Dual function of first position nominal groups in research article titles: Describing methods and structuring summary

Alex Rath
Email: rattle@cc.shu.edu.tw
Shih Hsin University, Taiwan

Abstract

Previous research has identified the nominal group as the most distinctive feature of the research article title. In contrast, the findings reported in this paper suggest Theme/Rheme is the dominant structure in title text. Theme/Rheme structures order and tie nominal groups in titles. When a title starts with a methodological term the first position nominal group acts as a theme marker. Thus, the following nominal groups yield coherence and generate summarization. This finding is based on an analysis of 347 research article titles randomly selected from 99 SSCI journals in linguistics. Focusing on titles with a research construct in first position, and using the most frequently found term, *effect*, as the basis for comparison, this article presents an analysis of how titles summarize content. The combination of nominal groups, Theme/Rheme, and coherence summarizes the content of the research article more effectively compared to titles that rely solely on the information packaging function of high-density nominalization.

Keywords: *Nominal Group, First Position, Theme/Rheme, Methodological Term, Corpus-Based Analysis*

1. Introduction

Titles of research articles have numerous uses such as naming the article and summarizing content. While there has been considerable research on titles over the last 20 years, the importance of the topic means that there is always room for additional work in this research area. This article treats the title as a section of the research article, not as a separate genre unto itself, and hence utilizes the insights of genre analysis to seek a better understanding of how title meaning is realized and communicated. Genre, defined as classes of communicative events with shared purposes, is one of the dominant paradigms in the field of English for specific purposes (ESP). In this article, second language writing, the name usually given to the study of writing

performed by non-native speakers of a language, including both true second or foreign language perspectives, is coupled with the analysis of genre.

In explaining the function of the title, Swales (1990) suggests that it is "at the same time both front matter and summary matter" (p. 179). The title is front matter because it is usually the first line of text encountered by readers, and all too often the last. Based on the title, many readers will decide correctly or incorrectly that the content of the article holds little relevance for them. If the content of the article is clearly summarized, readers can make a reasoned decision to continue. If the title is unclear and fails to summarize the content of the article, readers may incorrectly assume that there is nothing relevant to their needs and pass over useful published research. Therefore, according to Swales and Feak (2004), "Authors know that titles are important, they know that the RP [research paper] will be known by its title, and they know that a successful title will attract readers while an unsuccessful title will discourage readers" (p. 278). Helping readers to find relevant information is only one reason why titles have great significance in scientific publishing. Wang and Bai (2007) suggest that titles are important because they can "affect the impact factors of the articles" (p. 388).

There has been a considerable amount of advice and research about titles for second language writers of research articles. Given the Anglo-American orientation of numerous style guides (e.g., Day & Gastel, 2006), it is necessary to balance this dominant orientation with works for second language writers from different cultural backgrounds (e.g., Swales & Feak, 2004) to level the playing field. For example, Wang and Bai (2007) analyzed "the syntactic structures English native speakers have often employed to achieve conciseness or economy in English titles" (p. 397) to help non-native speakers "who wish to publish their RAs in peer-reviewed journals to write effective English titles" (p. 397). Since the pressure to publish in English-language international journals keeps increasing for second language writers (Braine, 2005; Curry & Lillis, 2004; Flowerdew, 1999), ESP-based research has provided assistance with many aspects of research writing, including titles. While this research has the potential to assist writers from all backgrounds, including native English speakers, one important goal of this type of research is to overcome barriers, a topic discussed by Canagarajah (1996) when analyzing the non-discursive obstacles of academic research article production.

For second language writers, the transition from novice to expert includes genre awareness, rhetorical appropriacy, and navigation of sociopolitical issues. While second language acquisition can be described as the confluence of complexity, fluency, and accuracy of the second language (L2) (Larsen-Freeman, 2006), the process is actually more complicated than simply mastering traditional content such as grammar. In the process of becoming proficient in publishing research articles in English-medium journals, Dressen-Hammouda (2008) describes how novices adopt the

disciplinary identity of their fields at the same time as they master the syntactic structures used in their discourse communities. Many second language writers struggle to improve their academic English as undergraduates (Angelova & Rianzantseva, 1999) and develop their research writing as graduate students (Li, 2006). Li describes how the novice-expert shift in the writing-for-publication process includes mastery of both syntactic structures and sociopolitical relationships. The goal of mastering a research genre, publishing journal articles, and becoming a member of a discourse community is now the central issue in many academic careers.

In an analysis of whether more English as International Language scholars are getting published, Belcher (2009) found increased diversity among contributors to English-medium journals between 1996 and 2006, but noted "less rhetorical diversity than expected" (p. 221). In other words, the sections of the research article, such as the title, the abstract, the introduction, and so on, have not changed as much as the population of the discourse community. Since there are many aspects of English that second language authors need to master, it is helpful to have a framework to understand the different genres and rhetorical appropriacy (Rowley-Jolivet & Carter-Thomas, 2005). In Rowley-Jolivet and Carter-Thomas' study of information structure, they found the conference papers and presentations of second language writers showed less syntactic differentiation than native speakers of English in their use of scientific communication structures. The focus of their study, information structure, usually encompasses Theme/Rheme and Given/New, and they found, for example, second language writers had less ability to use the passive and place clausal constituents in theme position.

For second language writers, there are many sources of assistance including members of the ESP community and traditional publishing professionals. Research articles are frequently shaped by disciplinary colleagues and professionals. According to Burrough-Boenish (2003), the spiraling path of a research article starts with the second language writer and often includes the author's second language colleagues, the authors' proofreader, the journal editor, the journal reviewers, and the copy-editor. The majority (73%) of these contributors, called literacy brokers by Lillis and Curry (2006), are academic professionals, and those who are English language professionals (23%) often make significant changes to the text including the title. The range of contributions runs from free advice of peers in the same academic discipline to paid professionals such as translators (Li & Flowerdew, 2007). Throughout the experience of working with literacy brokers and language professionals, authors have the potential to increase their English writing and editing skills.

Numerous second language writers become expert users of genres and members of discourse communities. Of the many determinants which explain the success of second language writers who do get published, Belcher (2007, p. 1) suggests that authorial persistence, defined as "willingness to continue

revising and resubmitting," is central to the process. This quality, a willingness to continue rewriting manuscripts, can be seen as having two parts, perseverance and editing skills. Developing perseverance is akin to a research area in psychology called self-efficacy, and not a common research topic in ESP, but the process of revising and resubmitting research articles is clearly within the domain of second language writing. Despite the many important reasons for publishing in a first language (L1), and many scholarly publications that continue to thrive in languages other than English (Flowerdew & Li, 2009), the increasing emphasis on English-medium journals presents a challenge for novice authors of research articles. To meet this challenge, second language writers often turn to published research to learn rhetorical appropriacy and master the syntactic structures (Rowley-Jolivet & Carter-Thomas, 2005). This process can be applied to any part of the research article including the title or to other research genres such as the conference presentations. As Soler (2007) suggests, "writing scientific titles is a challenging exercise as it requires a series of skills from authors to be able to include all these requirements in the titles of their papers" (p. 91).

2. Background to the Study

Recent research suggests that the nominal group is a central feature in scientific and academic writing. Scientific texts, including research articles titles, depend on nominalization to realize meaning. Research on the historical origins of nominalized text in science writing suggests links to Latin (Banks, 2005), and research on the development of synoptic style in scientific text shows increasing lexical density (Van de Kopple, 2002). Based on research by corpus linguists about the percentage of nouns in different types of English (Hudson, 1994) and discourse analysis of the increasing density of nominalization in academic English (Van de Kopple, 2002), it seems likely that nominalization is one of the distinctive features of scientific writing. In addition, nominalizations contribute cohesion in texts and perform a compacting function (Baratta, 2010).It seems likely that writing in a highly nominalized style is one of the many challenges for second language writers.

Many studies have documented the importance of nominal groups in research article titles. Nominal groups, according to Halliday (1994), are phrases with a noun as the head. In a cross-disciplinary study, Haggan (2004) compares full-sentence, compound, and nominal group titles in order to investigate the "important features in the succinct knowledge transmission required in title design" (p. 293). In a similar cross-disciplinary and cross-generic study, Soler (2007, p. 90) analyzes the "the structural constructions of titles" in order to identify the most distinctive features. Haggan and Soler conclude that nominal group construction is the most important feature of research article titles. They suggest the reason for the extensive use of nominal groups is their information density. Soler suggests this is accomplished by "piling up of pre- and post-modifiers" (p. 98). The function

of nominal group modification is to summarize content and to produce a synopsis. Pre- and post-modification realizes the specific meaning of the noun at the head of the phrase. Halliday suggests (1994) that this aspect of scientific nominalization is essential because "the nominal group is the primary resource used by the grammar for packing in lexical items at high density." (p. 351). Haggan and Soler conclude that the central reason for this title construction is compacting information. Therefore, the nominal group with pre- and post-modification, according to this line of thought, is the defining feature of research article titles.

In a cross-generic study of research article and thesis titles in applied linguistics, Jalilifar (2010) included a breakdown of titles which documented the dominance of nominal groups. In terms of research article titles, Jalilifar found that the compound construction was used more than other constructions, and that noun phrase/noun phrase (NP/NP) was the most common structural construction among compound titles. In addition, the second most common structural construction, after compounds, was the noun phrase title. Combining the compound titles that start with noun phrases (e.g., NP/NP, NP/VP, and so on) and the titles that are strings of noun phrases (without a colon or other punctuations creating a compound), Jalilifar's analysis suggests that nearly 70% of the titles in applied linguistics start with a nominal group. Therefore, it is important to examine the first position nominal groups to get a better understanding how they function and their effect on the following structural constructions.

To explore the structure of nominal groups in titles, Wang and Bai (2007) analyze the grammatical variations of first position nominal groups in titles, and examine the post-modifiers which follow the first position nominal groups. The compacting of disciplinary content information in pre-modified nominal groups, called taxonomic nouns by Halliday (1998), is an important feature of research article titles. As Wang and Bai (2007) suggest, these text structures do more than "allow a very dense packaging of referential information in text" (p. 395). The first position nominal group is the one that appears in the beginning of the title, and Wang and Bai found that about 75% of the first position nominal groups were uni-head terms, but they did not analyze these terms as theme markers. Like Haggan (2004) and Soler (2007), Wang and Bai conclude that summary of the research article content is achieved through nominal group construction and that pre- and post-modification realize meaning by densely packing information. Wang and Bai come closest to offering an explanation for the frequency of nominal groups in titles when they conclude, "the preference for such structures may be determined by [their] powerful ability to compact information in an economical way through various pre- and post-modifiers" (pp. 394-395).

While Wang and Bai (2007) use Systemic Functional Grammar, they do not address Theme/Rheme and cohesion. Halliday (1994) explains that Theme is the main message, or communicative event, for a text. He suggests

there are two ways to identify Theme/Rheme. It can be discussed at a clausal level as information order, and it can be explained at a nominal group level as a position in the text. In both cases, the central issue in Theme/Rheme is cohesion, and it ties together nominal groups. Cohesion, according to Halliday, is a technical description about how terms are tied together. The outcome of cohesion is coherence, which can be described as a semantically meaningful use of language. Halliday also discusses Given/New, but the differences between these two constructs suggest that Theme/Rheme fits this study better. Theme/Rheme focuses on information structure and word order while Given/New focuses more on general meaning. Theme, for example, is identified as being a first position nominal structure, but Given can range over any length of text.

Title text, due to the requirement that it is short and clear, can be a little hard to explain using the five types of cohesion identified by Halliday. As Swales (1990) noted, certain types of scientific writing "evince in Hallidayan terms coherence but little cohesion" (p. 168). In this quote, Swales was referring to methods sections of research articles, but this observation applies equally well to title text. Given the potential for disconnectedness of nominal groups in titles, Theme/Rheme is one explanation of how content terms are tied together. Haggan (2004), Soler (2007), and Wang and Bai (2007) all demonstrate that nominal groups are important features of research article titles. Yet, the question of how nominal groups generate a coherent summary is never fully addressed. Titles clearly do more than list keyword descriptors, but how summarization produced from nominal groups is not adequately explained.

3. Purpose of the Study

This study suggests that nominal groups, Theme/Rheme, and coherence work together to summarize content in research articles. While this study focuses on just one type of first position nominal group, it suggests that summarization is routinely carried out by repurposing one of the standard features in titles. Titles have long contained methods and research process terms. This study will show how first position nominal groups containing research constructs do more than just specify the methodology. In doing so, this study explores the attendant question regarding the importance of nominal groups. Are nominal groups the most important feature of titles? In addition, this article addresses the question of application for the ESP community: Should second language writers concentrate on nominal groups and try to compact as much information as possible through pre- and post modification into the title to fulfill the synoptic function and communicate contents to readers? Answering these questions yields a new understanding of the syntactic structure of titles and provides a direction for second language writers of titles to increase the effectiveness of the title text.

4. Method

During the summer of 2009, the author and two research assistants used the Social Science Citation Index website (Thomson Reuters, 2009) to collect 2640 titles. For each of the 99 linguistics journals included in the 2008 index, the full citation of each research article was downloaded. Then the researcher team eliminated review articles, short reports, technical communications, and other forms of research reports. Titles from non-research texts such as letters to the editor and book reviews were not included in the corpus. The corpus used in this study contained 347 titles. The coding technique used in this article was developed by the author over the last two years and was used in a series of related articles (Rath, 2010a, 2010b).

During the first round of coding, all titles with research process nominal groups in first position were sorted based on the first position nominal group. There is some debate about how to best parse nominal groups. Identifying pre-modification of headwords is usually not the problem. Dividing post-modification of nominal groups, especially clausal structures, can be problematic. In order to use a system that can be easily applied, the parsing of titles was done based on the smallest possible nominal group. During the second round of coding, the headword of first position nominal group was double-checked and if necessary re-categorized. Based on the root headword, 54 categories were created. Words such as *effect* and *effects* were placed in the same category. Then the 54 headwords were ranked based on frequency.

5. Results

The analysis focused on the headwords in the first position nominal groups. Table 1 presents a list of common headwords, each of which appears in more than 10 of the 347 titles. The top 11 headwords accounted for 67% of the 347 titles being analyzed, which demonstrates that they are much more common than the other 43 headwords, many of which only appeared just once or twice. While there is a great deal of variability among the headwords in the first position nominal groups, certain headwords which would be expected based on previous research, such as *role* and *influence,* appeared frequently in titles. The most common headword, *effect*, was found in 77 (22%) of the 347 titles.

Table 1. *First position research process nominal group headwords in research article titles*

Headword	Frequency	Percentage
effect	77	22%
contrast	26	7%
role	20	6%
analysis	18	5%
approach	16	5%

theory	15	4%
influence	14	4%
model	12	3%
study	11	3%
relationship	11	3%
comparison	11	3%
Sub-Total	231	67%
Other headwords	116	37%
Total	347	100.0%

The headword, *effect*, showed considerable nominal variability. Table 2 presents the different forms of *effect* when it appeared in first position. By far the most common form in the first position, appearing in 46 (60%) titles, was as a singular headword, such as *the effects*. When pre-modification appeared, it was more likely to be taxonomic compounding of the single *effect* being specified, but a minor number of titles specified two or three effects. There is no rule regarding the number of pre-modifiers necessary for a nominal group to be identified as a taxonomic compound noun, as opposed to a compound noun, which means headwords with two, three, four, and five terms can all be interpreted as attempts to precisely specify the disciplinary content.

Table 2. *Variability of the first position research process nominal group with headword* effect

Form of *effect* in title	Frequency	Percentage
One *effect* specified		
Single term	46	60%
Two-term compound	11	14%
Three-term compound	10	13%
Four-term compound	2	3%
Five-term compound	1	1%
More than one *effect* specified		
Two effects	6	8%
Three effects	1	1%
Total	77	100%

Note: The plural, *effects*, was included in this category, but terms such as *effective* were not included.

First position research process nominal groups can be a single noun or they can be taxonomic nominal groups. All the examples in this section will use *effect*, but the same lexicogrammatical structure appears in the other titles in the corpus. Example 1 is a title containing a single headword in the plural form, *effects*, with minimum pre-modification and no post-modification:

(1) *The **Effects** of Training on Automatization of Word Recognition in English as a Foreign Language*

Example 1 has no pre-modification, and successive nominal groups cannot be combined into one long post-modifying structure. Example 1A presents the title divided into five nominal groups:

(1A) / *The **Effects** / of Training / on Automatization / of Word Recognition / in English as a Foreign Language /*

Example 1A highlights the nature of nominal groups in titles. They can be grouped into clauses or they can be divided into noun phrases with discrete lexical meanings.

This analysis concentrates on the nominal group in first position, but the process of increasing the specificity of nominal groups by adding pre-modification, also called information compacting, can appear at any point in the title. Example 2 presents a two-term head, *Stroop Effect*, in first position:

(2) *The **Stroop Effect** in Kana and Kanji Scripts in Native Japanese Speakers: An fMRI Study*

Example 3 presents a three-term head, *Phonotactic Probability Effects*, in first position:

(3) ***Phonotactic Probability Effects** in Children Who Stutter*

Example 4 presents a four-term head, *Speech Focus Position Effect,* in first position:

(4) *The **Speech Focus Position Effect** on Jaw-Finger Coordination in a Pointing Task*

Example 5 presents a five-term head, *Masked Associative/Semantic Priming Effects,* in first position:

(5) ***Masked Associative/Semantic Priming Effects** Across Languages with Highly Proficient Bilinguals*

This process of pre-modifying the head to create a taxonomic compound in the nominal group appears widely in the corpus.

Pre-modification can also take different forms. Examples 1-5 focus on a single noun that is becoming increasingly specialized though taxonomic structures that specify sub-categories. By comparison, Example 6 presents a first position nominal group, *Subjective and Objective Effects*, which specifies two effects:

(6) ***Subjective and Objective Effects*** *of Fast and Slow Compression on the Perception of Reverberant Speech in Listeners With Hearing Loss*

Example 7 presents a first position nominal group, *Stimulus, Task, and Learning Effects*, which contains three effects:

(7) ***Stimulus, Task, and Learning Effects*** *on Measures of Temporal Resolution: Implications for Predictors of Language Outcome*

From these seven examples, the variability of first position research process nominal with just one head groups can be seen. This process, pre-modifying to achieve lexical density, is central to the current explanation of title summarization of research article content. Despite their variability, all seven terms function as the theme of the title.

5.1 Theme/Rheme structure

When theme is defined as the first position nominal group, all that follows is rheme. Example 8 illustrates this structure:

(8) ***Effects*** *of Two Training Procedures in Cross-Language Perception of Tones*

The title can be divided into theme and rheme, as shown is example 8A:

(8A)	Theme	/	Rheme
	Effects	/	*of Two Training Procedures in Cross-Language Perception of Tones*

The theme statement informs the reader that the focus of the research article is the influence of *Two Training Procedures* on *Cross-Language Perception of Tones*. This is the standard function of research process nominal groups. The theme statement in the title structures the following nominal groups. The impact of the theme statement helps the reader understand the relationship between the following terms, and it also creates a grammatically correct line of text, as Example 8B shows when the term is removed:

(8B) *Two Training Procedures in Cross-Language Perception of Tones*

Example 8 is a title with a single word nominal group in first position. The same relationship can be seen in titles with extensive post-modification. This dual function, specifying a research construct and structuring Theme/Rheme, can be seen in Example 9:

(9) ***Effects*** *of Trait Emotional Intelligence and Sociobiographical Variables on Communicative Anxiety and Foreign Language Anxiety Among Adult Multilinguals: A Review and Empirical Investigation*

Example 9 is a compound title, as it has two parts separated by a colon (:). Examination of the first half shows a string of nominal groups which has basic pattern *Effects of A and B on C and D among E*. The second half, *F and G*, also contains nominal groups. The use of the head *effect* sets up the relationship between *A and B* and *C and D* and also *among E*. The theme articulated in the first position nominal group also encompasses the second half of the compound title. The first half of the title without the theme marker in Example 9A presents a truncated version:

(9A) *Trait Emotional Intelligence and Sociobiographical Variables on Communicative Anxiety and Foreign Language Anxiety Among Adult Multilinguals*

The pattern of the title, *A and B on C and D among E*, demonstrates the extensive use of nominalization. The truncated title, Example 9A, exhibits a grammatical problem due to removing *Effects*. The preposition *on* would have to be changed to make it grammatically correct. An alternate title might have an *A, B, C, and D among E* form. In this title, nominal terms *A, B, C, and D* have a parallel structure. The importance of *effect* can also be seen in how it ties the research methodology located after the colon (:) in this compound title. Placing the description of the methodology, *A Review and Empirical Investigation*, in first position would not sufficiently clarify the relationship between the nominal groups in the first half of the Example 9. This example highlights the dual function of the first position nominal term. It describes a research construct and ties together the following terms.

5.2 Coherence in titles

When a first position nominal group simply specifies disciplinary content, it often has little impact on the coherence of the title. However, a first position nominal group with a dual function does more as it specifies something about a research construct while structuring the title in Theme/Rheme terms. The result of the ties that are created between the nominal groups is coherence. A string of nominal groups without something to tie them together is a list, as in the case of the keywords which appear below the abstract. When research process terms are in first position, they usually tie the following terms together and yield coherence, as can be seen in Example 10:

(10) *The **Effects** of Divided Attention on Speech Motor, Verbal Fluency, and Manual Task Performance*

The structure of Example 10 can described as *The Effects of A on B, C, and D*. It is not the inclusion of disciplinary content nominal groups (*B, C, and D*) that generates coherence. Nor is it the use of taxonomic nouns, such as *Manual Task Performance*, that produce coherence. The first position nominal group ties together the following nominal groups. Consider a revised version of the title, where the first position research process nominal group is removed, as shown in Example 10A:

(10A) *Divided Attention, Speech Motor, Verbal Fluency, and Manual Task Performance*

Example 10A is a list (*A, B, C, and D*), and none of the nominal groups produce coherence. For a title to summarize content, the nominal groups need to be placed in a text structure that produces a meaningful relationship between the terms.

Coherence, the quality of being semantically meaningful, is created by a theme marker in the title. Consider the role of the first position term in Example 11 where it provides essential content and also ties together the other terms:

(11) *The **Argument-Structure Complexity Effect** in Children with Specific Language Impairment: Evidence from the Use of Grammatical Morphemes in French*

In Example 11, the first position term provides the theme of the summarization and produces a Theme/Rheme structure. Example 11A presents this title without the first position nominal group:

(11A) *Children with Specific Language Impairment: Evidence from the Use of Grammatical Morphemes in French*

In Example 11A, the first half of the compound identifies the population, but does not specify anything beyond it. The tie that connects the first half of the compound title to the second half is missing. Disciplinary content is supplied in the second half of the title, but the two halves are only tied by juxtaposition, but not by Theme/Rheme. To try to remedy this problem without a research construct, Example 11B presents a revision that includes a disciplinary content nominal group adapted from the pre-modifying terms of *Effect*:

       (11B) *Argument-Structure Complexity in Children with Specific Language Impairment: Evidence from the Use of Grammatical Morphemes in French*

The preposition *in* ties the two nominal groups in the first half of the title. While the preposition *in* suggests linkage, the relationship is still unclear. Does the study concentrate on *Argument-Structure Complexity* by itself or its relationship to other factors such as *Use of Grammatical Morphemes*? Given the varying degrees of clarity and the innumerable combinations of terms in titles, there is no combination that can be described as "the most effective," but Example 11 is more effective in concisely specifying content than Examples 11A and 11B. The reason Example 11 is more effective seems to be the inclusion of a term that functions as a research construct and generates a Theme/Rheme structure within the title. The dual function creates a more coherent title and produces a clearer summary.

6. Discussion

    Previous research suggests the dominant function of research article titles is description of content. Hartley (2005) asks a central question about titles: Should titles attract or inform? Haggan (2004) suggests that they do both, they attract and inform, without analyzing whether attractive titles are more effective. Likewise, Jalilifar (2010) suggests that titles do both, as they "organize perceptions and create structures of meaning" (p. 27). Thus, there is some rhetorical appropriacy (Rowley-Jolivet & Carter-Thomas, 2005) about informative titles. Belcher (2009) seems to be correct in noting that there is less rhetorical diversity in research articles than might be expected. Informative titles have become the dominant form and they have not changed much over the last 10 or 20 years. None of the recent studies of titles noticed any new or emerging forms of titles. Since "succinct knowledge transmission," as Haggan (p. 293) calls it, is the dominant function of research article titles, this study has been concerned with the syntactic structures that increase summarization of the contents of research articles.

    This study confirms the findings of Haggan (2004), Soler (2007), and Wang and Bai (2007) that the most distinctive feature of research article titles is the nominal group construction, but not necessarily the high-density nominal group terms created with pre- and post-modification. In Soler's terms, "the most recurrent structural construction corresponds to the *nominal group construction*" (italics in original, p.97). Given the importance of rhetorical appropriacy, one might not expect much change is possible or desirable. However, the emphasis on nominal groups in recent research about titles needs to be reconsidered.

    Are nominal groups the most important feature of titles? Pre-modification or post-modification of nominal groups in titles seems to be an essential part of title structure, but emphasizing nominal groups overlooks the

contribution of Theme/Rheme to summarization. Haggan seems to suggest that post-modified nominal groups containing prepositional phrases are one of the distinguishing features, as they have an information packaging function. Wang and Bai suggest that pre-modification is an essential tool for creating precise nominal groups, what can be called taxonomic nouns, but their discussion of titles also suggests that post-modification allows for dense information packaging. Soler says both pre- and post-modification of headwords in nominal groups are important, a process she describes as "piling up" (p. 98) the modifiers. Summarization of research article content, according to Haggan (2004, p. 303) is aided by "simple juxtaposition" of nominal groups in titles. This is the prevailing explanation for how titles summarize the content of research articles. This study found however, that 60% of the titles containing *effect* in first position were single term nominal groups. The balance (40%) showed a variety of taxonomic compounding structures. Therefore, this study generally supports findings about the importance of nominal groups, but questions the necessity to pile up too many terms in titles.

Haggan (2004) and Soler (2007) do not discuss the role of first position nominal groups. Wang and Bai (2007) studied the first position nominal groups, and found that the majority (74.6%) in their corpus are uni-head nominal groups, followed by bi-head nominal groups (21.8%), and multi-head nominal groups (3.6%). Of the 308 uni-head nominal groups, the most common form of uni-head titles (91.6%) contained post-modified terms contained in prepositional groups. They emphasized post-modifying syntactic structures and offered a breakdown of the nominal groups that followed the first position, and concluded that they all have the same function. This study found a greater proportion of uni-head groups than Wang and Bai. About 90% of the titles containing *effect* were uni-head first position terms. Like Haggan and Soler, Wang and Bai conclude the central function of nominal groups was "compacting information in an economical way" (p. 395). Compacting information, however, is somewhat different from producing a summary of research article content.

Compacting information is necessary in titles, and high-density nominal groups are needed for precise specification of disciplinary specialties, but it does not explain the structure of titles very well. There are differences between the nominal groups, and not all nominal groups function as information compactors. Furthermore, a string of nominal groups without a coherent structure can only provide a limited summary, though juxtaposition does offer potential for interpretation. However, dual function first position nominal group increases summarization because they act as theme markers. The structure of Theme/Rheme suggests that the nominal group in first position will orient and structure the following terms. This is not, strictly speaking, an information packaging technique. Soler suggests that titles exhibit a "classifactory process" (p. 98), which is similar to Wang and Bai

who suggest that titles contain "very dense packaging of referential information" (p. 395).

This article has described how nominal groups in conjunction with Theme/Rheme create a concise summary. The findings of this study suggest that the nominal groups in the middle and the end of the title are tied together by the nominal group in first position. Therefore, summary is created out of the interaction of the nominal groups. The nominal groups are tied together, a process called coherence, because of the structure imposed by the term in first position. In other words, the summary of the article is created out of nominal groups, a Theme/Rheme structure, and ties which produce coherence. It is not just nominal groups, no matter how precise. Nominal groups in conjunction with Theme/Rheme, and coherence produce summary.

7. Pedagogical implications

Translating research findings into advice and guidelines can be difficult. It is hard to find the correct level of detail for recommendations and updated examples. For many novices, examples outside their disciplinary area are often hard to apply. Nevertheless, general suggestions are possible and description of common forms is helpful. In their discussion of implications, Wang and Bai (2007) state, "Medical researchers, practitioners, and students who wish to publish their RAs in peer-reviewed journals are recommended to adopt nominal groups, especially those with prepositional group as post-modifier, in writing English titles or translating titles into English" (p. 398). This is a good starting point for tentative guidelines for writing titles that concisely summarize research article contents. Combining nominal groups, especially nominal groups that start with prepositions, can produce adequate summary. The use of taxonomic nouns can increase the focus on the specialized content of research articles, but there is more to writing effective titles than lexical density and nominalization. The aim of this brief comment on the application of these findings is to further delineate pedagogical activities to help second language researchers and writers of research articles to write titles that succinctly summarize the content.

Instead of just checking the correspondence of nominal groups in the title to the keywords, abstract, or manuscript, the findings of the research project presented in this paper suggest that second language writers need to check the first position nominal group to determine if it is performing a dual function. This can be done by examining the ties between the first position term and the following nominal groups in the title. In theory, theme markers can be both disciplinary content and research process nominal groups. However, it might be useful to write more than one title, including a title that starts with a research construct or a research methods term. Comparing different versions of titles will undoubtedly help second language writers learning the genre of research articles to produce a title with a relatively concise and coherent summary.

8. Conclusion

This study examined research process nominal groups in the first position of research article titles. Research process nominal groups in first position seem to have a dual function, specifying something of the research methods or constructs in the study being reported and structuring the following nominal groups in the title, a process explained by Theme/Rheme. They provide coherence and tie together the nominal groups in the title. They structure the summary in addition to describing the methods, hence their dual function.

Additional research is necessary to confirm these findings. The next step in following up on these findings is to examine disciplinary content nominal groups in first position. To do this, it is necessary to code titles with a disciplinary content nominal group in first position and examine the ties to subsequent nominal groups. In addition, it is possible that research article titles may function differently if the research process nominal groups are in the middle or the end. After coding for research terms in rheme position, it will be possible to examine ties to other types of terms. With the addition of these studies, it should be possible to come to a better understanding of the first position term in titles.

The title is one of the first parts of a research article that a reader sees. As Jalilifar (2008) states, "A title is the first point which captures the reader's eye" (p. 27). This situation makes the title an especially important line of text. As Swales (1990) points out, "Title and abstract in published papers are at the same time both front matter and summary matter" (p. 179). Since the title is usually the first point of contact between the reader and the article, it is important that the summary of the content of the research article be clear and concise. While taxonomic nominal groups may be information compactors, and information density is important to a certain extent, the title has to function as a summary, not just a list of high-density keyword descriptors. The nominal group in first position in the theme seems to play an essential role in that it ties together the disciplinary content nominal groups in the rheme and helps produce a coherent title.

It seems likely that research process nominal groups in first position had only one function at one time, but over the years they took on this second function. It is easy to overlook this second function, but the second function is of great importance to the title. When the research process nominal group is in first position, it creates the structure that increases the effectiveness of the summarization. When nominal groups stand alone, they are descriptors. If a string of nominal groups are tied together in a meaningful way, the outcome of this process summarizes of the content of the research article.

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Dr. Alex Rath (Ph.D., University of Illinois, 1995) is an associate professor in the English Department at Shih Hsin University in Taipei, Taiwan, ROC. He has published 20 articles and ten books about English and education. His research interests include discourse analysis and English for Specific Purposes.