

A Comparative Study on Promotion of Modal Adjuncts in Research Article Introductions

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Abstract—Promotion is a major strategy in Research article introductions (RAIs) to attract reader's attention and gain recognition. Building on previous researches that suggest promotion in RAIs could be realized by different kinds of linguistic elements and rhetoric structures, this study collected 100 SCI RAIs in the discipline of computer science as data and explored the promotion realized by interpersonal metafunction and rhetoric structure of modal adjuncts. Meanwhile, in order to identify if there are differences and similarities of promotion between Chinese EFL RAIs (English RAIs written by Chinese scholars) and English L1 RAIs (English RAIs written by English and American scholars), this study quantified lexical features by examining lexical density, lexical variety and position of modal adjuncts. Results showed that the modal adjuncts could realize promotion through varying interpersonal metafunctions (temporality, modality, intensity and comment) and the model of Create a Research Space (CARS). However, more comprehensive promotion was realized in English L1 RAIs through interpersonal metafunction conveyed by more frequent, more kinds of and more positions of modal adjuncts. Besides, this study also verified that modal adjuncts were encoded of CARS to realize promotion in both Chinese EFL RAIs and English L1 RAIs in the same way because of the same strategies (familiarity and logic) and similar linguistic features. These results are discussed in terms of "constraint communication", and discipline background drawn on for knowledge claims in same and different types of academic writing of promotion between Chinese EFL RAIs and English L1 authors.

Index Terms—research article introductions, interpersonal metafunction, modal adjuncts, create a research space

I. INTRODUCTION

In the field of academic writing, the research article (RA) is identified as "a recognizable communicative purpose and by the presence of characteristic features with standardized form, function, and presentation that are part of its general conventions" (Thomas & Hawes, 1994). In order to make a smooth communication between the writer and reader, different sections of RA assume the realization of special functions, especially the promotional function of research article introductions (RAIs). In the extant literature that relates to what is referred to here as promotion in academic discourse, to promote the writers' research and to attract readers' attention, Afros and Schryer (2009) proved RAIs are one of the vital sections where promotional acts are likely to accumulate. Berkenkotter and Huckin (1995) even remarked, "It is not so much the amount of news value that is remarkable in today's scientific journal arguments as it is the promoting of it." As for how to realize promotion in RAIs, just as Hyland (1990) has summarized, successfully published researchers seldom stop at displaying factual information of their research, but skillfully manipulate "interactive features and various rhetorical structures" to promote their work. Therefore, it is worth paying attention to the interactive features and rhetoric structure of linguistic features which could realize promotion in RAIs.

To realize the promotional function, the authors would try to utilize on the one hand different kinds of linguistic elements that are generally acknowledged as interactive features so as to make their research achievements accepted by readers and academic communities more easily. On the other hand, they also take into account the rhetorical structure of move-based persuasion to construct logic in order to confirm the validity and rationality in RAIs. According to Systemic functional grammar (SFG), the interpersonal metafunction can be seen as the exchange or interaction between the speaker (writer) and listener (reader) and serves to establish and maintain the social relations (Halliday, 2008). Specifically, it is widely acknowledged that modal adjuncts could serve interpersonal metafunction in academic discourse. Thus, it is worthy of a study to explore how the promotion function is carried out with the interactive features of interpersonal metafunction expressed by modal adjuncts. While RAs typically cannot be "dramatically self-justificatory" (Swales, 2004), there may be a "hidden agenda", as Bhatia (2004) put it, which handles promotional intentions. The rhetoric structure of this kind of feature is Swales (1990) and Bhatia's (1993) model of Create a Research Space (CARS) with the elaboration of three moves with persuasive function in RAIs, namely, establishing a territory, establishing a niche and occupying the niche. Studies on promotion, therefore, should not miss how rhetoric structure is encoded by modal adjuncts to realize promotion in RAIs.

In addition, English as a lingua franca is commonplace where English is used as the language of communication

between academic practitioners with different linguistic and cultural backgrounds. However, as proposed by Hawes and Thomas (2012), native speakers instinctively know a great deal about the information structure patterns of their mother tongue. This phenomenon has posed challenges to authors who are non-native English speakers. Not only do they have to demonstrate the awareness of writings conventions and strategies that are generally accepted in RAIs to construct themselves as competent members of the academic community, but they also consider that these conventions and strategies might be different from those in their languages (Bizzell, 1992). Moreover, Shaw et al. (2014) argued that language in promotional discourse could be affected by disciplines or technology environments and thus would show variations in actual application. Consequently, the comparative study between Chinese EFL RAIs (English RAIs written by Chinese scholars) and English L1 RAIs (English RAIs written by English and American scholars) should also be noted, and the discipline of computer science is selected because promotion in RAIs may be highly discipline-specific.

This study, therefore, aims to investigate how promotion is realized by modal adjuncts through analyzing their interpersonal metafunction and rhetoric structure encoded by modal adjuncts in both Chinese EFL and English L1 RAIs. To illuminate possible difficulties faced by Chinese EFL authors and suggest ways in which they might deal with in realizing promotion in RAIs of the discipline of computer science, the comparative study is also made between Chinese EFL and English L1 RAIs. In all, this study addresses the following questions: 1. How is promotion realized by the interpersonal metafunction of modal adjuncts in both Chinese EFL RAIs and English L1 RAIs? 2. How is promotion realized by the rhetoric structure of modal adjuncts in both Chinese EFL RAIs and English L1 RAIs? 3. Are there any differences in the promotion realized by modal adjuncts between Chinese EFL RAIs and English L1 RAIs?

II. METHODOLOGY

A. Data Collection

As a part of data gathering process, all data were searched and extracted from 100 RAIs written by Chinese EFL and English L1 writers. These 100 RAIs were chosen from five SCI journals of computer science and engineering discipline from 2014-2018, 10 RAIs written by Chinese EFL and English L1 writers of each year. Author's identity was conducted by following the procedure of An (2015); English L1 writers were distinguished from Chinese EFL writers using Wood's (2001) strict criterion: first authors must have names native to the country concerned and also be affiliated with an institution in countries where English is spoken as the first language. Though this may not be a perfect method to ascertain the nativeness of the authors, it is an often-used method apart from actually contacting the authors themselves. There were a large number of "noisy" data in the raw data. To reduce the influence of noisy data, all raw data were passed through manual screening; footer and header, chapter head, picture and table were deleted. Besides, direct quotation sentences were also excluded because they are borrowed expressions, though these sentences were quite few in the corpus. Finally, 105,173 words of clean data, including 55,425 words of Chinese EFL RAIs and 49,748 words of English L1 RAIs, were analyzed in this study.

B. Labelling

According to SFG, modal adjuncts are typically realized by adverbs and prepositional phrases. The prepositions and adverbs were first automatically labelled by LIWC (Linguistics Inquiry and Word Count), a lexical approach to perform sentiment analysis with large internal dictionaries, and then manually were identified if they serve as modal adjuncts or not. The labelled adjuncts were classified manually in terms of the interpersonal metafunction. According to SFG (Halliday, 2008), the modal adjuncts consist of mood adjunct and comment adjunct, and the mood adjunct can be further divided into modality, temporality and intensity adjunct. So in this study, in order to do a more detailed analysis, the modal adjuncts were classified into four types: intensity, temporality, modality and comment. This study labelled 555 modal adjuncts (315 were intensity; 109 were temporality; 85 were modality; 52 were comment) in English L1 RAIs, and 685 modal adjuncts (415 were intensity; 99 were temporality; 86 were modality; 85 were comment) in Chinese EFL RAIs. Meanwhile, noun phrases and verb phrases related to the modal adjuncts were also labelled in order to calculate the position. The position of modal adjunct was labelled as thematic, neutral and afterthought on the basis of SFG (Halliday, 2008). This study found 179 thematic, 220 neutral, and 156 afterthought positions of in English L1 RAIs, and there were 242 thematic, 341 neutral, and 102 afterthought positions in Chinese EFL RAIs.

By adapting CARS model (Swales, 1990; Bhatia 1993), this study classified all the sentences with modal adjuncts into three moves, including Move 1: establishing a territory, Move 2: establishing a niche, and Move 3: occupying the niche. We found 169 modal adjuncts in Move 1, 426 modal adjuncts in Move 2, and 90 modal adjuncts in Move 3 in Chinese EFL RAIs, and 156 modal adjuncts in Move 1, 318 modal adjuncts in Move 2, and 81 modal adjuncts in Move 3 in English L1 RAIs.

After the automatic process of labelling, three authors were involved in the manual labelling in order to minimize the level of subjective judgement. Two professionals firstly annotated all modal adjuncts in RAIs independently, and it turned out that about 96% of results were the same as each other. Secondly, the move structures were coded by two raters and the interrater reliability was 92%. The rest of the labelling results where they failed to agree on the classification were further discussed with the third person until they eventually reached consensus on all the categories.

C. Analyzing the Realization of Promotion

The annotated data were further analyzed to identify the lexical patterns to realize promotion. This realization was assessed in three aspects: lexical density, lexical variety, and position. Lexical density expresses the number of sentences which includes a modal adjunct, and lexical variety refers to the type/token ration of modal adjuncts. The positions of modal adjuncts were measured in both a regular way and a weighted way. The regular method is to analyze the distribution of each position, whereas the weighted method is to predict the overall tendency. The formulas to measure lexical density, lexical variety and position are as follows. Besides, to test whether there is any difference between Chinese EFL RAIs and English L1 RAIs, t test was employed to calculate the P-value by SPSS, version 25.0.

Lexical density = $n/N \times 100\%$ (n= The number of sentences with a modal adjunct; N = The total number of sentences)

Lexical variety = $n/N \times 100\%$ (n = The type of modal adjuncts; N = The token of modal adjuncts)

Position = $n/N \times 100\%$ (n = The number of one kind of modal adjunct position; N = The total number of modal adjunct positions)

Weighted position = $(1 * n1 + 2 * n2 + 3 * n3) / N$ (n1 = The number of thematic positions; n2 = The number of neutral positions; n3 = The number of afterthought positions; N = The total number of modal adjunct positions)

III. RESULTS

Our qualitative analysis identified promotional realization in RAIs based on interpersonal metafunction and CARS of modal adjuncts. We then presented the quantitative results to analyze if there were differences in overt promotion between Chinese EFL and English L1 RAIs, by analyzing the linguistic features of modal adjuncts.

A. Promotion Realized by Interpersonal Metafunction of Modal Adjuncts

(a). Promotional Interpersonal Metafunction

In our study, typical words (see Table 1) were defined as high-frequency words, and were just compared by counting their frequencies. They are represented by top-3 high-frequency words accounted for approximately 50.00%, sometimes even as high as 75.00% of all the modal adjuncts in both Chinese EFL and English L1 RAIs.

TABLE 1
INTERPERSONAL METAFUNCTIONS OF TOP-3 MODAL ADJUNCTS

| Interpersonal metafunction | | Chinese EFL RAIs | English L1 RAIs |
|----------------------------|-------------------------|---|---|
| Intensity | Counterexpectancy | only (59), additionally (39) | only (46), even (21) |
| | Degree | also (93) | also (81) |
| Temporality | Relative to now | recently (32) | recently (18), previously (12) |
| | Relative to expectation | still (15), not yet (9) | still (20) |
| Modality | Usuality | usually (36), often (24), always (6) | often (44), usually (9) |
| | Probability | | likely (11) |
| Comment | Propositional | specifically (38), in particular (18), | in particular (42), (un)fortunately (24), specifically (18) |
| | Speech-functional | generally (14) | |

The first kind of interpersonal metafunction of modal adjuncts that commonly serve is intensity. Intensity can be further classified into counterexpectancy and degree. In counterexpectancy, word "even" in E.g.1 showed the exceeding, and "only" in E.g.2 expresses limiting. As for the degree, only one word "also" in E.g.3 was found. Thus, there's no big difference in the choice of modal adjuncts of intensity.

E.g.1 These texture-less objects are even characterized by their contour structure. (EN)

E.g.2 the 2014 MITOSIS dataset that only labels the center of mitosis. (CH)

E.g.3 A similar idea was also proposed by Gennari and Hager. (CH)

Temporality is another interpersonal function realized by adjuncts. In SFG, temporality can present two-time states, one is the relative to now, the other is the relative to expectation. Combined with the genre analysis of RAI, in the context of literature review, the temporality of relative to now may help describe the previous work or studies, such as the word "previously" in E.g.4 while the temporality of relative to expectation can express expectation of future study to fill in the gap of preceding research. As shown in E.g.5, the typical word "still" not only shows the limitation of past work, but also expresses the author's negative attitude. Furthermore, the word "recently" in E.g.6 describes the current situation attempting to solve the research problem.

E.g.4 Previously, we used a tight-linkage problem. (EN)

E.g.5 Worse still, flash memory can only be erased in blocks. (CH)

E.g.6 to become an affordable alternative to traditional disks only recently. (CH)

Still another interpersonal function realized by adjuncts is modality, including usuality and probability. In both English L1 and Chinese EFL RAIs, "usually" in E.g.7 and "often" in E.g.8 of usuality were frequently used. As for probability, only in English L1 RAIs, this paper found writers adopted modality of probability such as "likely" in E.g.9 to show humility and respect to readers and offer some room for readers to disagree with them (Abdollahzadeh, 2011; Gillaerts &

Velde, 2010; Hyland, 1996). Compared with English L1 RAIs, the probability of modality was used less frequently in Chinese EFL RAIs. Besides, English L1 writers did not prefer the speech-function comment in their RAIs.

E.g.7 for long-standing rumours, processing is usually retrospective. (EN)

E.g.8 Attackers are often assumed to have physical access to the vulnerable system. (CH)

E.g.9 but the case and the names involved will most likely differ. (EN)

Comment is another interpersonal function realized by adjuncts. The word "generally" in E.g.10 verified that "there is no very clear line between comment and the mood adjuncts" (Halliday, 2008), especially with the degree of intensity. In the type of propositional comment, such as the word "unfortunately" in E.g.11 was used to express writers' attitudes, which showed that writer was not satisfied with the proposed method. In this way, the comment was used to stress the significance and their contributions in their academic field. Table 2 shows that English L1 RAIs used more comment than Chinese EFL RAIs, which can be ascribed to more usages of speech-function comment of English L1 RAIs. Except for the insufficient vocabulary, it is perhaps because Chinese cultural members dislike overt displays of confidence whereas modesty and respect are considered to be virtues. In contrast, individualism and the ownership of ideas in the West are taught and considered appropriate for both the author and their readership (Hyland, 1996).

E.g.10 Generally, SLC flash is used in industry-grade devices to provide high performance and sTab. reliability. (CH)

E.g.11 Unfortunately, in their proposed method, Boyle et al. (2008) did not describe how to estimate the optimal window size. (EN)

(b). Linguistic Realization of Interpersonal Metafunction

Table 2 shows the data obtained about lexical density. As can be seen, English L1 RAIs used more modal adjuncts than Chinese EFL RAIs significantly ($P < 0.05$). 29.46% sentences employed modal adjuncts in English L1 RAIs, while only 27.42% sentences in Chinese EFL RAIs used modal adjuncts. This perhaps can be explained by Pan et al (2016), who indicated that L2 writers seemed to focus less on directing readers' attention to facilitate understanding. Therefore, the more promotion in English L1 RAIs could be realized because of interpersonal metafunction conveyed by more modal adjuncts than Chinese EFL RAIs.

Considering different types of modal adjuncts in terms of interpersonal metafunction, this study found adjuncts of intensity appeared most frequently both in Chinese EFL (14.65%) and English L1 (14.60%). And the difference between English L1 and Chinese EFL RAIs was negligible (0.05%), which could be explained by Mu et al. (2015) who illustrated that academic genre needs to be objective and impersonal in persuasion. Another reason for this might be the genre of research articles, which is computer science and engineering. Thus, the predominance of intensity adjuncts was to describe some statistic results and to show the author's attitude towards them. It should be noted that although there are most types of comment adjuncts in SFG, it does not account for the most density in both Chinese EFL and English L1 RAIs. The reason of discipline could also explain the distribution of comment, because the subjectivity of hard discipline is not as strong as soft discipline (Chang, 2008). In addition, it was observed that adjuncts of modality were used least in both Chinese EFL (3.20%) and English L1 (4.30%) RAIs, which may be ascribed to the scientific thinking of writers who would not like to use some vague language in their RAIs. The biggest difference between Chinese L1 and English EFL RAIs in terms of lexical density lies in comment adjuncts, with a difference value of 2.40%. As in Xu and Nesi (2019) study, this difference can be explained by the fact that English was a foreign language for the Chinese authors, and that they might not have had access to all lexicogrammatical resources available to the English L1 authors.

TABLE 2
RESULTS OF LEXICAL DENSITY, LEXICAL VARIETY, AND WEIGHTED POSITION OF INTERPERSONAL METAFUNCTION

| Interpersonal metafunction | Lexical Density | | Lexical Variety | | Weighted Position | |
|----------------------------|----------------------|---------------------|----------------------|---------------------|-------------------|-----------------|
| | Chinese EFL RAIs (%) | English L1 RAIs (%) | Chinese EFL RAIs (%) | English L1 RAIs (%) | Chinese EFL RAIs | English L1 RAIs |
| Intensity | 14.65 | 14.60 | 11.57 | 15.24 | 1.9012 | 2.0920 |
| Temporality | 3.80 | 5.13 | 18.45 | 21.21 | 1.6667 | 1.8349 |
| Modality | 3.20 | 4.30 | 12.79 | 16.47 | 2.1047 | 2.1647 |
| Comment | 6.95 | 9.35 | 30.59 | 32.69 | 1.2388 | 1.2714 |
| Overall | 27.42 | 29.46 | 15.09 | 18.15 | 1.7303 | 1.8305 |

As to lexical variety, significant difference between Chinese EFL (15.09%) and English L1 RAIs (18.15%, $P < 0.01$) was found. It is consistent with the study of Pan et al. (2016). After searching the wordlist of modal adjuncts, it was found that synonym is one means for English L1 writers to achieve rich lexical variety. For example, the word "sometimes" in E.g.12 is replaced by "for some time" in E.g.13 and an uncommon word "sporadically" (which can't be searched from General-Service-List) in E.g.14. Our results of support the claim of Gras et al (2020) which is native speakers display a wider repertoire of forms (no. of different types). Because of more types of modal adjuncts in English L1 RAIs, they had more ways to express interpersonal metafunction which resulted in the more various promotion in RAIs than Chinese EFL RAIs.

E.g.12 Sometimes, procedural content generation needs to tackle the problem of infeasible solutions. (CH)

E.g.13 an $O(n)$ -time and $O(n)$ -space algorithm for computing minimal absent words (on a fixed-sized alphabet) based on automata is known for some time (EN)

E.g.14 So, selected experiences are sporadically injected into the overall population of tribes (EN)

The type of comment adjuncts enjoyed the highest variety in both Chinese EFL (30.59%) and English L1 RAIs (32.69%), which may be caused by its numerous types and usages (Halliday, 2008). Conversely, the variety of intensity in both Chinese EFL RAIs (11.57%) and English L1 RAIs (15.24%) was the lowest. This might be explained from the perspective of the feature of intensity. In SFG, the intensity is identified to express the degree and counterexpectancy of the results and content of research and is possibly employed with some specific and fixed usage. And surprisingly, the difference value of modality adjuncts between English L1 and Chinese EFL RAIs was the biggest (3.68%). For the same reason, Chinese EFL writers might have had less access to all lexicogrammatical resources available to the English L1 writers.

As for position, as shown in Table 2, although both Chinese EFL and English L1 writers preferred the neutral position, with all the values of WP close to 2, the significant difference of lexical position was noted between Chinese EFL and English L1 RAIs ($P < 0.05$). Consequently, English L1 writers deployed promotion in more positions than Chinese EFL writers.

Table 3 shows the results of position measured in a regular way. The difference value between the most and least Overall P of Chinese EFL RAIs (30.71%) was considerably higher than that of English L1 RAIs (16.95%), which showed that English L1 RAIs were of more balanced distribution of modal adjuncts than Chinese EFL RAIs. English L1 writers preferred all three kinds of positions, while in most cases, Chinese EFL writers only used thematic and neutral positions. A striking difference was noted when different kinds of modal adjuncts were considered singly in terms of interpersonal metafunction. As far as temporality adjuncts were concerned, the thematic position was preferred by Chinese EFL writers (49.50%) instead of the neutral position, whereas the thematic and neutral positions were equally used (38.84%) in English L1 RAIs. This is perhaps because Chinese EFL writers are used to expressing time firstly, which might have caused the temporality to appear less frequently in neutral and afterthought positions. Therefore, more implicitly promotion in English L1 than Chinese EFL RAIs was caused by different lexical positions, in terms of its more balanced position which did not attract too much readers' attention which results in gaining their recognition unconsciously. In addition, in all the cases of modal adjuncts, the thematic position of comment was used most frequently in both English L1 RAIs and Chinese EFL RAIs than other kinds of modal adjuncts. It can be explained by the information focus which could function at the beginning of sentence proposed by Cruttenden (1997).

TABLE 3
RESULTS OF POSITION IN INTERPERSONAL METAFUNCTION

| Interpersonal metafunction | Position | Chinese EFL RAIs (%) | English L1 RAIs (%) |
|----------------------------|--------------|----------------------|---------------------|
| Intensity | Thematic | 26.75 | 23.81 |
| | Neutral | 56.38 | 43.17 |
| | Afterthought | 16.87 | 33.02 |
| Temporality | Thematic | 49.50 | 38.84 |
| | Neutral | 34.34 | 38.84 |
| | Afterthought | 16.16 | 22.32 |
| Modality | Thematic | 6.98 | 16.47 |
| | Neutral | 75.58 | 50.59 |
| | Afterthought | 17.44 | 32.94 |
| Comment | Thematic | 81.09 | 80.40 |
| | Neutral | 12.94 | 12.06 |
| | Afterthought | 5.97 | 7.54 |
| Overall | Thematic | 41.07 | 41.17 |
| | Neutral | 44.82 | 34.61 |
| | Afterthought | 14.11 | 24.22 |

B. Promotion Realized by Rhetoric Structure of Modal Adjuncts

(a). Promotional Rhetoric Structure Combining Interpersonal Metafunction

The move structure is another important factor to examine the realization of promotional function. In different moves, modal adjuncts with different interpersonal metafunctions may be preferred by adopting different strategies. As is shown in Table 4, this study identified how the interpersonal metafunction was considered appropriate for the fulfillment of promotion in terms of CARS. In this way, familiarity (Ma & Qi, 2016) which showed writers' knowledge in his/her research, and logic (Yang, 2016) which drew references and summarized the meaning were adopted as two strategies in both Chinese EFL RAIs and English L1 RAIs to gain readers' recognition and achieve promotional function with the usage of modal adjuncts.

The interpersonal metafunction of temporality and modality were embodied in the strategy of familiarity with the usage of modal adjuncts whose identifications were relative to now and usuality of each interpersonal metafunction. When the logic strategy is concerned, it was involved in Move 2 and Move 3 of CARS, which convinces that the link between Move 2 and Move 3 is a strong one (Swales, 1990). The logic strategy is manifested by the interpersonal metafunction of intensity, temporality and comment. After the general review of previous work in Move 1, both Chinese EFL and English L1 writers proposed the insufficiency or sufficiency of previous work by using the adjuncts which were defined as counterexpectancy, relative to expectation and propositional in Move 2. Meanwhile, they began to establish the progressive relationship of Move 3 in their RAIs. The interpersonal metafunction of intensity and comment were

employed again with the usage of modal adjuncts named degree and speech-functional when they introduced their research. The logical relationship was constructed completely, by using the modal adjuncts to respond to the insufficiency or sufficiency of previous work. It can be concluded that the strategies and methods of utilizing the interpersonal metafunction used to realize promotional function in both Chinese EFL and English L1 RAIs are the same as each other. Details about these two strategies realized by modal adjuncts in different moves are as follows.

TABLE 4
REALIZATION OF PROMOTION UNDER MOVE AND INTERPERSONAL METAFUNCTION

| Move | Strategy | Interpersonal metafunction | |
|----------------------------------|-------------|--|--------------------------------------|
| Move 1. Establishing a territory | Familiarity | Relative to now Usuality Counterexpectancy | Temporality Modality Intensity |
| Move 2. Establishing a niche | Logic | Relative to expectation Propositional Degree | Temporality Comment Intensity |
| Move 3. Occupying the niche | Logic | Speech-functional | Comment |

In Move 1, the author would like to display previous research. When displaying the overview of previous work, the strategy modal adjuncts commonly realize is showing writers' familiarity with their knowledge in the field, by showing research time, methods and contents. The modal adjuncts of relative to now which belong to temporality in SFG were often involved in the representation of time, such as the word "recently" in E.g.15. As for the research methods and contents, the modality was used to express writers' stance, such as the words "likely" in E.g.16. Meanwhile, both Chinese EFL and English L1 writers showed the preference of vague language to offer space to readers to dispute their general review. Using such median and low adjuncts, it wouldn't arouse controversy and lay the foundation for the next move to bridge the gap (Martin, 2005). In this way, writer's impersonal and objective image was built firstly and impressed readers with writer's knowledge.

E.g.15 Recently, researchers have attempted to learn the structure of occlusions from data [9], [18]. (EN)

E.g.16 but the case and the names involved will most likely differ. (EN)

In Move 2, writers usually pinpoint the insufficiency or sufficiency to explain rationale for analyzing his/her research. After showing the general review with the strategy of familiarity in Move 1, the interpersonal metafunction of comment, temporality and intensity appeared to construct logic. The modal adjuncts of counterexpectancy, relative to expectation and propositional were employed to show the surprising insufficiency and sufficiency of previous work. In E.g.17, "only" of counterexpectancy pointed out what has not been analyzed of previous work, while sufficient research was indicated by the word "even" of counterexpectancy in E.g.18. By doing so, both Chinese EFL and English L1 writers began to build the progressive relationship between the gap and their research, and the sufficiency and insufficiency can be regarded as the reason why they chose the thorough method or content of previous work in their study or filled in the gap of insufficient work. Besides, the highest and explicit promotion was observed in this step because of the usage of some high degree modal adjuncts such as "almost" in E.g.19. These modal adjuncts were chosen to highlight the necessity of gap which should be explored.

E.g.17 the 2014 MITOSIS dataset that only labels the center of mitosis. (CH)

E.g.18 These texture-less objects are even characterized by their contour structure. (EN)

E.g.19 Almost all optimisation procedures search the parameter space by evaluating the objectives for a given parametrisation before proposing a new, hopefully better, parametrisation. (EN)

The third move of CARS is occupying the niche which only includes the strategy of logic. Actually, the logic in this move is the continuum of the logic in Move 2. Here, the logic employed the interpersonal metafunction of intensity and comment with the usage of adjuncts which were recognized as degree and speech-functional. Both Chinese EFL and English L1 writers put forward their research according to the insufficiency and sufficiency of previous work, such as "also" of degree in E.g.20 which expresses writer's agreement of the previous work, thus he/she also accepted the same identification in the study. On the contrary, "specifically" of propositional comment in E.g.21 indicated the angle-based evolutionary algorithm was not focused by other researchers, thus, he/she proposed a new algorithm. The interpersonal metafunction of intensity and comment appeared again in Move 3 to help writer to respond to the adjuncts which shows the sufficient or insufficient research in the previous step, and completed the construction of logic. The use of these modal adjuncts brings readers into the progressive relationship and convinces them that writers' study is reasonable because it is proposed based on the previous work. Compared with the adjuncts in the logic employed in Move 2, the logic in this move was rather implicitly embedded in the texts because of the usage of median and low degree adjuncts, such as the word "hardly" in E.g.22. Meanwhile, the objective image was built when writers introduce their work.

E.g.20 we also consider the feature map as a Pca cancer response map (CH)

E.g.21 Specifically, this paper proposes a vector angle-based evolutionary algorithm (CH)

E.g.22 their presence in wide parts of the genome may be hardly tolerated for less known reasons (EN)

(b). Linguistic Realization of Rhetoric Structure

As to lexical density of modal adjuncts in three moves, significant difference between Chinese EFL and English L1 RAIs ($P > 0.05$) was not found. A close examination of results reveals that the linguistic features of modal adjuncts used in

three moves to realize promotion between Chinese EFL and English L1 RAIs are similar with each other. As is shown in Table 5, the type of modal adjuncts used in logic construction of Move 2 was the most frequently occurring modal adjuncts found in both RAIs. Therefore, in the process of realizing promotional function in RAIs, both Chinese EFL and English L1 writers paid more attention to constructing logic to lead the readers to accept their own research rather than show their knowledge of previous work. Besides this writing convention, we think another reason is that science RAIs tend to avoid (or do not need) the more rhetoric options (Swales, 1990), so the lexical density of each Move in both Chinese EFL and English L1 RAIs is not so balanced.

TABLE 5
RESULTS OF LEXICAL DENSITY, LEXICAL VARIETY, AND WEIGHTED POSITION IN DIFFERENT MOVE

| Move | Strategy | Lexical Density (D) | | Lexical Variety (V) | | Weighted Position (WP) | |
|----------------------------------|-------------|----------------------|---------------------|----------------------|---------------------|------------------------|-----------------|
| | | Chinese EFL RAIs (%) | English L1 RAIs (%) | Chinese EFL RAIs (%) | English L1 RAIs (%) | Chinese EFL RAIs | English L1 RAIs |
| Move 1. Establishing a territory | Familiarity | 23.30 | 28.10 | 18.01 | 21.34 | 1.7267 | 1.7272 |
| Move 2. Establishing a niche | Logic | 64.40 | 57.30 | 16.40 | 11.04 | 1.7068 | 1.8121 |
| Move 3. Occupying the niche | Logic | 12.30 | 14.60 | 2.35 | 3.75 | 1.8824 | 2.1000 |
| Total | | 100.00 | 100.00 | 15.09 | 18.15 | 1.7303 | 1.8305 |

In comparing the lexical variety of modal adjuncts used in varying strategies in each move, the results revealed the insignificant difference ($P > 0.05$) between Chinese EFL and English L1 RAIs. Table 4 shows that the type of modal adjuncts used most in three moves is showing writer's familiarity in both RAIs, followed by constructing logic in Move 2 and Move 3.

When position of modal adjuncts in each introduction is concerned, the significant difference ($P > 0.05$) was not observed between Chinese EFL and English L1 RAIs. Table 4 shows that both Chinese EFL and English L1 writers preferred the similar position of modal adjuncts in each move to encode rhetoric structure to realize promotion in RAIs, that is, the neutral position, with all the values being close to 2.

It should be noticed that, although the same logic construction strategy was accepted in Move 2 and Move 3, both Chinese EFL and English L1 employed different positions of modal adjuncts to construct logic in these two moves (see Table 5). In Move 2, logic strategy was encoded mostly in the thematic position of modal adjuncts, while both Chinese EFL and English L1 writers adopted the neutral position of modal adjuncts to build logic in Move 3. It means that when Chinese EFL and English L1 writers would like to build logic in a more obvious way to attract readers' attention firstly, and then the logic construction was finished inconspicuously to realize promotion.

TABLE 6
RESULTS OF POSITION IN DIFFERENT MOVE

| Move | Strategy | Position | Chinese EFL RAIs (%) | English L1 RAIs (%) |
|----------------------------------|-------------|--------------|----------------------|---------------------|
| Move 1. Establishing a territory | Familiarity | Thematic | 39.75 | 37.01 |
| | | Neutral | 47.83 | 51.30 |
| | | Afterthought | 12.42 | 11.04 |
| Move 2. Establishing a niche | Logic | Thematic | 44.77 | 48.09 |
| | | Neutral | 40.45 | 30.25 |
| | | Afterthought | 15.00 | 24.20 |
| Move 3. Occupying the niche | Logic | Thematic | 13.95 | 7.50 |
| | | Neutral | 86.05 | 75.00 |
| | | Afterthought | 0.00 | 17.50 |

In short, the modal adjuncts could realize promotion through varying interpersonal metafunctions in both Chinese EFL and English L1 RAIs, while English L1 writers had more ways to convey interpersonal metafunction and resulted in more comprehensive promotion in their RAIs than Chinese EFL RAIs. It was found that differences occurred in virtually all cases of lexical density, lexical variety and lexical position of modal adjuncts between English L1 and Chinese EFL RAIs. Though published in the same journal, English L1 RAIs used more modal adjuncts, more kinds of adjuncts and more positions than Chinese EFL RAIs. Considering the influence of different quantitative results of interpersonal metafunction on promotion between Chinese EFL and English L1 RAIs, less lexical density of modal adjuncts represents less interpersonal metafunction and brings out lower promotion in Chinese EFL RAIs. Besides, considering the similar linguistic features (lexical density, lexical variety and position) of modal adjuncts and same strategies (familiarity and logic) adopted by both Chinese EFL and English L1 writers, we concluded that modal adjuncts in English L1 RAIs and Chinese EFL RAIs were encoded in the same way of CARS to realize promotion.

IV. DISCUSSION

Based on Halliday's (2008) classification of interpersonal metafunction and Swales's (1990) and Bhatia's (1993) elaboration of CARS, our study firstly identified four types of interpersonal metafunction of modal adjuncts, namely, temporality, intensity, modality and comments, which can be seen as a means to realize promotion in both Chinese EFL

RAIs and English L1 RAIs. Meanwhile, this study also found the differences of promotion caused by linguistic choices between Chinese EFL and English L1 RAIs. Secondly, when rhetorical structure of modal adjuncts was taken into consideration, Chinese EFL and English L1 writers adopted the same strategy to realize promotion, and all results of linguistic choice showed no significant difference. These differences and similarities may be explicable in terms of discipline and constraint communication.

The infusion of promotional elements in both Chinese EFL and English L1 RAIs of computer science reflects the need for the authors of computer science to convince peers of the well-establishedness and rationality of their research topics and therefore, of the worthiness of their studies. This need responds to the popularity of promotionism in academic discourse, or what Fairclough (1993) termed the marketization of academic discourse, and is a likely result of the much-competed-for chance of publication, whereby "names are made, knowledge authenticated, rewards allocated and disciplinary authority exercised" (Hyland, 2005). Therefore, this study thinks the discipline could explain the similarities of promotion between Chinese EFL and English L1 RAIs.

The considerable presence of promotional elements may be understood by reference to the nature of computer science as natural science. Bazerman (1981, 1988), in his comparison of the characteristics of natural and social sciences, points out that the goal of natural sciences, is not to establish a perception of reality but to represent nature. Hyland (2002) also indicates that the knowledge of natural sciences is built on the prior existence of phenomena in the real world and developed progressively and cumulatively along well-defined paths, and have more cohesive and established frameworks of knowledge which is different from social sciences. Therefore, this study thinks the majority of logic strategy of Move 2 in both Chinese EFL and English L1 RAIs could be explained by the feature of discipline. They default the existing knowledge is familiar in their academic community, so they prefer to construct logic through indicating gap of previous studies and describing their research in Move 2 to persuade readers to accept their research rather than displaying the knowledge in Move 1.

Furthermore, as a kind of natural sciences, as mentioned above, the discipline of computer science serves other writing features in both Chinese EFL and English L1 RAIs. Compared with social sciences, the natural sciences deal with experiment data which are not always affected by contextual factors, but show "more control of variables, less diversity of research outcomes" (Hyland, 2005). More specifically, most of the research outcomes could be displayed by the data and thus both Chinese EFL and English L1 writers have propensity to employ intensity to show the experiment results in their RAIs, such as the word "only" in E.g.23.

E.g.23 We only focus on some recent advances in this area. (CH)

A possible explanation for the differences of promotion between Chinese EFL and English L1 RAIs is constraint communication, a concept proposed by Lansty& and Heltai (2005), which means some of the potential limiting factors play greater roles in communication that occurred under certain conditions. According to our research, two factors, i.e., the language proficiency and cultural background of Chinese EFL authors, influence their RAIs a lot.

One of the plausible constraints is language competence of Chinese EFL authors since they are not fully exposed to the English environment. Where Chinese authors have to write in language which is not their mother tongue, they might write in a specific way because of limitations of language proficiency (Shaw, 2003). For Chinese EFL authors, their lexico-grammatical resources are not as many as English L1 writers. Therefore, some synonyms and uncommon words this study observed in the list of modal adjuncts of English L1 RAIs, including the words "sporadically", "sometimes" and "for some time" are missing from the Chinese EFL list.

Another constraint may be the cultural background. When writing RAIs, Chinese authors, as educated writers in Chinese academic writing, may be unconsciously influenced by the writing norms and native culture. As mentioned above, Chinese writers prefer the thematic position when they use temporality to show time since it is customary to express the time firstly in Chinese communication and writing. Besides, this study also found a typical word "(un)fortunately" which shows writers' strong attitude in English L1 RAIs, such as in E.g.24. Because of the dominant English or American authors we selected as English L1 writers in this study, the prevalent rhetorical norms and discursive preferences in these RAIs are influenced by their cultures. With their historical roots in Socratic and Aristotelian philosophical traditions, their cultures value such epistemological practices as questioning one's own as well as others' ideas and beliefs, independently evaluating received knowledge, and engaging in debate and formal argumentation as a canonical form of knowledge construction (Galtung, 1981; Peng & Nisbett, 1999; Tweed & Lehman, 2002). This proposition is consistent with the finding from studies (Hu & Cap, 2011) of Anglo-American academic writers that capitalize on hedging to make their scholarly writing display the appropriate level of circumspection, tentativeness, and commitment so that their positions, arguments or claims are more tenable or palatable to fellow members of a their discourse communities. It is no surprise that English L1 authors prefer to use comment adjuncts to make their writing show the judge of other researches. In Chinese EFL RAIs, Chinese cultural practice is characterized by a deep-seated sociocognitive belief that "verbal debate and argumentation are not meaningful tools for understanding truth and reality" (Peng & Nisbett, 1999) and that truth is self-evident without the need for argument (Bodde, 1991). Therefore, this kind of employment seldom occurs in Chinese EFL RAIs because they would not like to judge other studies in Chinese traditional culture.

E.g.24 Unfortunately, even with FDE, systems exhibit a major weakness in that data and code stored in memory are unencrypted (i.e., stored in the clear). (EN)

V. CONCLUSION

This study demonstrated that the employment of modal adjuncts was an important means to promote research in both Chinese EFL RAIs and English L1 RAIs of the discipline of computer science and engineering, and offered differences and similarities of promotion realization between them. A system of promotion in RAIs may therefore be fleshed out by grouping miscellaneous promotional elements by the types of modal adjuncts they correspond to. Meanwhile, this study provided further statistical evidence as regards different extent of promotion realization between Chinese EFL RAIs and English L1 RAIs, by examining lexical variety, lexical density and position of modal adjuncts.

Our study identified that four types of interpersonal metafunction of modal adjuncts were made in overt promotion, that is, intensity, temporality, modality and comment. According to the different quantitative results of interpersonal metafunction on promotion between Chinese EFL and English L1 RAIs, less lexical density of modal adjuncts represents less interpersonal metafunction and brings out lower promotion in Chinese EFL RAIs. This study also focused on how hidden intention of promotion in writer's research was achieved by modal adjuncts of CARS. In this way, we illustrated that modal adjuncts in English L1 RAIs and Chinese EFL RAIs were encoded in the same way of CARS to realize promotion because of the similar linguistic features (lexical density, lexical variety and position) of modal adjuncts and same strategies (familiarity and logic) adopted by both Chinese EFL and English L1 writers. Besides, two factors were identified as possible explanations of such differences and similarities: discipline and constraint communication.

More studies that focus on other promotional strategies in RAIs are clearly warranted. Promotion realized by other metafunction in RAIs is also worthy of exploration.

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