



Comparative Analysis of Engagement Markers in Research Article Introductions and Conclusions

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Abstract

In the last few decades, the interpersonal aspect of academic writing has been stressed in English for academic purposes (EAP). This corpus-based study has focused on cross-cultural and cross-contextual analysis of engagement markers in English Physics research articles (RA) written by American English writers publishing in English-medium international journals; Persian writers publishing in international English-medium journals, and Persian writers publishing in English-medium national journals. Hyland's (2005) interpersonal model was used as the analytical framework. The analysis is based on a corpus of 240 RAs in two subsections: introductions and conclusions. The computer programme AntConc was used to analyse the data, and the engagement markers were textually examined for the various functions and uses they served in the introductions and conclusions. Results of data analyses showed differences in the overall frequency of engagement markers among the three sub-corpora. However, although American academics and internationally published Persian academics' metadiscourse preferences are relatively similar, Persian writers seem to be affected by cultural preferences when making their engagement choices. This implies that the linguistic background of writers in addition to the cultural contexts of publication seems to direct scholars' rhetorical patterns when writing their RAs. Results of the current study help novice and international Physics scholars, particularly Iranian academics, to at least partially meet the disciplinary conventions of the journal they submit their manuscripts. Moreover, EAP teachers can benefit from the results to gain a more comprehensive understanding of the needs of EAP learners.

Keywords: Engagement, Engagement Markers, Research Article

Received 19 January 2021

Accepted 17 April 2021

Available online 21 June 2021

DOI: 10.30479/jmrels.2021.14944.1825

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Article Type: Research
Vol. 8, No. 3, 2021, 1-24

1. Introduction

In recent years, researchers have turned to analyzing linguistic features in academic writing. Research on the concept of metadiscourse in different genres of written academic texts has been particularly valuable because metadiscourse studies can help writers to expand the focus of their studies beyond the textual features to find how they function interpersonally (Hyland, 2015). Studies have shown that every researcher with different L1 backgrounds makes use of metadiscourse while writing. Mauranen (2010), for example, considers metadiscourse to be ‘discourse universal’, a major element of communication in languages, which speakers can draw on as necessary. As a result, researchers study text types in order to establish a framework for novice researchers.

Using “self-reflective linguistic expressions referring to the evolving texts” (Hyland, 2004, p. 133), writers add interactional aspects of language to the informative content of their texts (Hyland, 2005). This aspect of language which allows the speaker, or writer, to organise his or her text is referred to as metadiscourse (Jiang & Hyland, 2016). Hyland (2005) defined metadiscourse as “the cover term for the self-reflective expressions used to negotiate interactional meanings in a text, assisting the writer (or speaker) to express a viewpoint and engage with readers as members of a particular community” (p.37). In other words, metadiscourse refers to “how we use language out of consideration for our readers or hearers based on our estimation of how best we can help them process and comprehend what we are saying” (Hyland, 2017, p.17).

In recent years, metadiscourse has been widely used to study the rhetorical patterns of both written and spoken texts. Metadiscourse studies have focused on the genre of RA in that it is an extremely powerful genre which represents the key product of the “knowledge manufacturing industry” (Swales, 1990, p.125). In this respect, the purpose of the present research is to identify culturally based rhetorical differences in the introduction and conclusion sections of English RAs in Physics published in Iranian English-medium Physics journals and internationally well-known English journals. Particularly, metadiscourse merits more investigation as regards the way non-native-English speakers (NNES) write in English, since inevitable dissimilarities in employment of metadiscourse have been observed between native English speakers (NESs) and NNESs by some scholars (Davies, 2003; Hyland, 2015, 2016). This would particularly benefit novice, and more specifically NNESs, since they face language barriers in addition to academic writing difficulties when readership includes the international members of a particular discourse community. Furthermore, by analyzing the

metadiscourse conventions used by NESs in transmitting disciplinary knowledge, a better understanding may be gained of the routines shared among members of the community. The present study has focused specifically on just engagement markers.

Previous studies on engagement markers have mostly focused on the contextual and cultural effects on writers' choices of these signals in English texts by NESs published in the international journals and RAs by NNESs in their L1 published in the national journals rather than English RAs in the national context. They have also taken RAs into consideration as a whole. However, in this study, we compare the use of engagement markers in three corpora of English Physics RAs published by American writers in the international journals, Persian Writers in the same international journals and Persian writers in the national journals. We also focus on two separate sections (introduction and conclusion) of these RAs in order to be able to observe the intersectional differences as well. Therefore, we used the following research question to analyse engagement markers in Physics RA introductions and conclusions across three writer groups.

Are there any significant differences in the frequency and use of engagement markers in Physics RA introductions and conclusions across three writer groups?

2. Literature Review

2.1. Metadiscourse

The term metadiscourse was first coined by Harris (1959) in order to build a framework to represent how a writer, or speaker, attempts to guide the reader through a text, and the concept was later developed by several researchers (Ädel, 2006; Beauvais, 1989; Crismore, 1989; Vande Kopple, 1985, 1988, 2002). However, metadiscourse has not referred to the same thing for all researchers. From the *reflexive* point of view, Ädel (2006), and Ädel and Mauranen (2010) delimit the concept of metadiscourse to elements referring to the text itself, which helps to organise the text.

In the meantime, Hyland and Tse (2004) introduced an encompassing model known as the interpersonal model of metadiscourse (also known as integrative), based on Vande Kopple's (1985, 2002) classification of metadiscourse. The integrative model refers to the author's rhetorical manifestation in the text and considers how discourse is organised to connect with the audiences (Hyland, 2015). In contrast to Vande Kopple's model, all metadiscourse markers are interpersonal, referring to interactions between the writer or speaker and their audiences (Hyland & Tse, 2004), embracing the textual features of the reflexive taxonomy as well (Hyland, 2015).

The interpersonal metadiscourse distinguishes between *interactive* and *interactional* resources. Interactive resources allow the writers, or speakers, to organise the “discourse and reflect the writer’s assessment of what needs to be made explicit to constrain and guide what should be recovered from the text” (Hyland, 2015, p. 999); interactional resources, however, enable writers “to control the level of personality in a text and establish a suitable relationship to his or her data, arguments and audience” (Hyland, 2015, p. 1000). Interactive metadiscourse includes *transitions*, *frame markers*, *evidentials*, and *code glosses*, and interactional metadiscourse consists of *hedges*, *boosters*, *attitude markers*, *engagement markers*, and *self-mentions*.

This classification is open to new items, and there are no fixed form-function correspondences to identify metadiscourse (Hyland, 2015). Hyland’s (2004, 2005) taxonomy has been used by numerous researchers in order to conduct cross-disciplinary studies (e.g., Gillaerts & Van de Velde, 2010; Hu & Cao, 2015; Hyland & Tse, 2004; Li & Wharton, 2012). Besides, a number of cross-linguistic and cross-cultural studies have compared metadiscourse preferences among different languages, or L1 and L2 writers (e.g., Kim & Lim, 2013; Li & Wharton, 2012) in varied academic genres.

Interactional metadiscourse is “more personal” and involves the reader more actively in the text by “intruding and commenting on their message” (Hyland, 2005, p. 44-49). Thus, as interactional metadiscourse is more directly related to the reader involvement in texts, giving the writers the opportunity to “express their views and engage with the socially determined positions of others” (Hyland, 2005, p. 52), we have restricted our research to a sub-category of this type. Many other researchers have employed Hyland’s classification of interactional metadiscourse in their research studies (e.g., Abdollahzadeh, 2011; Del Saz-Rubio, 2011; Hu & Cao, 2015; Gillaerts & Van de Velde, 2010). Table 1 presents the sub-categories of Hyland’s (2005, 2015) interactional metadiscourse with some examples provided.

Engagement markers, as one subcategory of metadiscourse types, refer to the readers’ involvement in the text by being attracted to the text or included in the text through devices such as second-person pronouns, imperatives, question forms, and asides—also known as remaindered links or link blogs—a very popular method of adding little bits of information to one’s blog (Hyland, 2015). Hyland (2005, p. 54) points out that engagement markers focus on reader participation with two main purposes:

1. Reader pronouns such as *you* and interjections like *by the way* are used to establish solidarity with readers and engage them in an argument to include them as participants in a dialogic process.

2. Questions, directives, obligation modal auxiliaries, and references to shared knowledge can be strategically employed to position readers in an argument, to guide them to argumentations, propositions, and interpretations.

Table 1

Interactional Metadiscourse

Category	Function	Example
Hedges	Withhold writer's full commitment to propositions	might/perhaps/possible/about
Boosters	Emphasise force or writer's certainty in propositions	in fact/definitely/it is clear that
Attitude markers	Express writer's attitude to propositions	unfortunately/I agree/surprisingly
Engagement markers	Explicitly refer to or build relationship with reader(s)	consider/note that/you can see that
Self-mentions	Explicit reference to author(s)	I/we/my/our

Note. Adapted from "Metadiscourse," by K. Hyland, 2015, *The International Encyclopaedia of Language and Social Interaction*, p. 1000.

2.2. Previous Related Metadiscourse Studies

Research writing is one domain where the writer's orientation to the reader is crucial in securing rhetorical objectives. This occurs by making linguistic choices that the audience will conventionally recognise as persuasive (Hyland, 1998). Metadiscourse analysis is, therefore, "a valuable means of exploring academic writing and of comparing the rhetorical preferences of different discourse communities" (Hyland, 2010, p. 141), which can consequently contribute to both NESs and NESs to convey their messages and engage with their readers more effectively (Hyland, 2005). Research article (RA) as the main means for sharing work and establishing reputation (Hyland, 2005) is one of the most preferred genres in English for academic purposes (EAP).

Hyland (2000) argues that metadiscourse is fundamentally context-dependent, which means there is a close relationship between the use of metadiscourse and the norms and expectations of those who use it in particular settings. In order to characterise the genre-specific features, research has set out to study various key linguistic and rhetorical features of particular genres (e.g., Abdelrahim & Abdelrahim, 2020 in students' argumentative writing; Ädel, 2017 in teachers' feedback on students' writing; Ho, 2018 in workplace request emails; Malmir et al., 2019 in RA highlights;

Qin & Uccelli, 2019 in personal emails and school reports). These studies have vividly shown that different metadiscourse patterns can offer an important means of distinguishing different text types and can specify the ways writers interact with their texts and their readers. Some other researchers have limited their studies to spoken genres (Ädel, 2010; Lee & Subtirelu, 2015; Mauranen, 2010; Thompson, 2003; Zhang et al., 2017).

As Hyland (2011) pointed out, academics display a considerable amount of dexterity representing their disciplinary identity, which helps them to demonstrate their loyalty to their discipline and competent participation in the disciplinary community. Writing as a member of a disciplinary community, one has to textualise work in a way that colleagues can distinguish, which might influence the discourse restricting the ways of argumentation and authorise the writer as someone competent to argue for it (Hyland, 2005). Therefore, there is an inevitable need for persuading readers of our ideas by framing messages in a way that draws the attention of particular community-recognised relationships (Hyland, 2000, 2002). The fact that metadiscoursal preferences in RAs are highly influenced by the disciplinary identity, has been elucidated through various research studies (e.g., Khedri & Kritsis, 2018 in *Applied Linguistics and Chemistry*). Disciplinary metadiscourse conventions have significantly changed over the past 50 years (Hyland & Jiang, 2018).

In the area of representing the use of metadiscourse in different disciplines, Abdi (2002) conducted an analysis investigating discussion sections of 30 English RAs in each of Natural and Social sciences published in 1999. Studying three types of interpersonal metadiscourse (hedges, emphatics, and attitude markers), he concluded that hedges were used almost as frequently as emphatics. Different functions of metadiscourse expressions were discovered in his quantitative and qualitative analysis. One of the main results was that Social Science authors displayed more uncertainty than Natural Science writers about the ongoing proposition. This might be explained by the Natural Science writers' tendency to report empirical and objectively observable phenomena. Emphatics, however, were not employed significantly differently by writers of the two disciplines. Abdi also claimed that authors did not use emphatics to show arrogance, as suggested in literature (Vande Kopple, 1985), but their main purpose was to reveal their limitations and show humility.

As Hyland (2012) argued, the language people use plays a crucial role in their writing style. The cross-linguistic and cross-cultural studies have shown considerable variation in type and extent of metadiscourse use across languages and texts written by NESs and NNEs (Hyland, 2015). Therefore, several studies have investigated the impact of language and culture on metadiscourse preferences in RAs.

Mur-Dueñas (2011), for instance, explored rhetorical and discursive cross-cultural differences in the expression of interpersonality in 24 Business Management RAs published in international English journals and national Spanish journals. The results of the study showed American authors' higher tendency to use metadiscourse features in their RAs, which confirms previous English-Spanish cross-cultural studies on Spanish texts (e.g., Dafouz-Milne, 2008). Findings indicated that interactional metadiscourse was employed more frequently by both American and Spanish scholars in comparison with interactive metadiscourse; however, the American writers used significantly more interactional metadiscourse features than the Spanish. Mur-Dueñas suggested that this would lead to a stronger interaction between the writer and the reader in English texts compared to Spanish texts within the discipline, as American scholars more closely guided the readers through their arguments in their RAs using forms such as logical markers and code glosses. It was also pointed out that American writers put a greater emphasis on their role as authors and the role of readers as active participants in the negotiation of new scientific knowledge.

Mu et al. (2015) came to a similar conclusion comparing 20 English RAs by NESs and 20 Chinese RAs by Chinese writers in Social science. They found that metadiscourse features were significantly more common in English than in Chinese RAs. They also reported a difference in metadiscoursal choices between NES and Chinese writers. Chinese writers turned out to mostly prefer boosters and inclusive pronoun *we* when referring to themselves, while NES writers included a higher number of hedges and used more exclusive pronoun. Mu et al. argued that the results indicate cultural influences. Similarly, Li and Xu (2020) reported more metadiscourse features in English RAs than Chinese RAs in Sociology, which they believe might have originated from sociocultural factors and rhetoric functions.

In regard to whether metadiscourse is a marker of national culture or of academic discipline, Dahl (2004) investigated a total number of 180 articles in three languages of English, French and Norwegian. Sixty RAs were collected in each language, with 20 RAs in three disciplines: Linguistics, Economics, and Medicine. The results showed that French uses much less metatext than do both English and Norwegian. Furthermore, a striking similarity in metadiscourse use between English and Norwegian RAs was noticed. The interdisciplinary comparison, on the other hand, revealed a completely different structure in medical RAs which was reported to originate from the formal organization of medical reporting, where there is no need for the expert reader to make extra processing effort to orient himself or herself to the text. The overall findings of the study ultimately showed that as far as medical texts were concerned, metadiscourse reflected the academic discipline features as the field is more stable and mature than economics and

linguistics in which language and national writing traditions seem to be much more dominant.

While there are several studies which have sought to compare the metadiscourse preferences across languages, a number of research studies have been done to identify metadiscourse variation in RAs written in English by writers from different cultural backgrounds. Mauranen's (1993) work on Finnish academics provides an analysis of text-organizing metadiscourse elements, which she argues, do not add any propositional information to discourse such as connectors 'and, so, as a result'. She explored two pairs of academic research reports in Economics in English, one of which was written by a Finnish author and the other one by a native-English speaker. The findings of the study showed that Anglo-American writers used more metatext than Finnish authors, including a higher proportion of metatextual elements in each category. Therefore, Mauranen suggested that the native-English speakers made greater effort to orient their readers and make their presence felt in their texts.

Abdollahzadeh (2011), moreover, analysed the employment of interpersonal metadiscourse in the conclusion section of 60 Iranian and Anglo-American RAs written in English in *Applied Linguistics*. The focus of the study was on the explicit realization of the sub-categories of hedges, emphatics, and attitude markers. English academic writers were selected from the leading international journals and the articles written by Iranian authors were selected from the leading local research journals in the field. Findings reported a statistically greater use of interpersonal metadiscourse by English writers compared to their Iranian counterparts in the whole corpus. "This finding suggests that the English applied linguists in their attempts to establish a more writer-reader interaction tend to resort significantly to such interpersonal devices which may collaborate in the creation of appropriate interpersonal effect" (Abdollahzadeh, 2011, p. 291). Mainly addressing a local audience, Persian writers, on the other hand, underused attitudinal language to guide their readers rhetorically, employing assertive language to address their readers. The qualitative analyses revealed the fact that metadiscourse was used in different ways by English and Iranian writers. For example, Emphatics were used by English writers "to stress the significance and contributions of their findings, boost the current knowledge and scholarship, emphasise the results to elicit a positive evaluation of the same results by the readers, and stress the need for further research" (p. 293), while Persian writers employed emphatics to underline common knowledge to support their findings, and emphasise results supporting their initial hypotheses.

Mur-Dueñas (2016), however, reported different findings comparing the use of hedges in 24 Business Management RAs by NNES writers and that

in 24 Business Management RAs by NES writers. She found similarities in their overall frequency of use and preferences of the hedging features among the two studied corpora. She argued that the similarities pointed to the very fact that writers tending to publish in international English-medium journals do not transfer the divergent communicative conventions in their L1s regarding hedges but rather manipulate them to conform to the Anglocentric context of publication.

The comparisons made between different genres, disciplinary communities, and communities owning different cultural and L1 backgrounds have revealed how writers shape their texts to the expectations of different audiences and the fact that their choices reflect their community practices rather than individual decisions (Hyland & Jiang, 2016). For example, to track changes in engagement over time, Hyland and Jiang analysed three corpora of RAs from the same journals in four disciplines (Applied linguistics, Sociology, Electrical Engineering, and Biology) at three periods 1965, 1985, and 2015. Results showed a decrease in authors' explicit engagement choices per 10,000 words, in spite of the observed increase in selected RAs in soft sciences. The findings of the study showed fairly stable engagement markers in Biology, but Electrical Engineering RAs experienced a rise in employing such features between 1965 and 1985.

Considering the importance of engagement markers, a number of studies have analysed the use of these interactional markers in different genres (e.g., Mur-Dueñas, 2008; Yin & Parkinson, 2021). Jiang and Ma (2018), for example, reported on the higher inclusion of engagement markers in RAs compared to PhD confirmation reports. Jiang and Ma argued that their findings show the fact that PhD students usually consider reader assessors to play an authorial role, which leads PhD students to be cautious in the choice of addressee devices. Therefore, they suggest that explicit instruction on engagement markers is essential for the novice researchers to interact with their readers more effectively. Mur-Dueñas (2008) also argued that the difference in the use of engagement markers such as inclusive pronouns by Spanish and English writers originates from the fact that Spanish writers' audience includes a rather small and homogenous discourse community. Lafuente-Millán (2014), however, in a comparison between three corpora of RAs by English writers in international journals, Spanish writers in the same international journals, and Spanish RAs by Spanish writers in national journals concluded that the national culture of writers is a more influential factor in their engagement markers use compared to the context of publication. This means that Spanish writers relied on the rhetorical styles and interpersonal tactics preferred in their own cultures rather than the internationally built conventions even when they are publishing in international contexts.

3. Method

3.1. Corpus Development

A corpus of 240 English RAs in Physics was developed to fill the research gap. Our corpus consisted of three sub-corpora: (1) American Corpus (AC), 80 RAs by American writers in international journals; (2) Persian International Corpus (PIC), 80 RAs by Persian writers in the same international journals; and Persian National Corpus (PNC), 80 RAs by Persian writers in national journals. Four sub-fields in Physics were selected: Condensed Matter; GeoPhysics; Atomic, Molecular and Optical Physics; and AstroPhysics. The sub-fields were selected based on the classifications presented on two websites <https://arxiv.org> and <https://journals.aps.org>. We selected the four sub-fields which were included in both web sites with the aim of having a number of most popular sub-fields in Physics. We decided to focus on four different sub-fields of Physics in order to strengthen the empirical findings in order to reach a generalizable claim about the patterns of engagement markers of Physics RAs considering the fact that there might exist a considerable amount of variation among sub-fields of a discipline (Harwood, 2006; Ozturk, 2007).

The selected sub-fields were submitted to five PhD students and professors in the Department of Physics at the University of Zanjan (ZNU), and Institute for Advanced Studies in Basic Sciences (IASBS) in Zanjan in Iran in order to feel reassured about the selected areas and to receive help selecting the journals. Based on the results of these interviews and considering the different classifications presented on different websites, four sub-disciplines among various subject areas were selected.

After we identified a number of journals in each sub-field based on experts' opinions in the field, we explored the published volumes in 2016 and 2017 to select the ones offering an adequate number of RAs published by both American and Persian writers to develop AC and PIC. Next, all of the RAs published by American writers, who both owned English names and were affiliated with American institutions in English international journals, and RAs published by Persian Writers based on their names in the same journals were extracted.

Swales' (1990, 2004) Introduction-Method-Results-Discussion (IMRD) model was used to select RAs. Having carefully investigated the selected RAs to include sections titled as introduction and conclusion, we selected 20 RAs in each sub-field for each of AC and PIC, so each corpus included 80 RAs in total. Table 2 provides a summary of the corpora and their word count.

In order to identify Iranian Physics journals, we consulted the experts. All of the identified journals were used to extract RAs for the PNC, as there were not any clearly specialised classifications in Iranian Physics journals. The RAs again had to consist of Swales' (1990, 2004) Introduction-Method-Results-Discussion (IMRD). Then similar to the international corpora, 80 RAs including the sections titled as introduction, and conclusion, and published in 2016 and 2017 were selected for the PNC.

Table 2*Corpus Size and Composition*

Corpus	Number of RAs	Sections	Word Count	Total Word Count
AC	80	Introduction	71,091	106,084
		Conclusion	34,993	
PIC	80	Introduction	67,583	94,388
		Conclusion	26,805	
PNC	80	Introduction	43,818	59,138
		Conclusion	15,320	
Total	240			

3.2. Materials and Instruments

To identify engagement markers in our corpus, we adopted Hyland's (2005, 2015) taxonomy. According to Hyland (2005, p. 54), engagement markers focus on reader participation with two main purposes:

1. The first acknowledges the need to adequately meet readers' expectations of inclusion and disciplinary solidarity, addressing them as participants in an argument with reader pronouns (you, your, inclusive we) and interjections (by the way, you may notice).
2. The second purpose involves rhetorically positioning the audience, pulling readers into the discourse at critical points, predicting possible objections, and guiding them to particular interpretations. These functions are mainly performed by questions, directives (mainly imperatives such as see, note and consider and obligation modals such as should, must, have to, etc.) and references to shared knowledge.

AntConc (v. 3.2.4, Anthony, 2011), a commonly utilised computer program for text analysis and concordance tool, was used to identify all instances of engagement markers in the three corpora. This program helps to measure the frequency of metadiscursive expressions listed in Hyland's (2005) classification in the corpus.

3.3. Procedure

After the corpora were developed, the computer program AntConc (v. 3.2.4, Anthony, 2011), a commonly utilised computer program for text analysis, was used to process the corpora. We searched for all potential engagement markers in Hyland's (2005) comprehensive list (pp. 222–223). Since potential items might not function as engagement marker, each instance was carefully analysed manually in its textual context in order to ensure that only items serving an engagement function are included in the data. For instance, *we* in example 1 serves an engagement function, but it is a self-mention marker in example 2: In (1) *we* is an inclusive pronoun, but in (2) it refers to the writers of the RA.

- (1) However, there can be several complicating effects—such as secular relaxation, or the presence of a triaxial potential, rings or disks of stars, and/or a second massive body—and there is a lack of understanding of their relative importance in local galaxies. In addition, we need to better understand the mass spectrum of disrupted stars, in particular given mass segregation (e.g., MacLeod et al. 2016b). (AC Conclusion 11)
- (2) We have modeled the tidal disruption of a new class of object. (AC Conclusion 11)

Having carefully analysed each token in context, the data was reviewed by a colleague. Any cases of disagreement were discussed, and a decision was made. The result of the process was used to observe the frequency of total engagement markers employed by English writers and Persian writers in both International journals and Iranian journals. The three corpora AC, PIC and PNC were next compared quantitatively and qualitatively. Next, a chi-square test was run to investigate whether there was a significant difference between two sections of each corpus and among the three writer groups and determine the difference.

3.4. Data Analysis

We used the Chi-square test as implemented in SPSS (version 22.0). The significance level was at $p < .05$. We also had the standardised z score residual calculated for each cell to identify which cells were statistically significant across writer groups and sections. If a z score is equal to, or greater than, 1.96, the difference is statistically significant.

In the literature on metadiscourse, because of varying lengths of corpora, raw frequency of metadiscourse markers may be misleading and uninformative. Researchers, therefore, have used two different methods to normalise metadiscourse markers. One group of researchers calculate the density of metadiscourse per sentence or per line, the second group consider

number of metadiscourse per 1,000 (e.g., Hu & Cao, 2015; LI & Wharton, 2012) words or per 10,000 words (e.g., Hyland, 2004, Mur-Dueñas, 2011). The normalised number of signals helps us make more meaningful comparisons. In this study there are different sub-corpora with different corpus sizes. Therefore, we decided to use an average number per 1,000 words to be able to notice the differences among writers and different sections.

4. Results and Discussion

4.1. Results

Figure 1 illustrates the number of engagement markers per 1,000 words in the introduction and conclusion sections of the three studied corpora. It is clear from Table 3 that no statistically significant differences were reported in introductions and conclusions across the three groups of writers involving their readers in their texts.

Table 3

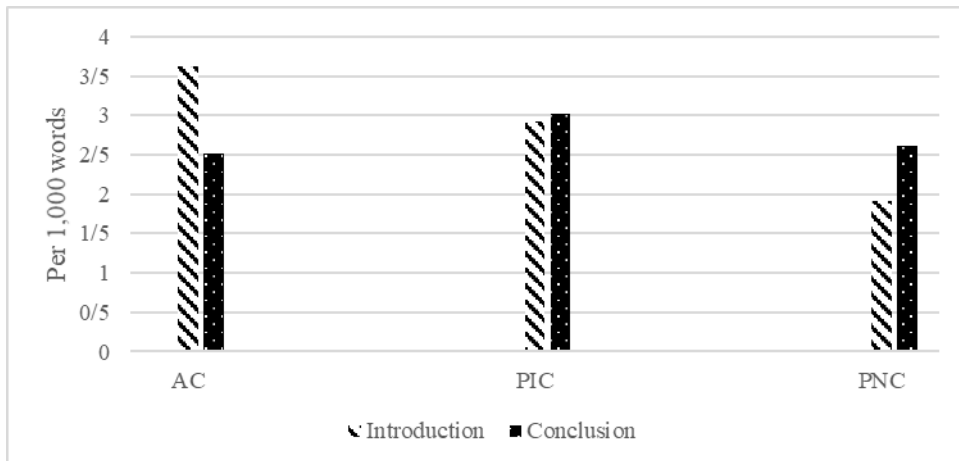
Engagement Markers in the Introduction and Conclusion Sections across Writers

	AC			PIC			PNC		
	Frequency	Per 1000	St. residual	Frequency	Per 1000	St. residual	Frequency	Per 1000	St. residual
Introduction	258	3.63	.2	198	2.93	.0	84	1.92	-.4
Conclusion	106	2.51	-.4	81	3.02	.0	42	2.61	.7
Total	364	3.43		270	2.86		126	2.13	

$\chi^2=7.92, df=2, p=.673, Cramer's V=.032$

Figure 1

Engagement Markers per 1,000 Words in Sections in the Corpora



As can be seen from Table 3, in total, AC writers used a higher number of engagement markers per 1,000 words compared to the other two groups. They included a bigger proportion of engagement markers in introduction

(3.63 per 1,000 words) compared to that in conclusion (2.51 per 1,000 words). This was different for both Persian groups, who included fewer engagement markers per 1,000 words in introduction compared to conclusion. Interestingly, AC writers used slightly fewer engagement markers per 1,000 words than the two Persian groups when concluding their research. This might imply that AC writers would prefer a more impersonal style of writing in the conclusion section, while Persian writers seem to have a higher tendency to include their readers when writing up the conclusion of their research. An overwhelming concentration on *asides* (briefly offering a comment on what has been said) (Extract 3) and *imperatives* were found in AC introduction. AC conclusion included more *asides* and *obligation modals* (Extract 4).

(3) Point (b) is particularly important because finite-T effects are only cleanly accessible with exact diagonalization or with QMC, as the Bethe ansatz does not provide a controlled approximation in that case (at least not for all temperatures). (AC Conclusion 34)

(4) This model must be trained on ancillary data where true redshifts are available. (AC Introduction 16)

We found slightly more engagement markers per 1,000 words in PIC conclusions than PIC introductions, which possibly means that PIC writers would like to build a stronger interaction with their readers in the conclusion section. PIC writers employed more *asides* and *imperatives* in introductions and conclusions. Extract 5 shows an example of *imperatives*:

(5) See Krishnan and Raju (2016), Chakraborty (2016) for proof. (PIC Introduction 5)

PNC writers also included a higher number of engagement markers in the conclusion compared to introduction. The similarity between the two Persian groups in terms of higher inclusion of engagement markers when concluding their research reflects the effect of national culture and values on their writing style which is observable in both national and international contexts. In contrast to AC and PIC, PNC writers included few imperatives in introduction and conclusion, and mostly preferred *asides*, and *obligation modals* such as *should*, *have to*, and *must*. A closer look at the corpora revealed the fact that PNC writers in comparison to the other two writer groups predominantly deployed more *inclusive pronouns* concluding their research studies. There were almost the same number of *inclusive pronouns* in introduction and conclusion of PIC. This was different for AC writers who tended to include their audiences when introducing the study and included only a few instances of inclusive pronoun in the conclusion section. The high inclusion of *inclusive pronouns* by both Persian groups in conclusion one more time mirrors the cultural effects regardless of the context of publication.

Extract 6 contains an instance of *inclusive pronoun*, which enables authors to bring their readers into the discourse.

(6) Rock Physics analysis and modeling have now become an important step in any reservoir characterization project. This means that knowledge about the rock properties of the reservoir is needed if we want to have a better understanding of our reservoir. (PNC Conclusion 13)

4.2. Discussion

The present study identified and analysed the frequency and use of engagement markers in different sections of the AC, PIC and PNC. In addition, most frequent signals of engagement markers in the three corpora were identified. It was also investigated to see whether there was any significant difference between American writers and Persian writers in their use of engagement markers in international and national journals. The findings are generally discussed in this section.

The overall inclusion of engagement markers per 1,000 words in AC was higher than that of the other two corpora. This finding is consistent with those of Mozayan et al. (2018), who also found fewer instances of engagement markers in Persian Qualitative Medical Physics and nursing RAs. Similarly, some other studies reported more inclusion of engagement markers by NESs compared to NNEs (e.g., Mu et al., 2015; Shafique et al., 2019; Validi et al., 2016). However, the data revealed that Persian Physicists included a higher number of engagement marker per 1,000 words in the conclusion section than American writers, which is in line with some previous studies. For example, Lafuente-Millán (2014) and Mur-Dueñas (2011) reported a higher number of these markers by Spanish writers compared to English writers. Lafuente-Millán (2014) argues that the extent to which writers decide to explicitly address readers to focus their attention, or include them as discourse participants, highly depends on their national culture although many other factors such as the context of publication, disciplinary expectations, and generic conventions may also be at play. Directives including imperatives and modals of obligation and asides were very common in all three corpora. Hu and Cao (2015), Lafuente-Millán (2014) and Mur-Dueñas (2008) also observed considerably high density of directives especially modals of obligation in English and Spanish RAs.

Persian writers turned out to use more inclusive pronouns in the conclusion section compared to AC writers. Nearly 30% of engagement markers in PIC conclusion, 29% in PNC conclusion, and 9% in AC conclusion consisted of inclusive pronouns, particularly *we*. Lafuente-Millán (2014) and Mur-Dueñas (2008) also reported higher use of inclusive pronouns by Spanish writers, which they attributed to Spanish writers'

cultural interpersonal style. Frequent use of inclusive pronouns can be considered a particularly common strategy to reduce the distance between writers and readers who pursue similar goals and to present the findings as a shared discovery (Hyland, 2005; Mur-Dueñas, 2011).

However, our findings are not in line with some previous studies. For instance, Mozayan et al. (2018) reported a higher use of engagement markers by Persian writers than NES writers in medical physics quantitative RAs, which was different from medical physics qualitative RAs. Mozayan et al.'s (2018) findings revealed the pragmatic effects on the use of metadiscourse in addition to the disciplinary and cultural effects. With regard to the conclusion section, Al-Zubeiry and Al-Baha (2019) came up with a different result from ours, reporting a higher use of engagement markers by NES writers than Arab writers in the conclusion section of engineering and medical science RAs. They claimed that the lower use of engagement markers by Arab writers might have resulted from NNEs' different level of proficiency from English researchers. Our findings, however, showed that Persian physicists, despite their language barriers, tend to interact more strongly with their readers in the conclusion section. This might originate from a national convention in the discipline due to the high importance of the conclusion section itself and the need for reader engagement when concluding the research study. Considering the most frequent instances of engagement markers, Alkathlan (2019) found different reader pronouns as the most frequent engagement markers in interpretation and translation RAs by Saudi writers. Alkathlan's findings conform to those of Musa et al. (2019) on more use of reader pronouns by Arab writers in applied linguistics RAs. Taking the disciplinary conventions for granted, the different preferences of engagement markers types by different nationalities seem to result from writers' different linguistic and cultural backgrounds.

Engagement markers refer to readers' involvement in the text by being attracted to the text or included in the text through devices such as second person pronouns, imperatives, question forms, and asides. Engagement markers are used with the aim of explicitly addressing readers, either to draw their attention or include them as discourse participants. Academic genres in hard sciences, including Physics, tend to be more objective and more impersonal and Physics writers may decide to underuse them to report research findings as objectively as possible (Mu et al., 2015). The fact that the use of engagement markers might be affected by the disciplinary conventions can be seen from Khedri and Kritsis' (2018) study which reported no use of these rhetorical features in the introduction section of chemistry RAs.

5. Conclusion and Implications

We set out, in the present study, to examine a cross-cultural analysis of engagement markers in two sections of Physics RAs. The findings revealed that the number of employed engagement markers by American and Persian Physicists was slightly different. Moreover, we showed that although AC and PIC writers had relatively similar preferences of engagement markers publishing in the same international contexts, PIC writers were still affected by their national culture which lead to a considerably high inclusion of inclusive pronouns in the conclusion section (very similar to PNC writers). This means that not only does the context of publication influence the metadiscoursal choice, but the culture is also an important factor. Therefore, Persian writers apparently tend to adjust their tone to the internationally accepted conventions to the extent that they do not sound like aliens to their international disciplinary communities, but they keep their cultural preferences even in international contexts.

Results also showed that the rhetorical functions of the different sections of introduction and conclusion determines the degree of authorial engagement reflected by various instances, as confirmed in previous studies as well (Abdollahzadeh, 2011; Hopkins & Dudley-Evans, 1988; Salager-Meyer, 1994). Being published in the national journals, which are mostly of interest to Iranian scholars, PNC can be considered as direct translation of Persian physics RAs into English. Therefore, PNC can reflect Persian writers' national culture, namely, very few inclusion of imperatives, which seems to result from the Iranian culture of not favouring to be too direct when addressing the audience. Interestingly, PIC writers used considerably more imperatives which shows the influence of context of publication on Persian writers' rhetorical choice. Furthermore, we observed a high inclusion of inclusive pronouns in the conclusion section by both Persian writer groups. This may also rise from the Iranian culture of valuing the act of representing writers' sense of belonging and respect to their disciplinary community when presenting conclusions of their research. This cultural characteristic of Persian physicists seems to remain intact even when they are publishing in an international context.

There are some limitations in this study that are explained. The first limitation was related to the process of compiling the corpora for current research. We limited our corpus to the particular academic genre of RAs in Physics. Nevertheless, dealing with other written and spoken genres in Physics certainly can enrich the metadiscoursal studies. Therefore, the findings cannot be transferred to the entire academic community or to other disciplinary fields. We limited our corpora to RAs published by American writers and Persian writers in international journals and RAs written by Persian writes in national Iranian journals. With regard to the native corpus,

we limited American writers to those who both own English names and are affiliated with American institution. Another limitation was the variety of structure in Physics RAs, a restricted number of which followed the Swales' (1990, 2004) IRMD model. To be more consistent, we selected the articles with specified sections of introduction and conclusion, and the RAs, including sub-headings such as *summary and discussion* or *discussion* were excluded. Although the constructed corpus in this study was attempted to be relatively larger than those in some previous research, more valid and reliable results would be obtained, using much larger corpora.

The findings of this study might be useful for novice physicists and NNES, especially Iranian physics scholars in order to get acquainted with their disciplinary conventions of engagement markers use in two different sections of RAs. International students of other hard sciences can also use the results of this study since different disciplines from hard sciences share a lot of rhetorical features (Hyland, 2005). Moreover, EAP teachers and material developers can benefit from the results of this research to become more aware of EAP student's metadiscoursal needs, which might arise from their language proficiency level, national culture and disciplinary conventions, and, therefore, plan and design more efficient lessons and materials for them.

References

- Abdelrahim, A. A., & Abdelrahim, M. A. (2020). Teaching and assessing metadiscoursal features in argumentative writing: A professional development training for EFL teachers. *International Journal of Applied Linguistics*, 30(1), 70-91.
- Abdi, R., (2002). Interpersonal metadiscourse as an indicator of interaction and identity. *Discourse Studies*, 4(2), 139-145.
- Abdollahzadeh, E. (2011). Poring over the findings: Interpersonal authorial engagement in applied linguistics papers. *Journal of Pragmatics*, 43(1), 288-297.
- Ädel, A. (2006). *Metadiscourse in L1 and L2 English*. John Benjamins.
- Ädel, A. (2010). Just to give you kind of a map of where we are going: A taxonomy of metadiscourse in spoken and written academic English. *Nordic Journal of English Studies*, 9(2), 69-97.
- Ädel, A. (2017). Remember that your reader cannot read your mind: Problem/solution-oriented metadiscourse in teacher feedback on student writing. *English for Specific Purposes*, 45(1), 54-68.
- Ädel, A., & Mauranen, A. (2010). Metadiscourse: Diverse and divided perspectives. *Nordic Journal of English Studies*, 9(2), 1–11.
- Alkathlan, M. (2019). Metadiscourse in academic writing: An investigation of Saudi EFL students' research articles. *Linguistics and Literature Studies*, 7(5), 220-225.
- Al-Zubeiry, H. A., & Al-Baha, K. S. A. (2019). Metadiscourse devices in English scientific research articles written by native and non-native speakers of English. *International Journal of Linguistics*, 11(1), 46-61.
- Anthony, L. (2018). AntConc (version3.2.4) [computer software]. Waseda University.
- Beauvais, P. (1989). A speech act theory of metadiscourse. *Written Communication*, 6(1), 11-30.
- Bloch, J. & Chi, L. (1995). A comparison of the use of citations in Chinese and English academic discourse. In D. Belcher & G. Braine (Eds.), *Academic writing in a second language: Essays on research and pedagogy* (pp. 231-274). Ablex.

- Crismore, A. (1989). *Talking with readers: Metadiscourse as rhetorical act*. Peter Lang.
- Dafouz-Milne, E. (2008). The pragmatic role of textual and interpersonal metadiscourse markers in the construction and attainment of persuasion: A cross-linguistic study of newspaper discourse. *Journal of Pragmatics*, 40(1), 95-113.
- Dahl, T. (2004). Textual metadiscourse in research articles: A marker of national culture or of academic discipline? *Journal of Pragmatics*, 36(10), 1807-1825.
- Davies, A. (2003). *The native speaker: Myth and reality*. Multilingual Matters.
- Del Saz Rubio, M. M. (2011). A pragmatic approach to the macro-structure and metadiscoursal features of research article introductions in the field of Agricultural Sciences. *English for Specific Purposes*, 30(4), 258-271.
- Gillaerts, P., & Van de Velde, F. (2010). Interactional metadiscourse in research article abstracts. *Journal of English for Academic Purposes*, 9(2), 128-139.
- Harris, Z. (1959). The transformational model of language structure. *Anthropological Linguistics*, 1(1), 7-29.
- Harwood, N. (2006). (In)appropriate personal pronoun use in political science: A qualitative study and a proposed heuristic for future research. *Written Communication*, 23(4), 424-450.
- Hinds, J. (1987). Reader versus writer responsibility: A new typology. In U. Connor, & R. Kaplan (Eds.), *Writing across languages: Analysis of L2 text* (pp. 141-152). Addison Wesley.
- Ho, V. (2018). Using metadiscourse in making persuasive attempts through workplace request emails. *Journal of Pragmatics*, 134, 70-81.
- Hopkins, A., & Dudley-Evans, T. (1988). A genre-based investigation of the discussion sections in articles and dissertations. *English for Specific Purposes*, 7(2), 113-122.
- Hu, G., & Cao, F. (2015). Disciplinary and paradigmatic influences on interactional metadiscourse in research articles. *English for Specific Purposes*, 39(3), 12-25.

- Hyland, K. (2000). *Disciplinary discourses: Social interactions in academic writing*. Longman.
- Hyland, K. (2002). Directives: Argument and engagement in academic writing. *Applied linguistics*, 23(2), 215-239.
- Hyland, K. (2004). Disciplinary interactions: Metadiscourse in L2 postgraduate writing. *Journal of Second Language Writing*, 13(2), 133-151.
- Hyland, K. (2005). *Metadiscourse: Exploring interaction in Writing*. Continuum.
- Hyland, K. (2010). Metadiscourse: Mapping interactions in academic writing. *Nordic Journal of English Studies*, 9(2), 125-143.
- Hyland, K. (2011). Projecting an academic identity in some reflective genres. *Ibérica*, 21, 9-30.
- Hyland, K. (2012). *Disciplinary identities: Individuality and community in academic discourse*. Cambridge University Press.
- Hyland, K. (2015). Metadiscourse. In K. Tracy, C. Ilie, & T. Sandel (Eds.), *The international encyclopedia of language and social interaction* (pp. 998-1006). John Wiley & Sons, Inc.
- Hyland, K. (2016). Academic publishing and the myth of linguistic injustice. *Journal of Second Language Writing*, 31(1), 58-69.
- Hyland, K. (2017). Metadiscourse: What is it and where is it going? *Journal of Pragmatics*, 113(3), 16-29.
- Hyland, K. (1998). Persuasion and context: the pragmatics of academic metadiscourse. *Journal of Pragmatics*, 30(4), 437-55.
- Hyland, K., & Jiang, F. (2016). "We must conclude that...": A diachronic study of academic Engagement. *Journal of English for Academic Purposes*, 24, 29-42.
- Hyland, K., & Jiang, F. K. (2018). In this paper we suggest: Changing patterns of disciplinary metadiscourse. *English for Specific Purposes*, 51, 18-30.
- Hyland, K., & Tse, P. (2004). Metadiscourse in academic writing: A reappraisal. *Applied Linguistics*, 25(2), 156-177.

- Jiang F., & Hyland, K. (2016). Nouns and academic interactions: A neglected feature of metadiscourse. *Applied Linguistics*, 37(6), 1–25.
- Jiang, F. K., & Ma, X. (2018). As we can see: Reader engagement in PhD candidature confirmation reports. *Journal of English for Academic Purposes*, 35, 1-15.
- Khedri, M., & Kritsis, K. (2018). Metadiscourse in applied linguistics and Chemistry research article introductions. *Research in Applied Linguistics*, 9(2), 47-73.
- Kim, L. C., & Lim, J. M. H. (2013). Metadiscourse in English and Chinese research article introductions. *Discourse Studies*, 15(2), 129-146.
- Lafuente-Millán, E. (2014). Reader engagement across cultures, languages and contexts of publication in business research articles. *International Journal of Applied Linguistics*, 24, 201–223.
- Lee, J. J., & Subtirelu, N. C. (2015). Metadiscourse in the classroom: A comparative analysis of EAP lessons and university lectures. *English for Specific Purposes*, 37(1), 52-62.
- Li, T., & Wharton, S. (2012). Metadiscourse repertoire of L1 Mandarin undergraduates writing in English: A cross-contextual, cross-disciplinary study. *Journal of English for Academic Purposes*, 11(4), 345–356.
- Li, Z., & Xu, J. (2020). Reflexive metadiscourse in Chinese and English sociology research article introductions and discussions. *Journal of Pragmatics*, 159, 47-59.
- Malmir, B., Khany, R., & Aliakbari, M. (2019). Journal article highlights in applied linguistics: An exploration into the rhetorical moves and their lexico-grammatical features. *Iranian Journal of English for Academic Purposes*, 8(4), 49-63.
- Mauranen, A. (1993). Contrastive ESP rhetoric: Metatext in Finnish-English Economics texts. *English for Specific Purposes*, 12(1), 3-22.
- Mauranen, A. (2010). Discourse reflexivity—a discourse universal? The case of ELF. *Nordic Journal of English Studies*, 9(2), 13–40.
- Mozayan, M. R., Allami, H., & Fazilatfar, A. M. (2018). Metadiscourse features in medical research articles: Subdisciplinary and paradigmatic influences in English and Persian. *Journal of Research in Applied Linguistics*, 9(1), 83-104.

- Mu, C., Zhang, L. G., Ehrich, J., & Hong, H. (2015). The use of metadiscourse for knowledge construction in Chinese and English research articles. *Journal of English for Academic Purposes*, 20, 135-148.
- Mur-Dueñas, P. (2008) Analysing engagement markers cross-culturally: the case of English and Spanish business management research articles In S. Burgess and P. Martín Martín (eds.): *English as an additional language in research publication and communication* (197–213). Peter Lang.
- Mur-Dueñas, P. (2011). An intercultural analysis of metadiscourse features in research articles written in English and in Spanish. *Journal of Pragmatics*, 43(12), 3068–3079.
- Mur-Dueñas, P. (2016). Modal hedging verbs in English as a Lingua Franca (ELF) Business Management research articles. *Kalbotyra*, 69, 153-178.
- Musa, A., Hussin, S., & Ho, I. A. (2019). Interaction in academic L2 writing: An analysis of interactional metadiscourse strategies in applied linguistics research articles. *3L: Southeast Asian Journal of English Language Studies*, 25(3), 16-32.
- Ozturk, I. (2007). The textual organization of research article introductions in applied linguistics: Variability within a single discipline. *English for Specific Purposes*, 26(1), 25-38.
- Qin, W. & Uccelli, P. (2019). Metadiscourse: Variation across communicative contexts. *Journal of Pragmatics*, 139(1), 22-39.
- Salager-Meyer, F. (1994). Hedges and textual communicative function in medical English written discourse. *English for Specific Purposes*, 13(2), 149-170.
- Shafique, H., Shahbaz, M., & Hafeez, M. R. (2019). Metadiscourse in research writing: A study of native English and Pakistani research articles. *International Journal of English Linguistics*, 9(4), 376-385.
- Shaw, P., & Liu, E. (1998). What develops in the development of second language writing? *Applied Linguistics*, 19(2), 225-254.
- Swales, J. M. (1990). *Genre analysis: English in academic and research settings*. Cambridge University Press.

- Swales, J. M. (2004). *Research genres: Explorations and applications*. Cambridge University Press.
- Thompson, S. E. (2003). Text-structuring metadiscourse, intonation and the signalling of organisation in academic lectures. *Journal of English for academic purposes*, 2(1), 5-20.
- Validi, M., Jalilifar, A., G Shooshtari, Z., & Hayati, A. (2016). Medical research article introductions in Persian and English contexts: Rhetorical and metadiscoursal differences. *Research in Applied Linguistics*, 7(2), 73-98.
- Vande Kopple, W. (1985). Some exploratory discourse on metadiscourse. *College composition and communication*, 36, 82–93.
- Vande Kopple, W. (1988). Metadiscourse and the recall of modality markers. *Visible Language*, 22, 233–272.
- Vande Kopple, W. (2002). Metadiscourse, discourse, and issues in composition and rhetoric. In E. Barton, & G. Stygall (Eds.), *Discourse studies in composition* (pp. 91-113). Hampton Press.
- Xu, H. (2001). *Metadiscourse: A Cross-cultural perspective*. Southeast University Press.
- Yin, Z., & Parkinson, J. (2021). Critical review of literature: the case of the news and views genre. *Journal of English for Academic Purposes*, 00972. Retrieved from <https://doi.org/10.1016/j.jeap.2021.100972>
- Zhang, M., Sun, W., Peng, H., Gan, Q., & Yu, B. (2017). A multidimensional analysis of metadiscourse markers across spoken registers. *Journal of Pragmatics*, 117(1), 106-118.

Acknowledgements

We would like to thank the anonymous reviewers who generously offered their constructive feedback to help us to improve the quality of the paper.

Bibliographic information of this paper for citing:

Khatibi, Z., & Esfandiari, R. (2021). Comparative analysis of engagement markers in research article introductions and conclusions. *Journal of Modern Research in English Language Studies*, 8(3), 1-24.
