

## Move analysis for scientific abstract sections: a study of nanoscience and nanotechnology research article abstracts

Chiou-shu J. Hwang<sup>†</sup>, Thanh-Hong Nguyen<sup>‡</sup> & Te-Jen Su<sup>‡</sup>

Meiho University, Pingtung, Taiwan<sup>†</sup>  
National Kaohsiung University of Applied Sciences, Kaohsiung, Taiwan<sup>‡</sup>

**ABSTRACT:** This study investigated the rhetorical features of the abstracts of research articles (RAs) in nanoscience and nanotechnology (NN). The corpus of this study included 60 NNRA's written by Vietnamese and English authors (VAs and EAs). The Hyland's five-move model for the abstract sections has been employed for the analysis. The chi-square test was used to check the statistical hypotheses about the move structure of abstracts. The results show that the abstracts of NNRA's do not follow the Hyland's model. The most frequently used move structures in abstracts of NNRA's are purpose - methodology - results. In addition, the move structure of VA's abstracts had some special differences with that one of EA's abstracts, which implied that the differences may come from the cultural context of the authors. The findings of this study offer pedagogical and cultural implications in academic writing for researchers and students who want to publish their works, especially for non-native researchers without an English-language background.

### INTRODUCTION

Research articles (RAs), one of the most common academic writing styles by students and researchers, is the way to present new research results among the academic community and request for the acceptance [1]. Because of the special characteristics of each research field, the structure and writing style of RAs in each field is also different. A lot of studies have concentrated on analysing the organisational patterns of RAs, such as the studying of the introduction section [2][3], the method section [4] and the results section [5][6]. Swale and Freak pointed out that RA is a genre, while the other components of RA are part-genres [7]. It means that specific sections of RAs also follow some rules of structure.

The abstract section is the first paragraph in most RAs that shows a brief description of all the content in the RA or thesis. The abstracts of each research field have their own forms and structures, which must be strictly complied with. Many researchers have studied the abstracts of RAs. Salvager and Meyer [8] investigated 77 medical English abstracts of three types of text: case reports, research papers and review articles. They figured out a six-move structure for medical article abstracts: statement, purpose, corpus/methods, conclusions and recommendations. Stein studied the conference abstracts of teaching English to the speakers of other languages (TESOL) in term of its rhetorical function [9].

In general, the number of RAs on genre analysis of abstracts of science and technology RAs is still small in comparison with those in social sciences RAs. Natural sciences and technology (NST), the pioneer in the development of society, has distinctive features, which separate it from the social sciences. The RAs of each small field belonging to NST also have their own features. In this study, a recent rapidly developed field of NST - nanoscience and nanotechnology (NN), is mentioned. The genre analysis of the abstract sections of NNRA's is presented in more detail. Meanwhile, the abstract sections of NNRA's which have been written by Vietnamese authors (VAs) and English authors (EAs) were compared.

### MOVE ANALYSIS

A genre comprises a class of communicative events, the members of which share some set of communicative purposes [2]. These purposes are recognised by the expert members of the parent discourse community and, thereby, constitute the rationale for the genre. Nowadays, genre can be found expansively in different fields, such as linguistics, discourse, social sciences and business. This study focused on the move analysis of a corpus of texts considered to be representative of a specific genre. A move in genre analysis is defined as a *discoursal or rhetorical unit that performs a coherent communicative function in a written or spoken discourse* [3]. Pho indicated *...each move has its own communicative purpose, which, together with other moves, contributes to the general communicative purposes of the texts* [10].

Each rhetorical move can be realised by one or more steps, but not all moves comprise constituent steps. Both moves and steps are functional units and can be optional or obligatory in a genre. Some moves or steps occurring regularly in a genre are considered obligatory; others occurring less frequently are considered optional. The identification of moves is a crucial step in a rhetorical structure analysis [3].

## METHODOLOGY

All abstracts for this study were gathered from a set of NNRA, which are easily accessed from the official Web sites of peer-reviewed SCI journals. Besides, all journals should come from different countries and continents, thereby, making the corpus more global and reliable. Initially, a comprehensive list of all the journals was collected. Then, five journals were selected by consulting the experts in the field of NN. All the selected RAs were recently published and with a reasonable format of abstract, which was clear, including 150-300 words compressed within five to eight sentences. The size of corpus should be considered carefully. Generally, the smallest number of RAs to be valid is about 30 [11].

For the purpose of comparing the genre of abstracts of RAs, which were written by VAs and EAs, 30 RAs written by VAs (so-called VARAs) and 30 RAs written by EAs (so-called EARAs) (Americans, English, Australians, Canadians, etc) were selected. To ensure the selected articles were written only by Vietnamese, the nationality of all the authors of those RAs was checked from their on-line bibliography or by e-mail-based contact. In the same way, the nationality of the authors of the RAs, which are written by NAs is also guaranteed.

### Analysis Method

For the general science and technology RAs, the abstracts should include five moves: introduction, purpose, method, results and conclusions, as suggested by many scientific writing manuals of worldwide technical universities. This model is also the same as the Hyland's five-move model [1]. In this study, the Hyland's five-move model in Table 1 serves as the starting point for analysing the move structure of abstracts of NNRA.

Table 1: Hyland's five-move model of abstracts.

Moves	Function
M1 - introduction	Establishes context of the paper and motivates the paper.
M2 - purpose	Indicates purposes, hypothesis, outlines aim behind the paper.
M3 - method	Provides information on design, procedures, data analysis, etc.
M4 - results	Indicates results, achievements and the argument.
M5 - conclusions	Interprets or extends the results, points to applications or wider implications and interpretation scope of paper.

After getting the corpus, all the abstracts were passed to a group of testers, who conducted the move structure identification. The authors first explained the move analysis and used an article as a sample to show how to categorise texts into moves. Then, all the testers used the move classification codes to tag the texts at a place and time of their choosing within a three-month period. Where they encountered segments that did not correspond to the moves or the steps listed, they could suggest new moves or steps as appropriate, explaining the communicative purposes of the new moves or steps in writing. The authors communicated with the testers via e-mail to answer any questions concerning the coding procedure and to receive explanations of new moves identified, when applicable. For a move to be recognised as typical or conventional, this study required that a move appear in at least 70% of the examined abstracts. Otherwise, it was considered to be optional. Next, the results from the testers were compared. Any differences were revised and discussed to reach unified results. After that, chi-square tests and descriptive statistical methods were used to analyse the results.

## RESULTS AND DISCUSSION

Table 2 summarises all the move patterns, which occur in the abstract sections of VARAs and EARAs. There are neither 2-move abstracts nor 7-move abstracts. In fact, the 6-move abstract is also less used. Therefore, the focus was on abstracts with 4-move and 5-move abstracts.

Table 2: The frequency of all move patterns in abstract of nanoscience and nanotechnology RAs.

	Pattern used	Vietnamese abstracts	English abstracts
3- move patterns	M2-M3-M4	9	5
	M1-M2-M3	0	1
	M1-M3-M4	0	1
	M2-M3-M5	1	0
	M1-M4-M5	1	0

4- move patterns	M2-M3-M4-M5	5	6
	M1-M2-M3-M4	8	8
5- move patterns	M1-M2-M3-M4-M5	3	8
	M2-M1-M3-M4-M5	1	0
	M2-M3-M4-M3-M4	2	1
Total		30	30

All five conventional moves of the Hyland's model were observed in the abstracts. However, the occurrence of each move in the abstracts was not the same. Table 3 shows the occurrence frequency of each move in the abstracts of VARAs and EARAs, and the hypothesis test on the move structure of NNRA's abstract is shown in Table 4. The significant value of chi-square test ( $0.003 < 0.05$ ) reveals that there are significant differences between the move model of NNRA's abstracts. In detail, move M2, M3 and M4 appear in the NNRA's abstracts with a high frequency of occurrence (above 95%); move M1 and M5, with the probability of occurrence smaller than 50%. It suggests that the move M2, M3 and M4 have an important role in the abstracts of NNRA's.

Table 3: The frequency of each move in the Hyland's model in the abstract of NNRA's.

Moves	Vietnamese	English	Average
M1 - introduction	9	15	12
M2 - purpose	29	29	29
M3 - method	29	30	29.5
M4 - results	29	29	29
M5 - conclusions	14	16	15

Table 4: The result of chi-square goodness-of-fit test on the model of NNRA's abstracts with the Hyland's model.

	Value	df	Asymp. sig. (2-sided)
Chi-square goodness-of-fit test	16.269	4	0.003

Table 5: The result of chi-square test of independence for Vietnamese abstracts and English abstracts.

	Value	df	Asymp. sig. (2-sided)
Chi-square test of independence	1.299	4	0.862

At a glance, the frequency of each move in NNRA abstracts seems not to be very different from the ones in NNEA abstracts. The chi-square test result in Table 5 confirms that statement. With the significant value 0.862 ( $> 0.05$ ), there are no significant difference between the using of moves in VA's abstracts and EA's abstracts. However, there are still some minor remarks on the writing habits of VAs and EAs. EAs use move M1 and move M5 with a higher frequency than VAs use them. On the other hand, the VAs did not include move M1 and move M5. It implies that VAs are not concerned about disclosing their findings or discussing their research. The differences between the two groups may be due to the lack of English general knowledge and writing skill in VAs. The low level of English proficiency limits their comprehension. As a result, they failed to present adequate types of information in their first and last moves, which usually require considerable writing skill.

Though sharing a similar set of moves, there are some differences between move sequence of VA's abstracts and EA's abstracts. Figure 1 gives a clearer indication of the similarities and differences between the use of each move pattern in the abstracts written by VAs and EAs.

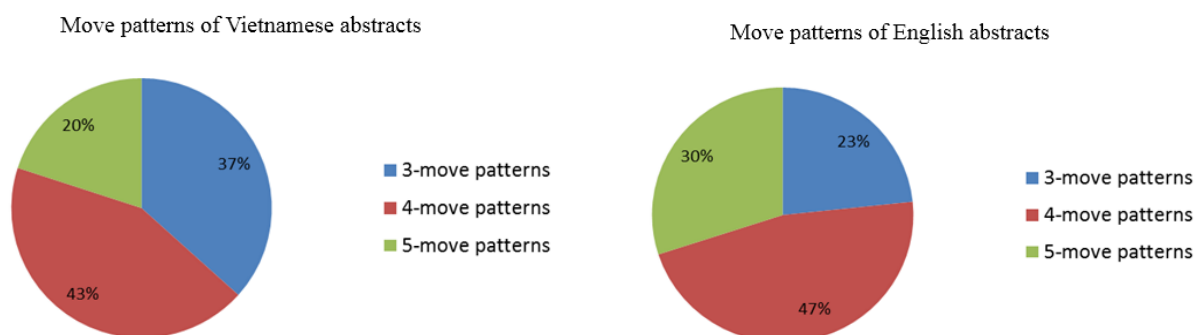


Figure 1: The percentage of using move patterns in abstracts of VAs and EAs.

The 4-move patterns appear with the highest frequency in both VAs and EAs. Among the remained move patterns, VAs use 3-move patterns more than 5-move patterns, but EARAs used 5-move-pattern abstracts more than 3-move pattern ones. Thus, EAs tend to follow the standard procedure in writing abstracts instead of missing one or two moves as the VAs do. The reasons may come from the cultural context of the authors. In a high context (HC) culture, which VAs belong to, not everything is explicitly stated and the listeners or readers are expected to understand the unsaid hints in context. In most cases, communication involves more of the information in the physical context or internalised in the person [12].

In contrast, EAs tend to have a low context (LC) culture, in which the meanings are explicitly presented through language. One more feature, the frequency deviation between three move patterns in EA's abstracts is smaller than that in VA's, which make EA's abstracts more reliable.

## CONCLUSIONS

This study researched the rhetorical structure of the nanoscience and nanotechnology (NN) research article abstracts written by Vietnamese authors and English authors, and the Hyland's five-move model was considered as the referred model. The results show that the certain variations can be found in the texts of both groups of abstracts. All the five moves appear in the abstracts and the M2 - purposes, M3 - methodology and M4 - results are used in most of the abstracts.

There is a relative lack of M1 - introduction and M5 - conclusions in VA's abstracts. The findings may help Vietnamese researchers in related fields become aware that the writing of abstracts differs in structural, linguistic and cultural ways. By being aware of the above variations, the non-English speaking students and researchers will increase their chances for publication and participation in the international research community.

## REFERENCES

1. Hyland, K., *Disciplinary Discourses: Social Interactions in Academic Writing*. London, UK, Longman (2000).
2. Swales, J.M., *Genre Analysis: English in Academic and Research Setting*. Cambridge University Press (1990).
3. Swales, J.M., *Research Genres: Explorations and Applications*. Cambridge University Press (2004).
4. J.M.H. Lim, Method sections of management research articles: a pedagogically motivated qualitative study. *English for Specific Purposes*, 25, 3, 282-309 (2006).
5. Taylor, G. and Chen, T., Linguistic, cultural, and subcultural issues in contrastive discourse analysis: Anglo-American and Chinese texts. *Applied Linguistics*, 12, 3, 319-336 (1991).
6. Yang, R. and Allison, D., Research articles in applied linguistics: moving from results to conclusions. *English for Specific Purposes*, 22, 4, 365-385 (2003).
7. Swales, J.M. and Feak, C.B., *Abstracts and the Writing of Abstracts*. MI: University of Michigan Press (2009).
8. Salager-Meyer, F., Discoursal flaws in medical English abstracts: a genre analysis per research and text-type. *Text*, 10, 4, 365-384 (1990).
9. Kamhi-Stein, L.D., Profiles of underprepared second-language readers. *J. of Adolescent and Adult Literacy*, 4, 8, 610-619 (1998).
10. Pho, P.D., An evaluation of three different approaches to the analysis of research article abstracts. *Monash University Linguistics Papers*, 6, 2, 11-16 (2009).
11. Stollera, F.L. and Robinson, M.S., Chemistry journal articles: an interdisciplinary approach to move analysis with pedagogical aims. *English for Specific Purposes*, 32, 1, 45-57 (2013).
12. Hall, E., *Beyond Culture*. New York: Doubleday (1976).