition, the use of modal verbs seems to be associated with the rhetorical functions of the individual sections. In the following paragraphs, use of modal verbs across the three subcorpora are presented and discussed in further details.

From Table 4.3, it can be observed that the two modal verbs with the highest frequencies are *can* and *should*, the former related to express capability and possibility, and the latter indicating plausible likelihood of something, as shown in the following examples:

> [4.43] //AS// Inclusive pronouns **can** act as positive politeness devices by describing and/or critiquing common disciplinary practices, and elaborating arguments on behalf of the community. (AL03, Abstract)
> [4.44] //AA// We propose that this approach **can** help to build a bridge between the analytic and inspirational approaches to design and can help designers meet. (CH01, Abstract)

[4.45] //AA// In attempting to explain the acquisition of target vocabulary items during task-based CMC interaction, teachers **should** focus on the nuances of negotiated interaction as well as more subtle indications of acquisition rather than learner uptake per se. (TQ04, Abstract)

Example 4.43 indicates the possibility of how "inclusive pronouns can" be used to serve specific functions of "positive politeness devices." In addition, this sentence serves the communicative function of AS (summarizing results), and it can thus be claimed that the modal verb *can* may be used to describe capability in terms of reporting research findings. In addition, examples 4.44 and 4.45 show the communicative function of drawing applications and/or pedagogical implications with the use of *can* and *should* to indicate possibility. Therefore, the use of these two modal verbs can be attributed to the communicative purposes this RA section aims to present.

In addition, it should also be noted that, as observed from Table 4.3, there were some modal verbs that did not occur in all 48 RAs. Such modal verbs include *could*, *must*, *ought to*, and *shall*. The possible reason why these modal verbs did not occur in Abstract may be attributed to the communicative purpose of this section as Abstracts only include the main findings as well as drawing applications or making suggestions for future studies and is limited in space and length. And these modal verbs, with *could* expressing low rate of possibility, *must* indicating obligation, *ought to* referring to making suggestions, and *shall* referring to certainty will, may not match the rhetorical purpose of this section and are therefore not included.

The Results section, in which the main communicative purposes are reporting, locating, and interpreting findings, include high occurrence of modal verbs *can*, *would*, *may*, and *could*. As indicated before, the modal verb *can* may be utilized to indicate possibility as well as capability, which can be shown in the following examples:

[4.46] //RS// This relation is closed by application of evaluation contexts, which **can** represent active attackers. (IS11, Results)

[4.47] //RS// Many were transfixed and literally stopped all movement while watching. This **can** be more distracting than conducive to social interaction. (CH12, Results)

Examples 4.46 and 4.47 include the illustration and use of *can*, the former one used to present capability of referring to report of results by illustrating that the relation is being capable, or "can, represent active attackers." Example 4.47 illustrates writers' interpretation on findings by claiming that the observation "can be more distracting than conductive." Therefore, it can be observed from these two examples that the modal verb *can* is utilized for communicative purposes of both reporting and interpreting research findings, both of which are crucial moves in Results section.

The modal verb *could*, which can be used as the past tense of *can* or indication of a lower chance of possibility, is used as follows:

[4.48] //RS// The junior high school teacher stated that her learners ranged from those who **could** not read in English to those who were fluent. (TQ12, Results)

[4.49] //RI// Two million children **could** be dying of hunger in the Sudan, and that wouldn't cause a bump in consciousness. (AL05, Results)

Example 4.48 illustrates an ability learners in a junior high school did not possess when the study was conducted to provide an overview of the main findings before illustrating specific results, and example 4.49 indicates a possibility that the children in Sudan might be exposed to make an inference on the retrieved data.

Use of modal verbs *would*, which can be used to express possibility, intention, as well as illustration of opinions, can be listed in the following examples:

[4.50] //RI// Another said that he had failed the linguistics essay and that he **would** have done better if he had written it in isiXhosa. (TQ06, Results)

[4.51] //RI// We **would** also like to argue that as direct commands for action are common in pair and group work in particular, directness can also be viewed as strategic language use to emphasize students' equal relationship and thus as a solidarity marker. (AL06, Results)

[4.52] //RA// Thus, if proximity to cities matters for labor-market shocks, we **would** expect wages in Ciudad Juarez and Tijuana to converge more quickly to the U.S. border wage differential than wages in Matamoros and Nuevo Laredo. (AL03, Results)

Example 4.50 includes an illustration of indicating a possibility that a student might have delivered a better performance "if he had written it in isiXhosa," indicating writers' interpretation of a learner's response. Example 4.51 illustrates writers' intention to make an argument and interpretation "to emphasize students' equal relationship." Finally, example 4.52 shows writers' point of view to draw possible application of the findings "for labor-market shocks." And finally, the modal verb *may* was also frequently used in Results, as shown in the following examples:

[4.53] //RI// The presence of a range of English language proficiencies **may** be taken for granted in the classroom, but this topic does not receive a great deal of attention in methods textbooks. (TQ12, Results)

[4.54] //RR// As one teacher in this study noted, middle, junior high, and high school faculty **may** believe that only elementary school teachers actually teach reading, but this assumption is not the case with ELLs. (TQ12, Results)

From the two examples above, it can be inferred that the use of *may*, which can be used to illustrate possible conditions, may be used in communicative purposes of both reporting as well as interpreting data. To sum up, the modal verbs used in Results are also closely associated with the communicative purposes of this section, with emphasis put on providing possible interpretations on retrieved data. In the following paragraphs, the use of modal verbs in Discussion section is presented and discussed.

Table 4.3 shows that in this section, there are a couple of modal verbs that evidently occur more frequently than others, and these modal verbs include *can*, *may*, and *would*, all of which can be used to illustrate the main findings, as well as providing possible explanations on retrieved data, as shown in the following examples:

> [4.55] //DS// Finally, inclusive pronouns **can** also be used to flag up the current problems and subject areas which preoccupy the discipline. (AL03, Discussion)\
> [4.56] //DA// While such solutions may appear to take control away from the user, they **can** be augmented with other simple and lightweight privacy regulation techniques like adjustable physical controls so users can fine-tune a privacy/awareness balance. (CH05, Discussion)

While *can* is used to illustrate writers' interpretation of findings in example 4.55, writers used it to provide possible application to "fine-tune a privacy/awareness balance" in example 4.56. In addition, it was further found that the use of modal verb *may* was also frequently used in this section, as seen below:

> [4.57] //DA// For example, classroom teachers **may** wish to look to the nature and amount of negotiated interaction that transpires as a better predictor of which lexical items learners are likely to acquire. (TQ04, Discussion)
> [4.58] //DP// Several factors **may** have caused this delay in implementing new technology. (CH04, Discussion)

Examples 4.57 and 4.58 illustrate the possible applications that can be applied for pedagogical implications as well as practical applications to make inference from retrieved data. And finally, uses of *would* are presented below:

> [4.59] //DS// This approach **would** raise learners' awareness of how what I referred to earlier (see 4.2.7) as `phrases' like as we will/shall see or as we have seen can in fact be seen as prefabricated units of language. (AL03, Discussion)

[4.60] //DF// With such flexibility in representation, it **would** be possible to explore additional modeling issues, such as how novice users might traverse an unfamiliar menu hierarchy, which paths through the hierarchy are more likely to result in errors, and how renaming or recategorizing menu items could influence navigation performance more than just reordering. (CH09, Discussion)

From the examples found in the Discussion subcorpus, it can be found that the modal verbs used in this section resemble those used in Results, except that the Discussion section includes more various and frequent use of modal verbs due to the communicative purpose of this section as not only are summaries and interpretation on data are being made in this section, but suggestions and inference from retrieved data also play a significant role in this section.

To sum up, modal verbs in Abstract are closely related to providing summaries of the findings, sometimes accompanied by use of possible interpretation or applications inferred from data. On the other hand, modal verbs in Results are associated with the purposes of reporting, locating, and interpreting data, matching the communicative purposes of this section. And finally, modal verbs in Discussion section display a higher frequency and variation than those in the other two sections as this section not only emphasizes report and interpretation of data, but that making appropriate inference of data is also crucial. Therefore, abundant modal verbs were used to illustrate writers' tentativeness as well as inference of data.

In this section, both main verbs and modal verbs in terms of reporting research findings were examined and discussed, but it should be noted that some fixed combinations of word use, or lexical bundles, are frequently utilized to report research findings, which will be further investigated in the next section.

**Lexical Bundles in Reporting Research Findings**

Word combinations, or lexical bundles, are a set of words that are often used to serve certain rhetorical functions. In order to get a more complete picture of the lexical realizations of reporting research findings, lexical bundles in the three sections were explored. Text analysis software AntConc was used to investigate the features of lexical bundles in terms of reporting research findings. Specifically, the function of "N-Grams" under "Cluster" in AntConc was performed to retrieve all three-word, four-word, and five-word bundles in the present study.

Previous studies have been using various frequency cut-off to identify meaningful lexical bundles (Biber et. al., 2004; Cortes, 2004). For example, Biber and Barbieri (2007) used a frequency cut-off of 40 times per million words, which was relatively high in comparison with that in Biber and Cortes (1999) and Cortes (2004). In the present study, since the subcorpora of the individual sections are quite small, a strict standard comparable to that of Biber and Barbieri (2007) was utilized. Take the Discussion subcorpus as an example, the frequency of 3 for a corpus of 64,097 words was set. The cutting point of lexical bundles in the Abstract was also 3 although the Abstract corpus consists of only 4,297 words because only the sentences related to reporting research findings are included. The cutting point to for the Results section, which has 117,616 running words, was set at 5.

The identified meaningful bundles were further divided into three categories: general bundles that may not be limited to the use in RAs; academic bundles, which are RA-related word combinations; and discipline-specific bundles, which are bundles characteristic of the specific discipline of applied linguistics or computer science. In the following paragraphs, lexical bundles used in the three RA sections will be individually presented and discussed.

After the lexical bundles in Abstract were retrieved, they were categorized into the three categories of general bundles, RA-related bundles, and discipline-specific bundles, with the result presented in Table 4.4.

Table 4.4. *Lexical Bundles in Abstract.*

| | General bundles | RA-related bundles | Discipline-specific bundles |
|---|---|---|---|
| 3-word bundles | as well as (6)* | in this paper (4) | oral English proficiency (4) the dominant language (4) in oral English (3) |
| 4-word bundles | | | change in oral English (3) in oral English proficiency (3) |
| 5-word bundles | | | change in oral English proficiency (3) |

*The figure within parentheses is the frequency of the bundle.

In can be observed from Table 4.4 that the bundles retrieved from the Abstract subcorpus included bundles of all three types, with the expression *as well as* referring to a statement of presenting a supplement of a similar idea, as can be shown in the following examples:

> [4.61] //AI// Our discussion relates these results to existing theory of group behavior in public places and how these social space augmentations relate to awareness **as well as** the problem of shared interaction models. (CH12, Abstract)
> [4.62] //AA// This article discusses the pedagogical **as well as** theoretical implications of the findings for an integrated model of lexical inferencing. (TQ01, Abstract)

Example 4.61 shows that writers tried to indicate the importance of how "social space augmentations relate to awareness as well as the problems of shared interaction models" when it comes to group behavior in public places, indicating that both awareness and problems of shared interaction models are equally important. Being used in a various way, example 4.62 includes writers' outline and overview of the

organization of the paper, in which "the pedagogical as well as theoretical implications" will be discussed. Therefore, as the bundle *as well as* provides an additional information to another preexisting one, it can be applied for the communicative purposes of AI (interpreting data) or AA (drawing applications and/or implications) and not to AR (reporting data) as RA writers usually only highlight the main findings instead of comparing various findings they have found in their studies.

The only RA-related bundle retrieved in Abstract was *in this paper*, which shows a distinctive feature of referring to the study, as presented below:

> [4.63] **In this paper**, we undertake a cross-linguistic analysis of collocation, semantic prosody, and near synonymy, drawing upon data from English and Chinese (pu3tong1hua4). (AL05, Abstract)
> [4.64] **In this paper**, we propose an improved role administration model named ARBAC02 to overcome the weaknesses of ARBAC97. (IS06, Abstract)

From the two examples above, it can be noted that the expression of *in this paper* was used with two distinctive features—it is located at the beginning of a sentence, and it is followed by a summary of the main findings or an overview of what has been done in the study. This pattern seems characteristic of RA Abstract, indicating the purpose of the study and alerting the start of the result reporting.

The discipline-specific bundles retrieved in Abstract include the 5-word bundle *change in oral English proficiency* and 3-word bundle *the dominant language*, with the former entailing its 3-word and 4-word variations of *oral English proficiency*, *in oral English*, *change in oral English*, and *in oral English proficiency*. Though these are the only meaningful bundles retrieved in Abstract, it should be noted that they occurred in one single research article and is therefore hard to be classified as conventional in RAs of the discipline of applied linguistics. On the other hand, no meaningful discipline-specific bundles were found in computer science RA Abstract,

indicating that there may be no conventional use of discipline-specific bundles in computer science RAs. To sum up, as the Abstract subcorpus in the present study is relatively small, only very few bundles were identified in this section. In addition, no 4-word or 5-word general bundles or RA-related bundles were found, possibly because general bundles are usually shorter in length and are less likely to be used as a convention in RA Abstracts.

In a similar way, 3-word, 4-word, and 5-word bundles in the Results subcorpus were identified and categorized into three types of bundles, as listed in the following table:

Table 4.5. *Lexical Bundles in Results.*

| | General bundles | RA-related bundles | Discipline-specific bundles |
|---|---|---|---|
| 3-word bundles | article + N + of (180)<br>as well as (33)<br>in other words (22)<br>as a result (6)<br>can be used (6)<br>in addition to (6) | shown in + N (22)<br>in this section/paper (16)<br>of the table (10)<br>analysis of variance (10)<br>general academic writing (7)<br>post hoc analysis (6)<br>results show that (6)<br>during the study (5) | bank of English (8)<br>phonological awareness group (7) |
| 4-word bundles | on the other hand (14)<br>to be able to (10)<br>to be more critical (7)<br>a small number of (7)<br>it should be noted (6) | both groups of informants (9)<br>general academic writing<br>issues (6)<br>the degree of certainty (6) | the moderate literacy group (6)<br>the story reading group (6)<br>term of the mSSR (12) |
| 5-word bundles | | | erupted in the past tense (8)<br>the million word newspaper corpus (5) |

*The figure within parentheses is the frequency of the bundle.

In general, there are much more bundles in Results than in Abstract as the former subcorpus entails 117,616 running words whereas the latter only includes 4.297 running words as only the sentence related to reporting findings are included in the Abstract subcorpus. For bundles that are similar in word combinations, a macrostructure representing the words are used, such as *article + noun + of* in Table

4.5 is capable to represent *a number of*, *the number of*, *a variety of*, and many others, as can be shown in the following examples:

> [4.65] //RR// In the Austrian data, for example, **the number of** teacher directives during individual lessons ranges between 33 and 136 per lesson (Fin: 24/70), and in the Finnish data the number of student directives ranges between 3 and 90 (A: 2/32). (AL06, Results)
> [4.66] //RL// Figure 5 shows **the number of** infected nodes over time for various values of the score s, in log-log scales. (IS12, Results)

Both examples 4.65 and 4.66 indicate an illustration of the number of either "teacher directives" or "infected nodes," indicating that this bundle can be frequently used in terms of making illustrations for a group of data showing the same or similar features. As noted before, great emphasis is laid on reporting findings in this section; therefore, this structure is used with a high frequency—there are in total 180 occurrences of this pattern, which is a lot in such a small corpus of 117.616 running words.

Another lexical bundle—*as well as*—is also commonly used in the Results section, with a frequency of 33, similar to Abstract, as shown in the following examples:

> [4.67] //RR// It should be noted that one-way repeated measures ANOVAs with total scores showed that even the relatively moderate gains observed in the control group between Pretest and Posttest 1 **as well as** between Pretest and Posttest 2 were significant: F(1, 27) = 9.57, p = <.01, F(2, 27) = 4.93, p = < .05, respectively. (TQ10, Results)
> [4.68] //RI// This difference may be present due to the typically longer summer holiday, **as well as** the tradition of teenagers participating in some type of summer learning opportunity. (CH08, Results)

Examples 4.67 and 4.68 illustrate the use of the bundle *as well as*, especially when being used to report specific data or writers' interpretation of retrieved data to state an additional piece of information. It should be noted that the same bundle is used in a different manner—while the bundle is used to illustrate interpretation or applications made from data, the bundle represents writers' interpretation and reporting of specific research findings to enable readers comprehend the specific illustration and interpretation of data.

The general bundle *in other words*, which is used to express an idea in a different way, also has a high frequency (22), suggesting its function of providing an explanation or interpretation of results in the Results section, as shown in the following examples:

> [4.69] //RI// **In other words**, the students' total scores on the tests over time were mediated by their language aptitude, as measured by the language analysis test. (TQ10, Results)
> [4.70] //RR// More interestingly, the results also show that Z2 for situation is .105; **in other words**, the situation accounts for almost 11 per cent of the variation in certainty. (AL01, Results)

From examples 4.69 and 4.70, it can be concluded that the bundle "in other words" is frequently utilized to convey writers' interpretation of retrieved data. Other 3-word general bundles include *as a result*, which is closely associated with reporting results; *can be used*, which often refers to the means by which a result is obtained; and *in addition to*, which has a function similar to *as well as*.

With respect to 4-word bundles in this section, transition expressions such as *on the other hand* is used to present an opposing argument and *it should be noted* to emphasize an issue frequently demonstrating a transition from reporting research findings to writers' interpretation of the data, as shown in the following examples:

[4.71] //RS// The concept of static status refers to a particular assignment of roles to users, which, therefore, does not change at runtime; **on the other hand**, a dynamic status refers to the information concerning sessions, activations, and enabled roles, which may change because of different user behavior at runtime. (IS09, Results)

[4.72] //RS// **It should be noted** that for £c =90, if W and H are swapped then the approach angle is equal to that of £c =0, so it must be the movement angle causing the significant difference. (CH03, Results)

Example 4.71 illustrates two findings that are opposing each other—the concept of "static status" and that of a "dynamic status." The general bundle of *it should be noted* in example 4.72 is used to indicate writers' emphasis of interpretation of data. And finally, the bundle of *to be able to* is used to refer to illustrate capability, which can be used to describe ability of participants or the proposed model, or it could be used to illustrate writers' capability to make possible interpretation of retrieved findings, as shown in the following example:

[4.73] //RR// A third elementary teacher wanted her students **to be able to** make connections between vocabulary in English and vocabulary in their L1s. (TQ12, Results)

No significant 5-word general bundles were found in the Results section, possibly because general bundles are usually shorter in length.

If we take a closer look at the RA-related bundles, the main pattern if *shown in + noun*, including *shown in table* and *shown in figure*, which are characteristic of Results since writers need to refer to graphics and indicate what can be observed from the graphics. Other expressions relating text to data in graphics could also be made through the lexical bundle of *of the table*, as shown below:

[4.74] //RR// As **shown in Table** 6, Ana's texts exhibited a gradual increase in the range of positions of head nominals modified by RCs (types 6.1.5;V6.1.8), supporting H2b. (AL08, Results)

[4.75] //RS// There were large differences between the two interfaces in terms of the numbers of errors that occurred, as **shown in Figure** 10. (CH06, Results)

[4.76] //RR// The significance **of the table** is underlined by the fact that students who were receiving Grades E (40;49%) or F (33;39%) for English as an additional language were at the same time either studying through the medium of English at school or would have to do so at university. (TQ06, Results)

The three RA-related bundles above indicate the relationship of referring to or making interpretation of graphic data. In example 4.74, writers tried to indicate the "gradual increase in the range of positions of head nominals" performed in Ana's texts. Similarly, writers made an interpretation from a figure to indicate the "large differences between the two interfaces in terms of the numbers of errors that occurred" in example 4.75. Finally, example 4.76 includes an illustration in which writers tried to draw significance observed from the table for "students who were receiving Grades E or F." Therefore, it can be concluded that RA-related bundles in Results section match the communicative purpose of RL (locating data) whenever writers need to make interpretation of retrieved findings shown in graphic or statistical data.

It should be noted that the 3-word bundle *in this paper* also occurs frequently in Results; similar bundles like *in this section* or *during the study* are also reference bundles indicating to the part of text or the study in concern, as shown in the following examples:

[4.77] //RI// Along with the development of interactive practices in classroom literacy events highlighted **in this paper**, these findings show a remarkable increase in these learners' engagement with literacy outside the classroom and evidence of their emerging identities as individuals literate in English. (AL07, Results)

[4.78] //RS// **In this section**, we will examine a group of synonyms related to price and cost. In English, they include, for example at (the) price(s)/cost(s)/expense (of), at (a) price/cost, pay a price/cost, and pay the price/cost of. (AL05, Results)

[4.79] //RR// First, argument dependencies within the complements of auxiliary verbs (type 5 in Table 3) were used on day 1 and were produced frequently (105 times) **during the study**. (AL08, Results)

The three examples above indicate writers' intention to indicate the highlight of the main findings or making reference to a part of the study or RA section. Example 4.77 indicates writers' interpretation of the findings by indicating that "these findings show a remarkable increase." Example 4.78 illustrates all the major steps and findings writers would like to indicate in the specific text section. And finally, example 4.79 provides a detailed specific report on data of "argument dependencies within the complement of auxiliary verbs."

In addition to referring to the specific location of data, RA-related bundles in the Results section also include those that summarize the methodology or a particular step applied in the study, such as *during the process*, as well as statistical analysis, such as *analysis of variance* and *post hoc analysis*, as presented in the following examples:

[4.80] //RS// The **analysis of variance** shows a significant difference between the English and Spanish informants, as can be seen in Table 2. (AL01, Results)

[4.81] //RS// A **post hoc analysis** shows the next category: above Working collects No Shirt and Picking Nose into a low-moderate risk rating ($p < 0.01$). (CH05, Results)

In these two examples, writers clearly indicated the means of analysis applied to analyze data to pinpoint the methodology applied in the study. In addition, it can also be noted that an RA-related bundle, *results show that*, signaling the report of research findings, was found to enable RA writers present their research findings:

[4.82] //RS// The **results show that** for the multi-window condition, subjects over-visited the last comparison set; the average observed number of visits exceeded the model prediction in all cases. (CH06, Results)

Another 3-word RA-related bundle, *Bank of English*, and other 4-word RA-related bundles such as *both groups of informants*, *general academic writing issues*, and *the degree of certainty* were being used to illustrate main findings of a study, as shown below:

[4.83] By carrying out a corpus search using the COBUILD **Bank of English**, it is possible to get a sense of the semantic profile of the verb `lash out'. (AL04, Results)

[4.84] The difference in certainty levels between **both groups of informants** is significant at p 5 .01 despite Z2 for language being .013; that is to say, accounting for 1.3 per cent of the variance in expressed certainty. (AL01, Results)

[4.85] More specifically, she resists Liam's agenda of doing micro-editing by initiating a new topic to prioritize **general academic writing issues** such as clarity or relevance. (AL02, Results)

[4.86] For this purpose a general linear model (analysis of variance) was used to assess the relationship between **the degree of certainty** expressed in questionnaire I and the realization of requests. (AL01, Results)

Though the four bundles indicated above also matched the cutting point of 5 in the present study, it should be specifically noted that they were only being repeatedly used in single RAs instead of being able to be utilized as conventional uses in RAs that intend to make interpretation of *both groups of informants*.

With respect to discipline-specific bundles, even though some of them were also found in the Results subcorpus in the present study, most of them were repeatedly used only in one or two specific RAs, and can therefore not be categorized as being conventionally used in RAs.

To sum up, although many lexical bundles were found in the Results subcorpus, the one with the most running words of the three section subcorpora, general bundles were still restricted to a shorter length compared with RA-related and discipline-specific bundles. And despite longer RA-related and discipline-specific bundles were retrieved, most of them were used in few specific studies in which RA writers tend to repeatedly use the same expressions over and over again for reporting data or putting emphasis on the findings.

Finally, the lexical bundles in the Discussion subcorpus were collected and categorized in a similar way as in the previous two sections. The categorized results are shown in Table 4.6:

Table 4.6. *Lexical Bundles in Discussion.*

| | General bundles | RA-related bundles | Discipline-specific bundles |
|---|---|---|---|
| 3-word bundles | article + N + of (40)<br>as well as (28) | in this + noun (25)<br>the current study (21)<br>we + verb + that (6)<br>for future research (5)<br>this study found (3)<br>we also found (3) | oral English proficiency (29)<br>the digital library (4) |
| 4-word bundles | at the same time (12) | research has shown that (4),<br>we have also shown (3) | in oral English proficiency (10), |
| 5-word bundles | it should be noted that (3) | the results of this study (4)<br>we did not find any (3)<br>this set of study has (3) | change in oral English proficiency (5) in a home media space (4) |

*The figure within parentheses is the frequency of the bundle.

At a first glance, it may be observed that the general lexical bundles in the Discussion section resemble those in the Results section that the amount of general bundles decreases as the number of words in bundles increases. In addition, more RA-related bundles were found in this section, possibly related to the communicative purpose of this section—summarizing the findings and relating them to the literature

as well as making suggestions for future studies. As the general bundles in this section were used in similar fashion with those in the Results section, only the RA-related and discipline-specific bundles are discussed in this section.

Among the RA-related bundles, some of them, including *this study found*, *we also found*, and *we have also shown*, were related to express the main findings obtained in the study to relate to other ideas such as providing comparison to literature or evaluating the study, as shown in the following examples:

> [4.87] //DS// **This study found** considerable similarities across the three different tasks, but other researchers have claimed that more natural methods are required than the crude estimating of absolute word frequency of lists of unrelated words, or the rank ordering of such lists. (AL11, Discussion)
> [4.88] //DS// In contrast to Accot and Zhai [2003], **we also found** that increasing the height of a target can make it easier to select even when it is greater than the width. (CH03, Discussion)
> [4.89] //DS// **We have also shown** how to generate all singleton SMER constraint sets that minimally enforce an RSSoD requirement. (IS10, Discussion)

The three examples above illustrate writers' summary of highlighting the main findings in their studies. It is interesting to note that writers may directly illustrate what they have found in their study, as in example 4.87 and 4.89, or they may make a comparison to literature to indicate the significance and value of their study, as shown in example 4.88.

In addition to making comparisons with the literature and indicating main findings, it has been proven in the previous sections that another communicative purpose of this section is to make suggestions and/or recommendations for future research. After examining the RA-related lexical bundles, it was found that some of them, such as *for future research* and *the results of this study*, are among the ones writers frequently use to indicate suggestions for future studies, as shown below:

[4.90] //DF// This study has implications **for future research** on the practice of teaching English to young Spanish-speaking children. (TQ02, Discussion)

[4.91] //DF// These informal discussions suggest that **the results of this study** could apply to other types of families who have less frequent direct communication, or are geographically more separated. (CH07, Discussion)

The remaining discipline-specific bundles were still restricted to the convention of being used in some research articles that discussed about the issues, such examples include *change in oral English proficiency* and *in a home media space*, related to RAs of applied linguistics and computer science, respectively.

To sum up, lexical bundles, a set of words that are often used to serve certain rhetorical functions, were examined in this section and it was found that all three RA sections in the present study included lexical bundles of the three categories of general bundles, RA-related bundles, and discipline-specific bundles. In the next section, the voice of RAs is examined and presented.

**Voice in Reporting Research Findings**

Style manuals often advocate the use of active voice for forceful writing (e.g., Strunk & White, 2000; Williams, 2000). However, as Lock (1996) indicated, voice can play a role in organizing information at the discourse level. In academic writing, it has been argued that a passive sentence can be more appropriate than active in some contexts (e.g., Robinett, 1980; Master, 1991). A number of studies have investigated the distribution of voice in the various sections of scientific research papers (Heslot, 1982; Martínez, 2001). Two well-known studies examined in detail the occurrences of active and passive voice in research articles. One of them is Tarone *et al.* (1981) who analyzed two astrophysics journal papers and found that active voice occurs as frequently as passive voice in both papers. Another study by Master (1991) examined voice choice in research articles from an American magazine, *Science News*. His

research results also showed that the frequency of active sentences are higher than that of passive sentences. Both studies, therefore, have pointed out that active forms are as appropriate as passive in academic writing.

To get a clearer picture of the use of voice in reporting research findings in RAs, this feature in the three subcorpora were examined. The text processing tool of "Sentence Extractor" on the website of Compleat Lexical Tutor (http://www.lextutor.ca/tools/ex_sentences/) was firstly used to break text into single sentences. Throughout the process of identifying the voice of sentences, only the main verb in each sentence was investigated, leaving out the verbs used in subordinate clauses as well as participial phrases. The percentages of active and passive sentences are presented in Table 4.7:

Table 4.7. *Percentages of Active and Passive Sentences.*

| | **Abstract** | | **Results** | | **Discussion** | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Passive | 18 | 11.84 | 477 | 10.98 | 232 | 10.00 |
| Active | 134 | 88.16 | 3,867 | 89.02 | 2,088 | 90.00 |
| Total | 152 | 100.00 | 4,344 | 100.00 | 2,320 | 100.00 |

As shown in Table 4.7, the three sections have a similar ratio of active-passive use. The active voice is used far more frequently than the passive. To understand voice choice in each section, I further examined each section. It was found that in most abstracts in the corpus, the overall findings are usually presented in active voice, following the fixed pattern of *article + noun (+ participle) + active verb*, such as *the results obtained show*, *the results demonstrate*, *the data show*, and *the findings show*, as shown in the following examples:

[4.92] //AS// **The data show** that complex aspects of language gradually emerged from item-based and compositional learning processes that interacted with the learner's environment, including input frequency and the functional purposes for which language is used. (AL08, Abstract)

[4.93] //AS// **The results** of the experiment **demonstrate** that the presence of TTS voice significantly increases consumers' perceptions of flow (a construct depicting a user's interaction with a computer as playful and exploratory), while 3D avatars enhance consumers' feelings of telepresence (a user's experience of seeming to be present in a remote environment by means of a communication medium). (CH04, Abstract)

Example 4.92 and 4.93 show that in RA Abstracts, research findings are usually presented in active voice, even if an inanimate noun is used as the subject of a sentence. However, if the writer uses inanimate nouns referring to or representing specific results, passive voice may be adopted, as shown in the following example:

[4.94] //AS// **Six issues were identified** as important to these teachers. They were (a) working with a range of learner proficiencies; (b) the use of materials…. (TQ12, Abstract)

This suggests that when *results*, *data*, or *findings* are used as the sentence subject to report general research results, active voice is usually used, even though these words are inanimate nouns, but passive is also possible if other inanimate nouns are used as sentence subjects.

Another major move in Abstract is, as shown in the first section of this chapter, AA (indicating applications and/or implications). Therefore, sentences expressing this move were further examined, as represented in the following examples:

[4.95] //AA// **The implications** of the findings for language learning **are** also **discussed**. (AL05, Abstract)

[4.96] //AA// **Theoretical implications** of these findings **are discussed**. (TQ09, Abstract)

[4.97] //AA// **This article discusses** the pedagogical as well as theoretical implications of the findings for an integrated model of lexical inferencing. (AL12, Abstract)

Examples 4.95 and 4.96 illustrate that as writers elaborate on the results; for example, discussing their implications, sentences using inanimate nouns such as "implications" as the subject are presented with a passive voice; however, when this move is realized by using *we* or *this study/article* as the subject, active verb is used, as shown in Example 4.97. To sum up, it seems AS (summarizing results) and AA (indicating implications/applications) can be realized by sentences in either passive voice or active voice, depending upon the choice of the sentence subject and sometimes the verb as well.

Results have four major moves, including RS (summarizing results), RR (reporting findings), RL (locating data), and RI (interpreting results and findings). As researchers (e.g., Swales & Feak, 2004) have indicated, graphics are very common in the Results section. When reporting and interpreting results, RA writers need to refer to data presented in graphics. It was found that in the realizations of the moves RL and RS, passive voice is often used to refer to graphics, as shown in the following examples:

[4.98] //RL// **The interaction is shown** in Figure 2. (AL10, Results)
[4.99] //RL// **The value** of ×2 per degree of freedom **is computed** and the resulting confidence level of the fit **is presented** in Fig. 2 as a function of the string scale. (AL03, Results)
[4.100] //RS// In the four corpora of the Brown family, a total of 198 such instances were found, **as shown** in Table 5. (AL05, Results)
[4.101] //RS// **As can be seen** from Table 3, the most salient differences between the two groups of informants were found in situations 1 (borrow book from university lecturer), 3 (ask neighbour for help moving things from flat with his/her car), 4 (ask bus passenger to swap seats) and 6 (borrow laptop from work colleague). (AL01, Results)

As shown above, patterns of *as + past participle + preposition* or *as can be + past participle + preposition*, such as *as shown in* or *as can be seen from*, are frequently used to provide a link between a graphic or statistical data and the text which locates or presents research results. However, these expressions function as a clause modifying the sentence illustrating research findings. In this study, the passive voice used in these clauses was not accounted for. This may reduce the total amount of passive sentences in this section.

For sentences realizing various moves indicated above, it seems either active or passive is possible, depending, again, on the choice of the sentence subject, and whether an active verb is possible for the subject. In the following, examples of using active or passive voice in the various moves are presented:

[4.102] //RS// **Each posttest score reflects** the percentage of previously unknown target items scored correct on the two receptive posttests (R1 and R2), and the average overall score (based on the scoring procedures elaborated earlier) for the corresponding productive posttests (P1 and P2). (TQ04, Results)

[4.103] //RS// Indeed, **this is reflected** in the Soweto text by the prepositional phrase, "with unrest", following "has been simmering". (AL09, Results)

[4.104] //RR// **An exact permutation test produced** a one-tailed p value of p = 0.449, so there is no statistical evidence that, as a group, the participants' recall was dependent on the number of changes in the recast. (TQ09, Results)

[4.105] //RR// As shown in Table 5, **28 RCs were produced** during the 201 days of the study. (AL08, Results)

[4.106] //RI// **These numbers show** that for the majority of participants, their threshold for identifying awareness cues with reasonable confidence is between blur levels 3 and 5, although a few participants recognized cues even earlier. (CH05, Results)

[4.107] //RI// **It can be shown** that when a certain constraint is true over a given GEO-RBAC status, other constraints, belonging to other classes, are also true. (IS09, Results)

The examples above illustrate use of verbs of *reflect*, *produce*, and *show*, and how they are used in terms of the same move in the Results section. Examples 4.102 and 4.103 represent the communicative purpose of providing summarized results with example 4.102 stated in active voice but example 4.103 in passive voice even though the subjects in both examples are inanimate nouns. In examples 4.104 through 4.107, a similar trend could be observed so that these communicative purposes can be realized in either active or passive voice.

As indicated earlier in the first section of this chapter, in the Discussion section, the writers not only summarize the main findings but also discuss how the findings could be useful for future studies or provide possible applications and/or implications. Therefore, it was found that sentences in this section often use *we* as the sentence subject, as shown in the following examples:

[4.108] //DS// **We show** how our threshold condition can be used to guide antivirus policies. (IS12, Discussion)

In Example 4.108, the use of the personal pronoun *we* is used to illustrate what the writers have carried out and active voice is usually used to emphasize the writers' point of view and attitude towards the results of the study in concern. As for the communicative purpose of providing insights for future studies, illustrations could be made as in the following examples:

[4.109] //DF// Some of design ideas described in the study: such as fuzzy events, notifications, or placing events on other households calendars, **should be explored** in further studies. (CH07, Discussion)

[4.110] //DF// Further studies, perhaps extending to include novice users, **could take** error types and error distributions **into account**, to help extend the range of application of these models. (CH09, Discussion)

Examples 4.109 and 4.110 include two examples, both starting with inanimate nouns of *further work* or *further studies*, the former statement is expressed in the passive voice while the latter in the active. Therefore, it seems that both active and passive voice could be used when suggestions are made for future research.

To sum up, although it was originally expected that when reporting research findings, writers should use more passive sentences than active sentences, the findings in the present study show the opposite. A possible reason is that the use of passive voice in non-finite verbs and verbs in clauses was not included in the count. In addition, in reporting research findings in all three RA sections, the writers often have free choices between active and passive, even if the sentence has an inanimate subject such as data, findings, or results. In the next section, disciplinary variations as well as similarities in terms of reporting research findings across the three RA sections are presented and discussed.

**Disciplinary Variations in Reporting Research Findings**

The present study is also aimed to investigate different features of reporting research findings in two disciplines—applied linguistics and computer science. In this section, both similarities and differences between the two fields are discussed in terms of moves and linguistic realizations.

First of all, move analysis was conducted to identify the moves as well as move patterns of reporting research findings. The following table demonstrates the frequency of moves across the three sections of RAs in both disciplines:

Table 4.8. *Frequency of moves across sections in the two disciplines*.

| | **Abstract** | | | | **Results** | | | | **Discussion** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AL | | CS | | AL | | CS | | AL | | CS | |
| | N* | %** | N* | %** | N* | %** | N* | %** | N* | %** | N* | %** |
| **(S)** summarizing results | 24 | 44 | 24 | 49 | 83 | 12 | 39 | 10 | 87 | 27 | 59 | 23 |
| **(L)** locating data | 0 | 0 | 0 | 0 | 120 | 17 | 48 | 12 | 4 | 1 | 1 | 0 |
| **(R)** reporting findings | 0 | 0 | 0 | 0 | 232 | 33 | 141 | 36 | 7 | 2 | 30 | 12 |
| **(I)** interpreting results/findings | 12 | 22 | 5 | 10 | 181 | 26 | 112 | 29 | 66 | 20 | 40 | 16 |
| **(P)** providing reasons/explanations | 0 | 0 | 0 | 0 | 11 | 2 | 16 | 4 | 15 | 5 | 10 | 4 |
| **(E)** evaluating results | 2 | 4 | 2 | 4 | 25 | 4 | 3 | 1 | 22 | 7 | 28 | 11 |
| **(C)** comparing results to literature | 1 | 2 | 2 | 4 | 49 | 7 | 26 | 7 | 63 | 19 | 38 | 15 |
| **(B)** indicating limitation/weaknesses | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 5 | 4 | 2 |
| **(A)** indicating implications/applications | 16 | 29 | 16 | 33 | 0 | 0 | 4 | 1 | 30 | 9 | 30 | 12 |
| **(F)** need/suggestions for studies | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 19 | 6 | 18 | 7 |
| **Total** | 55 | | 49 | | 701 | | 392 | | 328 | | 258 | |

*N refers to the raw frequency of rhetorical moves

**normalized percentage of rhetorical moves

As can be seen in Table 4.8, the two disciplines have a very similar ranking pattern in terms of move frequency. In both disciplines, the three moves with higher occurrences in Abstract are AS, AI, and AA; in Results, RR, RI, and RL; in Discussion, DS, DI, and DC. In addition, in both disciplines, AL, AR, AP, AB, AF, and RB do not occur at all. These results suggest that despite the different nature of research, RA writers in different disciplines may be aware of the same communicative purposes in the sections and thus emphasize the same set of moves to meet the respective rhetorical functions of reporting research results in the section in concern. However, the total frequencies of moves in each section in the two fields still reveal some interesting variations. First, the frequencies of major moves in each section in applied linguistics outnumber those in computer science. This reflects the more elaborate organization of argumentation required in the former, particularly in the Results section where specific results are presented and explained. In contrast, there are also some moves in CS which have higher frequencies and percentages than those

in AL, such as DR (reporting findings) and DE (evaluating results) in Discussion, suggesting that these specific moves may play a greater role in CS than in AL.

Common move patterns in each section of the two fields are also compared. Table 4.9 shows the move patterns in Abstract in both disciplines:

Table 4.9. *Move patterns in RA Abstracts in the two disciplines*.

| | Applied Linguistics | | Computer Science | |
|---|---|---|---|---|
| | pattern | frequency | pattern | frequency |
| 2-move patterns | AS AI | 12 | AS AA | 12 |
| | AI AA | 8 | AS AI | 5 |
| | AS AA | 8 | AI AA | 3 |
| | AC AE | 1 | AS AE | 2 |
| | AS AC | 1 | AC AA | 1 |
| | AS AE | 1 | AC AS | 1 |
| | | | AS AC | 1 |
| 3-move patterns | AS AI AA | 8 | AS AI AA | 3 |
| | AS AC AE | 1 | AC AS AA | 1 |
| | | | AS AC AA | 1 |

As shown in Table 4.9, common two-move patterns occurring in both RAs of applied linguistics and computer science are AS→AI, in which writers accompany the summary of research results/findings with an interpretation; AS→AA, in which writers provide possible applications and/or implications after the summary of research results/findings; and AI→AA, a pattern writers utilize to provide possible applications after an interpretation of results/findings, which is actually part of the three-move pattern of AS→AI→AA. Therefore, it can be concluded that the two most common move patterns in RA Abstracts are AS→AA and AS→AI→AA, both of which includes a summary of the main findings, followed by either interpretation or indication of possible applications drawn from the main findings. However, in computer science the pattern AS→AA occurs more often than AS→AI, probably because there are fewer occurrences of the move AI this field, while AS→AI occurs

more frequently than AS→AA in applied linguistics. In addition, no cycles of moves were found in Abstract in both fields.

To sum up, the move of AS (summarizing results) is an obligatory move in both applied linguistics and computer science Abstract, and it can be followed by either an interpretation or possible applications.

In terms of differences in the Results section, the most evident difference is the number of running words—the Results corpus of applied linguistics includes 71,035 running words, with an average of 2,960 words in an RA; on the other hand, the Results corpus of computer science only has 46,581 running words, with an average of 1,940 words per RA. This difference could be attributed to the nature of the study..

The move patterns of the Results section of RAs in both disciplines were examined and presented in the following table:

Table 4.10. *Move patterns in RA Results in the two disciplines*.

| | Applied Linguistics | | Computer Science | |
|---|---|---|---|---|
| | pattern | freq* | pattern | freq* |
| 2-move patterns | RR RI | 122 | RR RI | 94 |
| | RL RR | 74 | RI RR | 54 |
| | RI RR | 66 | RL RR | 36 |
| | RR RL | 51 | RS RR | 23 |
| | RS RR | 51 | RI RL | 18 |
| | RI RS | 26 | RC RR | 15 |
| | RI RC | 21 | RI RC | 9 |
| | RC RR | 17 | RI RP | 9 |
| 3-move patterns | RR RI RR | 47 | RR RI RR | 49 |
| | RI RR RI | 45 | RI RR RI | 34 |
| | RL RR RI | 40 | RL RR RI | 21 |
| | RR RI RL | 25 | RI RL RR | 16 |
| | RL RR RL | 21 | RR RI RL | 16 |
| 4-move patterns | RR RI RR RI | 33 | RR RI RR RI | 32 |
| | RI RR RI RR | 26 | RI RR RI RR | 21 |
| | RL RR RL RR | 12 | RI RL RR RI | 15 |
| 5-move patterns | RR RI RR RI RR | 20 | RR RI RR RI RR | 20 |
| | RI RR RI RR RI | 20 | RI RR RI RR RI | 18 |
| | RR RI RL RR RI | 12 | RR RI RL RR RI | 14 |

*freq refers to the raw frequency of rhetorical move patterns

As shown in Table 4.10, the move patterns which occur frequently are similar in the two disciplines. In terms of 2-move patterns, RR→RI, RL→RR, RI→RR, RS→RR are common patterns in both disciplines. As indicated in the previous discussion of move patterns across the sections, Moves often show a cyclic pattern in this section. It can be found that the move sequence of RR→RI and RL→RR are commonly presented in a cyclic pattern of RR→RI→ RL→RR→RI or RR→RI→RR→RI, indicating that RAs of both disciplines use similar conventions of moves and move patterns to report the main findings. However, after examining the normalized data in Table 4.10, it can be observed that computer science RA Results seem to have a higher frequency of the move patterns and move cycles, possibly because only a small piece of results is presented and interpreted each time before another set of findings is presented and illustrated.

Finally, with respect to the Discussion section, one of the major differences between these two disciplines is, similar to Results, the running words. The Discussion corpus in applied linguistics contains 34,407 running words while the Discussion corpus of computer science has only 29,690 running words. This can be attributed to the nature of how research articles of both disciplines are constructed—while RAs in applied linguistics often have both Discussion and Conclusion sections in which they elaborate on results, including possible interpretation of data and/or pedagogical implications before putting an end to their studies, RAs of computer science usually include only a short Conclusion section that serves as the closing of RAs.

The move patterns in this section/ these sections were further investigated, with move patterns summarized and shown in the following table:

Table 4.11. *Move patterns in RA Discussions*.

| | Applied Linguistics | | Computer Science | |
|---|---|---|---|---|
| | pattern | freq* | pattern | freq* |
| 2-move patterns | DS DI | 33 | DR DI | 15 |
| | DI DS | 26 | DS DC | 15 |
| | DS DC | 18 | DC DS | 13 |
| | DC DI | 14 | DS DR | 12 |
| | DI DC | 14 | DI DS | 11 |
| | DC DA | 9 | DS DI | 11 |
| | DI DA | 7 | DI DE | 8 |
| 3-move patterns | DS DI DS | 16 | DS DR DI | 6 |
| | DI DS DI | 13 | DA DC DS | 4 |
| | DS DI DC | 8 | DC DR DI | 4 |
| | DC DS DC | 5 | DC DS DC | 4 |
| 4-move patterns | DS DI DS DI | 9 | DC DS DR DI | 3 |
| | DI DS DI DS | 5 | DR DI DR DI | 3 |

*freq refers to the raw frequency of rhetorical move patterns

Table 4.11 indicates that though some move patterns (DS→DI, DS→DC) occur in both disciplines, there are some variations. For example, DC→DI, DI→DC, DC→DA, and DI→DA occur in applied linguistics, but not in computer science. On the other hand, DR→DI, DC→DS, DS→DR, and DI→DE occur in computer science, but not in applied linguistics. The different move patterns also result in various move cycles, as observed from the four-move patterns in Table 4.11, showing the cycle of DS→DI→DS→DI in RA Discussions in applied linguistics and DR→DI→DR→DI in Discussions in computer science. Compared to occurrence of rhetorical moves in Table 4.8 and move patterns in Table 4.11, we can find that although DA (indicating applications and/or implications) occurs frequently in computer science RA Discussion, no move pattern including DA was observed. On the other hand, as seen in Table 4.11, in applied linguistics DA occurs in move patterns of either DI→DA, in which writers provide possible applications after an interpretation of the findings; or DC→DA, in which applications and/or implications are drawn after making a

comparison to studies in the past.

To sum up, high-frequency moves and move patterns in Abstract and Results are quite similar in both disciplines, indicating that writers, regardless of different disciplines, construct their research papers with similar emphases, but in Discussion, there seem to be more variations in moves and move patterns Moreover, it has been found that the conventional section headings following the Results section may vary according to disciplines. There is also a difference in the number of total running words and frequency of moves between the corpora of the two disciplines.

To examine disciplinary variations in frequencies of main verbs, the RA corpus was divided into an AL corpus and a CS corpus, each of which contains Abstract, Results, and Discussion sections of RAs in the field. Then frequency analysis was run to identify the top 300 high-frequency words in each corpus. Verbs in each list were identified, including all of their inflectional variations. However, as some word forms can exist as both verb and noun, such as "study," the words were further examined to retain only the frequencies of the words used as verbs, as shown in Table 4.12.

As shown in the comparison list in Table 4.12, 12 verbs occur in both corpora, including *use*, *have*, *see*, *show*, *find*, *need*, *work*, *mean*, *base*, *change*, *result*, and *like*, indicating that these verbs are commonly used in RAs to report results irrespective of disciplinary variation. To know how both corpora differed from each other, verbs included in the AL Corpus but not in the CS Corpus were identified, including *suggest*, *produce*, *learn*, *erupt*, *help*, *relate*, *understand*, *support*, *test*, *study*, *collocate*, *question*, and *form*. On the other hand, verbs included in the CS Corpus but not in the AL Corpus include *make*, *provide*, *sense*, *describe*, *present*, *give*, *design*, *expect*, *focus*, *point*, *control*, and *set*. We can note that only a couple of verbs in each list, such as *learn* and *study* in applied linguistics, and *sense* and *control* in computer science, are apparently discipline-specific; the rest of them seem generally related to RA or to

Table 4.12. *A list of verbs among the top 300 high-frequency words in two disciplines.*

| AL Corpus | | | CS Corpus | | |
|---|---|---|---|---|---|
| Ranks | Freq | Verbs | Ranks | Freq | verbs |
| 1 | 370 | use | 1 | 327 | use |
| 2 | 314 | have | 2 | 250 | have |
| 3 | 175 | see | 3 | 209 | make |
| 4 | 292 | show | 4 | 133 | see |
| 5 | 165 | suggest | 5 | 116 | show |
| 6 | 114 | produce | 6 | 110 | find |
| 7 | 112 | find | 7 | 106 | provide |
| 8 | 99 | need | 8 | 98 | sense |
| 9 | 85 | learn | 9 | 87 | describe |
| 10 | 73 | erupt | 10 | 71 | present |
| 11 | 70 | help | 11 | 70 | give |
| 12 | 61 | work | 12 | 62 | base |
| 13 | 53 | relate | 13 | 56 | work |
| 14 | 50 | mean | 14 | 54 | change |
| 15 | 38 | understand | 15 | 52 | need |
| 16 | 34 | base | 16 | 40 | design |
| 17 | 30 | change | 17 | 32 | expect |
| 18 | 29 | support | 18 | 30 | focus |
| 19 | 27 | result | 19 | 25 | point |
| 20 | 21 | test | 20 | 22 | mean |
| 21 | 15 | study | 21 | 18 | control |
| 22 | 10 | like | 22 | 11 | set |
| 23 | 9 | collocate | 23 | 8 | like |
| 24 | 7 | question | 24 | 8 | result |
| 25 | 5 | form | | | |

reporting results rather than the discipline, as shown in the following examples:

[4.111] //DA// Finally, we think that it is important to make educational managers aware of the fact that classroom discourse has its very special characteristics and that this directly informs what can and also what cannot be **learned** and practised in CLIL classrooms in terms of foreign language competence. (AL06, Discussion)

[4.112] //RC// The relationship of decoding ability to overall reading proficiency has been widely **studied** in the L2 field, as has the connection between decoding in one language and another. (TQ12, Results)

[4.113] //RS// Running while looking at the screen is not expected and not desired, and is debatably **sensed** (the GPS can follow, although with some latency). (CH01, Results)

[4.114] //RC// However, they do have attack code location variety (stack, heap, and data), and more importantly, they have **controlled** diversity of corrupted code address types (return address, old base pointer, function pointer, and longjump buffer as either local variable or parameter), and offer either direct or indirect execution flow hijacking (see Wilander and Kamkar [2003]). (IS01, Results)

It, therefore, may be inferred that when RA writers report their research findings, they use general research-reporting verbs more frequently than discipline-specific verbs.

# CHAPTER FIVE

# DISCUSSIONS AND CONCLUSIONS

The present study explores how the communicative purpose of reporting research findings can be realized in research article Abstract, Results, and Discussion sections. In this final chapter, the major findings, along with a comparison with previous studies, are first summarized and discussed. After that, pedagogical implications, limitations as well as suggestions for future research are drawn.

## Discussions and Summary of the Study

This study took a genre- and corpus-based approach to examining the moves and language use of reporting research findings in RAs of two disciplines. A corpus consisting of 48 RAs, 24 from two major journals in the field of applied linguistics (*Applied Linguistics* and *TESOL Quarterly*) and the other 24 from another two journals in the field of computer science (*ACM Transactions on Computer-Human Interaction* and *ACM Transactions on Information and System Security*), was constructed. Specifically, the present study aimed to investigate how similar or different research findings are presented in Abstract, which entails the most concise illustrations of the main findings; Results, which includes detailed illustration and interpretation of the findings; and Discussion, which not only signals the end of an RA but also includes possible implications, applications and comparison with other studies.

Move analysis showed that in Abstract, the moves of AS (summarizing results) and AA (indicating implications/applications) were obligatory or near-obligatory. The finding was consistent with other studies on Abstract (Bhatia, 1993; Hyland, 2000; Lóres, 2003; Martín, 2003; Samraj, 2001, 2002). Though previous studies on Abstract

did not pay special attention to the move of AA, its high frequency could be attributed to the promotional nature of Abstract and its being a miniature of the whole study. In addition, the most frequently-used moves included RR (reporting findings), RI (interpreting results and findings), RL (locating data), and RS (summarizing results). Some of the moves occurred in cycles. This finding is similar to that in one of the much-cited studies investigating RA Results—Brett (1994). In the present study, it was found that the cyclic patterns in Results included RS→RR→RI, RL→RR→RI, or RR→RI, in which writers provide an interpretation of a small piece of presented findings before they start discussing a new set of data. The move patterns identified in the present study were similar to what Brett indicated as "pointer → statement of finding → substantiation of finding" (p.55) in his study on sociology RAs. Finally, move analysis of Discussion indicated that the main rhetorical moves included DS (summarizing results), DI (interpreting results and findings), DC (comparing results to literature), and DA (indicating implications/applications). This final section in RAs not only highlights what has been found in the study but also elaborates on the results, mainly interpretations, implications, and applications. Cyclic patterns were also identified in this section, including DS→DI or DS→DC, the former providing possible interpretation after presentation of findings and the latter entailing comparisons to previous studies after report of findings. The findings agreed with previous studies (Kanoksilapatham, 2005; Nwogu, 1997; Posteguillo, 1999; Yang & Allison, 2003).

From the discussions above, it can be concluded that while –R (reporting findings) is the most frequently used in Results section, Abstract and Discussion sections entail frequent use of –S (summarizing results), indicating that in Abstract and Discussion, research findings are presented in a summarized manner whereas findings are presented in precise and factual data in the Results section. In addition, as

Abstract is the shortest section in an RA, it contains no move cycles whereas move cycles were identified in both Results and Discussion sections. However, the move cycles in Results and Discussion section vary. Those in Results are closely related to reporting and interpreting findings, and those in Discussion are presented in report of findings, followed by interpretation, comparison, applications, or suggestions. The three RA sections, though all of them must report research findings, focus on different moves or use different move patterns, as shown in the move analysis of this study, in order to realize their respective communicative purposes.

To take move analysis a step further, that is, to know how the three sections may vary in levels of generality in reporting results, content analysis of the three sections of a single RA was conducted. The purpose was to identify the corresponding parts reporting a specific result in the three sections and show their variation in generality. It was found that in Abstract, the most concise section, research findings are presented in the most general manner without referring to specific data. On the other hand, in Results sections, writers usually provide a detailed illustration of specific results and use precise data to support the finding or interpretation of the findings. In the Discussion section, writers present their research findings with a level of generality between the prior two sections and focus more on applications and comparisons with other studies. Examples from both disciplines were used to showcase different levels of generality in the three sections. The implication of these results is that EAP courses of writing research articles should pay special attention to the variations in levels of generality and section focus of the three sections as novice researchers or graduate students often find it problematic to differentiate between/among the three sections of RAs in terms of reporting research results (Bitchener & Basturkmen, 2006).

In addition to move and content analyses, we still need to know how reporting results are realized linguistically in these sections. This study investigated linguistic

realizations in terms of verbs, modal verbs, lexical bundles, and use of voice. First of all, we would like to know verbs that are frequently used to report results in these sections. It was found that *show, see, find, and use* occur in all three lists of the top 10 high-frequency verbs of the sections. Some verbs occur in two sections such as *suggest*, *provide*, *support*, *see* and *make*, and some occur in only one section like *perform*, *present*, *describe*, *do*, *expect*, *mean*, *report*, and *need*. Overall, it could be observed that these words are not discipline-specific verbs, but popular verbs with meanings related to the various moves of reporting research results. In addition, lexical bundles in each section were identified to know if there are fixed expressions for reporting results. They were classified into general bundles, RA-related bundles, and discipline-specific bundles. It was found that general bundles were used in a similar way in RAs to that in general English texts. Most RA-related bundles, such as *in this paper*, *as shown in Table/Figure*, *results show that*, and *for future research*, could be related to specific moves of the section they occur. Although a few discipline-specific bundles were identified, it was found that they result from high occurrences in a single RA. This is probably because even within a single discipline, the research topics of the RAs can still be very different and for different topics there could be a wide variety of possible linguistic expressions for reporting research results.

Results from the analysis of voice in the three sections were quite unexpected since active voice was used by far more frequently than the passive voice. A closer examination of the sentences revealed that, as Martín (2003) indicated, many active sentences were constructed "by means of a sentence initiated with an inanimate noun" in subject position and followed by verbs used in active voice instead of passive voice. Also, the use of passive voice in clauses was not included in the count of passive sentences. Moreover, examination of frequency of modal verbs showed that

Discussion entails more modal verbs than the other two sections, indicating that when writers discuss findings and make claims, they use modal verbs to qualify statements and to show tentativeness.

Examination of disciplinary variations showed that whereas rankings of rhetorical moves in both disciplines showed similar results, move patterns showed slight variations in Abstract and Discussion. In Abstract, it was found that move pattern of AS→AA has a higher frequency in computer science RAs while move pattern of AS→AI was found more often in applied linguistics RAs. In addition, move pattern of DS→DI was utilized in applied linguistics RAs whereas DR→DI had a higher frequency in computer science RAs, a phenomenon that might be related to the nature of papers selected in the present study. As studies in applied linguistics often need to discuss implications of results for pedagogical purposes and materials development, many papers selected contain descriptions of pedagogical implications. On the other hand, studies in the field of computer science are usually aimed to improve an existing model or theorem, thus the performance of a study is usually the main focus in computer science RAs. With respect to the use of verbs in reporting results, writers of both disciplines rely much on general result-related verbs, such as *use*, *show*, and *find*, rather than discipline-specific verbs. Some verbs that may show disciplinary difference would be *learn* and *study* in applied linguistics and *sense* and *control* in computer science.

## Implications and/or Applications of the Study

Analyses in this study were mainly based on the construction of an RA corpus, which was further divided into subcorpora according to sections or disciplines. Frequency of rhetorical moves, move patterns, verbs, lexical bundles were all derived from the corpora with the use of NLP tools so that the findings of the present study

can be used for pedagogical purposes since data in the present study were based on authentic materials. As reporting research findings is the most crucial communicative purpose of RAs, it is essential that learners should know how it is realized in the three sections of RAs. The moves and move patterns identified in each section in this study could help both teachers and learners clarify the differences and similarities between and among the sections.

Furthermore, the findings can provide instructors with pedagogical implications. In addition to indicate the common or obligatory rhetorical moves and move patterns in Abstract, Results, and Discussion, micro-level features could be specifically pinpointed as well. For example, when providing overview of the main findings in both Abstract and Discussion, micro-level expressions like *show*, *find*, *use*, *in + article + noun*, and *this + noun + showed* to make general illustrations. In addition, as RA writers need to focus on specific findings or make reference to factual data in Results section, expressions of *see*, *suggest*, *shown in + noun* can be utilized. In addition, as Discussion further entails possible applications or suggestions derived from retrieved data, expressions like *suggest*, *for future research* could be used. All the expressions, including use of main verbs and RA-related bundles could be explicitly taught.

As writing RAs has become a must for both graduate students and researchers, they are often obliged to take academic writing classes. Though instructors may not specialize in the academic disciplines of these learners, they could provide learners with materials, such as frequency lists of verbs or lexical bundles collected from RAs in learners' disciplines. In addition, as findings in the present study revealed that levels of generality differ across various sections, instructors should put emphasis on this feature. They can use authentic examples to showcase how reporting results is realized differently, as reported in the section of content analysis.

## Limitations and Suggestions for Future Research

Results of the present study showed that, by applying a genre- and corpus-based approach, reporting research findings in various RA sections can be fruitfully explored. However, because of limitations in time and scope, some aspects were not investigated in the present study. Therefore, a number of suggestions could be drawn for future research. First, as the present study used only 48 RAs of two disciplines, the findings of our study may be constrained due to the small size of the RA corpus. Therefore, a larger corpus should be constructed for future studies to obtain more meaningful results. In addition, only RAs of two academic disciplines—applied linguistics and computer science—were collected for analysis in the present study. Future studies could collect RAs from more disciplines to generalize the findings for academic writing. Finally, comparison of RA corpus of native speakers and RA corpus of non-native speakers or novice researchers may further reveal the differences between them in reporting research results, thereby providing helpful suggestions for curriculum design and materials development.

# APPENDIX

## Sources of Text

*Applied Linguistics*

AL01 Reiter, R. M., Rainey, I., & Fulcher, G. (2005). A comparative study of certainty and conventional indirectness: Evidence from British English and Peninsular Spanish. *Applied Linguistics*, *26*(1), 1-31.

AL02 Waring, H. Z. (2005). Peer tutoring in graduate writing centre: Identity, expertise, and advice resisting. *Applied Linguistics*, *26*(2), 141-168.

AL03 Harwood, N. (2005). "We do not seem to have a theory…The theory I present here attempts to fill this gap": Inclusive and exclusive pronouns in academic writing. *Applied Linguistics*, *26*(3), 343-375.

AL04 Cotterill, J. (2005). Collocation, connotation, and courtroom semantics: Lawyers' control of witness testimony through lexical negotiation. *Applied Linguistics*, *26*(4), 513-537.

AL05 Richards, K. (2006). "Being the teacher": Identity and classroom conversation. *Applied Linguistics*, *27*(1), 51-77.

AL06 Hall, J. K., Cheng, A., & Carlson, M. T. (2006). Reconceptualizing multicompetence as a theory of language knowledge. *Applied Linguistics*, *27*(2), 220-240.

AL07 Hellermann, J. (2006). Classroom interactive practices for developing L2 literacy: A microethnographic study of two beginning adult learners of English. *Applied Linguistics*, *27*(3), 377-404.

AL08 Mellow, J. D. (2006). The emergence of second language syntax: A case study of the acquisition of relative clauses. *Applied Linguistics*, *27*(4), 645-670.

AL09 O'Halloran, K. (2007). Critical discourse analysis and the corpus-informed interpretation of metaphor at the register level. *Applied Linguistics*, *28*(1), 1-24.

AL10 Corrigan, R. (2007). An experimental analysis of the affective dimensions of deep vocabulary knowledge used in inferring the meaning of words in context. *Applied Linguistics*, *28*(2), 211-240.

AL11 Alderson, J. C. (2007). Judging the frequency of English words. *Applied Linguistics*, *28*(3), 383-409.

AL12 Maybin, J., & Swann, J. (2007). Everyday creativity in language: Textuality, contextuality, and critique. *Applied Linguistics*, *28*(4), 497-517.

*ACM Transactions on Computer-Human Interaction*

CH01 Benford, S., Schnädelbach, H., Koleva, B., Anastasi, R., Greenhalgh, C., Rodden, T., et al. (2005). Expected, sensed, and desired: A framework for designing sensing-based interaction. *ACM Transactions on Computer-Human Interaction*, *12*(1), 3-30.

CH02 Adams, A., Blandford, A., & Lunt, P. (2005). Social empowerment and exclusion: A case study on digital libraries. *ACM Transactions on Computer-Human Interaction*, *12*(2), 174-200.

CH03 Grossman, T., & Balakrishnan, R. (2005). A probabilistic approach to modeling two-dimensional pointing. *ACM Transactions on Computer-Human Interaction*, *12*(3), 435-459.

CH04 Qiu, L., & Benbasat, I. (2005). An investigation into the effects of text-to-speech voice and 3D avatars on the perception of presence and flow of live help in electronic commerce. *ACM Transactions on Computer-Human Interaction*, *12*(4), 329-355.

CH05 Neustaedter, C., Greenberg, S., & Boyle, M. (2006). Blur filtration fails to preserve privacy for home-based video conferencing. *ACM Transactions on Computer-Human Interaction*, *13*(1), 1-36.

CH06 Plumlee, M. D., & Ware, C. (2006). Zooming versus multiple window interfaces: Cognitive costs of visual comparisons. *ACM Transactions on Computer-Human Interaction*, *13*(2), 179-209.

CH07 Plaisant, C., Clamage, A., Hutchinson, H. B., Bederson, B. B., & Druin, A., (2006). Shared family calendars: Promoting symmetry and accessibility. *ACM Transactions on Computer-Human Interaction*, *13*(3), 313-346.

CH08 Grinter, R. E., Palen, L., & Eldridge, M. (2006). Chatting with teenagers: Considering the place of chat technologies in teen life. *ACM Transactions on Computer-Human Interaction*, *13*(4), 423-447.

CH09 Amant, R., Horton, T. E., & Ritter, F. E. (2007). Model-based evaluation of expert cell phone menu interaction. *ACM Transactions on Computer-Human Interaction*, *14*(1), 1-24.

CH10 Corter, J. E., Nickerson, J. V., Esche, S. K., Chassapis, C., Im, S., & Ma, J. (2007). Constructing reality: A study of remote, hands-on, and simulated laboratories. *ACM Transactions on Computer-Human Interaction*, *14*(2), Article 7, 1-27.

CH11 Sevilla, J., Herrera, G., Martínez, B., & Alcantud, F. (2007). Web accessibility for individuals with cognitive deficits: A comparative study between an existing commercial web and its cognitively accessible equivalent. *ACM Transactions on Computer-Human Interaction*, *14*(3), Article 12, 1-25.

CH12 McDonald, D. W., McCarthy, J. F., Soroczak, S., Nguyen, D. H., & Rashid, A. M. (2008). Proactive displays: Supporting awareness in fluid social environments. *ACM Transactions on Computer-Human Interaction*, *14*(4), Article 16, 1-31.

*ACM Transactions on Information and System Security*

IS01 Barrantes, E. G., Ackley, D. H., Forrest, S., & Stefanović, D. (2005). Randomized instruction set emulation. *ACM Transactions on Information and System Security*, *8*(1), 3-40.

IS02 Ye, Z., Smith, S., & Anthony, D. (2005). Trusted paths for browsers. *ACM Transactions on Information and System Security*, *8*(2), 153-186.

IS03 Zhou, L., Schneider, F. B., & Van Renesse, R. (2005). Apss: Proactive secret sharing in asynchronous systems. *ACM Transactions on Information and System Security*, *8*(3), 259-286.

IS04 Zhang, X., Parisi-Presicce, F., Sandhu, R., & Park, J. (2005). Formal model and policy specification of usage control. *ACM Transactions on Information and System Security*, *8*(4), 351-387.

IS05 Ateniese, G., Fu, K., Green, M., & Hohenberger, S. (2006). Improved proxy re-encryption schemes with applications to secure distributed storage. *ACM Transactions on Information and System Security*, *9*(1), 1-30.

IS06 Oh, S., Sandhu, R., & Zhang, X. (2006). An effective role administration model using organization structure. *ACM Transactions on Information and System Security*, *9*(2), 113-137.

IS07 Van Oorschot, P. C., & Stubblebine, S. (2006). On countering online dictionary attacks with login histories and humans-in-the-loop. *ACM Transactions on Information and System Security*, *9*(3), 235-258.

IS08 Li, N., & Tripunitara, M. V. (2006). Security analysis in role-based access control. *ACM Transactions on Information and System Security*, *9*(4), 391-420.

IS09 Damiani, M. L., Bertino, E., Catania, B., & Perlasca, P. (2007). Geo-RBAC: A spatially aware RBAC. *ACM Transactions on Information and System Security*, *10*(1), Article 2, 1-42.

IS10 Li, N., Tripunitara, M. V., & Bizri, Z. (2007). On mutually exclusive roles and separation-of-duty. *ACM Transactions on Information and System Security*, *10*(2), Article 5, 1-36.

IS11 Abadi, M., Blanchet, B., & Fournet, C. (2007). Just fast key in the pi calculus. *ACM Transactions on Information and System Security*, *10*(3), Article 3, 1-59.

IS12 Chakrabarti, D., Wang, Y., Wang, C., Leskovec, J., & Faloutsos, C. (2007). Epidemic thresholds in real networks. *ACM Transactions on Information and System Security*, *10*(4), Article 13, 1-26.

*TESOL Quarterly*

TQ01 Nassji, H. (2003). L2 vocabulary learning from context: Strategies knowledge sources, and their relationship. With success in L2 lexical inferencing. *TESOL Quarterly*, *37*(4), 645-670.

TQ02 Giambo, D. A., & McKinney, J. D. (2004). The effects of a phonological awareness intervention on the oral English proficiency of Spanish-speaking kindergarten children. *TESOL Quarterly*, *38*(1), 95-117.

TQ03 Hahn, L. D. (2004). Primary stress and intelligibility: Research to motivate the teaching of suprasegmentals. *TESOL Quarterly*, *38*(2), 201-223.

TQ04 Smith, B. (2005). The relationship between negotiated interaction, learner uptake, and lexical acquisition in task-based computer-mediated communication. *TESOL Quarterly*, *39*(1), 33-58.

TQ05 Gebhard, M. (2005). School reform, hybrid discourses, and second language literacies. *TESOL Quarterly*, *39*(2), 187-210.

TQ06 Leibowitz, B. (2005). Learning in an additional language in a multilingual society: A South African case study on university-level writing. *TESOL Quarterly*, *39*(4), 661-681.

TQ07 Folse, K. S. (2006). The effect of type of written exercise on L2 vocabulary retention. *TESOL Quarterly*, *40*(2), 273-293.

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