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Intercultural and Interdisciplinary Analysis of Engagement Markers in Academic Writing: Contrasting Native and Non-native (Iranian) Authorship in Hard and Soft Sciences Research Articles

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Abstract

In academic discourse across diverse fields, the cultivation of authorial competence in crafting compelling and persuasive texts is of paramount importance. Scholars in the field of linguistics, particularly those involved in discourse analysis, have been attentive to this necessity. Within the realm of academic writing, the strategic utilization of engagement markers plays a pivotal role in achieving persuasive communication and fostering reader engagement. The cultural positioning of academic writers is often reflected in the incorporation of these linguistic elements within written discourse. This study undertook an examination of 60 research articles spanning the domains of hard and soft sciences, with a focus on discerning potential disparities in the employment of engagement markers between two distinct cohorts of authors: native English speakers and non-native Iranian writers. Employing Hyland's (2005b) model of engagement markers as an analytical framework, the study sought to ascertain the frequency of these linguistic devices within academic research articles produced by the aforementioned groups. The findings of the analysis revealed significant differences in the overall and categorical distribution of engagement markers in the scholarly works of native English and non-native Iranian authors across hard and soft science disciplines. These differences may be ascribed to the cultural positioning of academic writers or the potential lack of familiarity with the established conventions of English rhetoric, pragmatics, and sociolinguistics among non-native Iranian authors. The implications of these findings are significant, as they can inform the development of pedagogical materials aimed at enhancing the academic writing proficiency of authors.

***Keywords*:** engagement markers, hard sciences, interactional metadiscourse, soft sciences.

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INTRODUCTION

Scholarly composition has long been perceived as a communal undertaking, affording authors the opportunity to assert their authorial presence within their writings and cultivate a sense of connection with their audiences. This pursuit is regarded as a persuasive undertaking, placing significance not only on the construction of texts, but also on the cultivation of social bonds through language (McCarthy, 2001). According to Hyland (2005a), the social bond between the author and audience is accomplished through the employment of engagement markers (EMs). Through the strategic use of these linguistic devices, writers can modulate the degree of their presence within their texts, and cultivate meaningful interaction with their audiences. Employment of EMs is contingent upon various factors such as the norms of the academic discipline, as well as the linguistic and cultural context in which writers are writing (Hyland, 2008; Blagojevic, 2004).

The assertion that disciplinary influences shape the linguistic preferences of academic writers has been substantiated by numerous studies (Hyland, 1998, 200, 2003, 2008). As noted by Hyland (2002), academic writing is not a homogeneous entity, but rather comprises a spectrum of subject-specific literacies. Consequently, scholars employ diverse linguistic devices that align with the norms and expectations of their respective disciplinary communities (Hyland, 2005a).

Moreover, the manifestation of knowledge rooted in scientific principles is deeply intertwined with culture-specific beliefs and norms, giving rise to a diverse array of intellectual styles in the expression and interaction within a given discourse (Dahl, 2004; Hinds, 1987; Sheldon, 2009). The influence of culture on writing has been a topic of debate, with differing perspectives. One viewpoint emphasizes the universality of academic writing (Widdowson, 1979), while the other highlights the cultural variations in textual patterns (Connor, 2004; Grabe & Kaplan, 1996; Hinkel, 2002; Mauranen, 2001). It is widely recognized that writing and writers' identities are closely intertwined, and that writers leave traces of their own

culture in their written discourse (Swann et al., 2004). As Dahl (2004) notes, writers are influenced by their native language culture as well as the academic discipline through which they are socialized, as they share their findings with their audience. Therefore, when utilizing English as an international language, the cultural conceptualizations of individuals from different first language (L1) backgrounds impact the way they write in English as their second language (L2). This claim is advocated by different scholars who conducted cross-cultural studies to underscore the significant influence of writers' L1 on their linguistic choices (Abdi, 2009; Atai & Sadr, 2008; Blagojevic, 2004; Dafouz-Milne, 2008; Dahl, 2004; Faghih & Rahimpour, 2009; Farrokhi & Ashasfi, 2009; Farrokhi & Emami, 2008; Marandi, 2003; Zarei & Mansoori, 2007). Despite an abundance of research on EMs as linguistic devices affected by disciplinary variation as well as authors' culture, there is still a dearth of understanding regarding their use in English-medium research articles across disciplines authored by native (English) and non-native (Iranian) academic writers and the differences in the use of these markers remain relatively unexplored. To address this gap in the literature, the present study attempts to examine the frequency of the use of EMs in the discussion sections of hard and soft sciences academic research articles written by native (English) and non-native (Iranian) authors.

LITERATURE REVIEW

Engagement Markers

EMs are a subset of interactional metadiscourse utilized by writers to establish and maintain a connection with their readers (Hyland, 1998). These markers are not standalone discourse categories, and their use and variation are influenced by the writer's communicative intentions. According to Hyland (2005a), the use of EMs is crucial for drawing readers into the discourse, anticipating potential objections, and involving them in a meaningful manner. Engagement markers focus on reader participation with two primary objectives: meeting readers' expectations of inclusion and

engaging them at critical junctures through questions and directives. This can be achieved through the use of *reader pronouns*, *directives*, *questions*, *shared knowledge* and *personal asides.*

Reader pronouns: Utilization of reader pronouns represents a critical element in reader engagement and personalization of discourse (Hyland, 2005b). Direct address to the reader using second-person pronouns like "you," "your," "we," "my friend," and "colleague" serves to involve them in the discourse (Hyland, 2005b). The examples from the corpus clarify the point:

(1) Thus, although it would appear that both GLM methods presented in this paper are providing biologically justifiable and statistically supported evidence regarding the diffusion of this influenza virus over **our** selected time period, the strong sampling biases give **us** pause (biology).

Directives: Directives are employed to align the writer's goals and desires with those of the readers. This is achieved through the use of obligation modals, which convey the writer's belief that something should be done in the manner intended (Hyland, 2005b). For instance:

(2) **Note that** in these simulations, uniform plasma temperature and non-uniform plasma density and pressure are considered (physics).

Questions: Questions are a type of discourse marker that can effectively engage readers and guide them towards the writer's viewpoint. By posing questions, writers can pique the readers' interest and share their own curiosity about a topic. (Hyland, 2002).

(3) It seems generally accepted that, with exceptions in various groups ranging from genera to families, conventional barcode analyses work quite well in circumscribing potentially recognizable species that can be further corroborated with other characters. Why then be concerned about using distance measures as arbiters of identity**?** (sociology)

Shared knowledge: Writers can establish a sense of agreement with their readers by using such devices. This technique involves assuming that readers share certain beliefs or knowledge and assigning them a role in shaping the

argument. By doing so, writers acknowledge the readers' contribution to the discourse and shape their role in the argument.

(Hyland, 2005b). For example:

(4) E. coli is an increasingly **prevalent** antibiotic-resistant Gram-negative bacterium in hospitals (medicine).

Personal asides: As Crismore et al. (1993) suggest, writers can use asides to interject personal comments or opinions into their arguments. This technique provides an opportunity for writers to connect with their audience and convey their personality and attitude, thus strengthening the writer-reader relationship (Hyland, 2005b). For instance:

(5) In addition, **I have speculated** that some of the variation can be attributed to (social) factors outside the linguistic system and some to internal restructuring of the system (Applied Linguistics).

Review of Empirical Studies

Engagement markers, as an important characteristic of persuasive written discourse, has been the subject of numerous studies and research in recent decades. Researchers have focused on various aspects of EMs, including inter-lingual and intra-lingual analyses. Blagojevic (2004), Crismore et al., (1993), Dafouz-Milne (2008), Dahl (2004), Marandi (2003), Vassileva (2001), Zarei and Mansoori (2007), and Zohrabi and Radkhah (2019) are among the researchers who have provided overviews of the subject and conducted cross-cultural study. Other researchers have focused more specifically on the issue of metadiscourse within particular languages across different genres to provide a more detailed description of a particular language. For example, Abdi (2002), Ghafoori and Oghbatalab (2012), Gillaerts and Van de Velde (2010), and Hyland (1998) have conducted studies on the use of EMs in specific genres of writing.

Marandi's (2003) cross-cultural inquiry explored the utilization of EMs in thirty M.A. theses authored by three distinct groups: native Persian speakers, non-native English speakers (Iranians), and native English speakers

(British). The study revealed no substantial disparities in the overall prevalence of EMs across the three cohorts. However, noteworthy distinctions were discerned in the categorical distribution of these linguistic elements. Similarly, Faghih and Rahimpour (2009) scrutinized a corpus encompassing English texts by native speakers, English texts by Iranians, and Persian texts by Iranians, finding that native English speakers exhibited a greater use of EMs compared to their Iranian counterparts. Abdollahzadeh (2011) and Abdi (2009) also reported analogous results concerning the overall prevalence of EMs. Nonetheless, Abdi's (2009) research indicated no significant variances in the categorical distribution of EMs within research articles by native and non-native (Iranian) authors. In a recent investigation, Al-Zubeiry (2019) explored the parallels and distinctions in the utilization of EMs in scientific research articles by native (American) and non-native (Arabic) authors. The analysis revealed that native English speakers utilized a greater number of EMs compared to their non-native (Arabic) counterparts. Similarly, Deliery Moghadam (2017) examined the frequency of EMs in opinion articles authored by native (American) and non-native (Iranian) writers, finding that native English authors integrated a higher number of EMs in comparison to non-native counterparts.

Hyland's (2008) influential study on EMs delved into the role of interaction in 240 published research papers across eight disciplines. The study highlighted a higher occurrence of directives in hard sciences disciplines compared to humanities and social sciences. Furthermore, reader pronouns were identified as the most frequent EMs, particularly prevalent in soft field disciplines. Hyland (2005b) also examined the use of EM subcategories in research articles across 10 disciplines, uncovering variations in frequency and type across different fields, reflecting distinct epistemological and rhetorical traditions. In another cross-disciplinary analysis, Jalilfar and Mehrabi (2014) found that Persian journals exhibited more directives in soft sciences disciplines than in hard sciences. Seyri and Rezaee's (2021) study offered a comprehensive examination of EMs from both cross-cultural and interdisciplinary perspectives. Their analysis of

research articles from soft and hard sciences revealed that both native English and non-native Iranian authors utilized more EMs in soft sciences disciplines compared to hard sciences. Additionally, the categorical distribution of EMs was found to be more prevalent in research articles from soft sciences disciplines, regardless of the authors' native or non-native status. From a cross-cultural viewpoint, native authors were observed to make greater use of EMs compared to their nonnative counterparts. It is noteworthy that all subcategories of EMs were significantly more utilized by native academic writers in comparison to non-native counterparts.

PURPOSE OF THE STUDY

Based on the literature reviewed, it is evident that the appropriate use of EMs plays a crucial role in enhancing reader comprehension and aiding writers in effectively conveying their intended meanings. However, it is noted that existing studies have predominantly focused on inter-lingual or cross-disciplinary research, with limited exploration of cultural and disciplinary differences simultaneously. In other words, the majority of research conducted by scholars has primarily concentrated on interdisciplinary variations, rather than examining specific groups of disciplines categorized as soft or hard sciences. This highlights a significant gap in the literature, as a deeper understanding of these distinct classifications could provide valuable insights into their unique methodologies and impacts. Addressing this gap, the present study aims to investigate the overall and categorical distribution of EMs in academic research articles from both hard and soft sciences, authored by native (English) and non-native (Iranian) writers. To guide the research, the following research questions have been postulated:

1: Are there any significant differences in the frequency of the use of *total engagement markers* employed by native (English) and non-native (Iranian) academic writers in their research articles discussion sections of *soft* sciences?

2: Are there any significant differences in the frequency of the use of *engagement markers subcategories* (directives, reader pronouns, appeals to

shared knowledge, personal asides and questions) employed by native (English) and non-native (Iranian) academic writers in their research articles' discussion sections of *soft* sciences?

3: Are there any significant differences in the frequency of the use of *total engagement markers* employed by native (English) and non-native (Iranian) academic writers in their research articles' discussion sections of *hard* sciences?

4: Are there any significant differences in the frequency of the use of *engagement markers subcategories* (directives, reader pronouns, appeals to shared knowledge, personal asides and questions) employed by native (English) and non-native (Iranian) academic writers in their research articles' discussion sections of *hard* sciences?

Method

Corpus

The study meticulously selected sixty research articles (30 written by native English speakers and 30 written by non-native Iranian authors in both hard and soft sciences) from six distinct sub-disciplines within the soft and hard sciences. The corpus encompassed applied linguistics, sociology, marketing as soft sciences research articles and physics, biology, and medicine as hard sciences ones, with a specific focus on the articles published in the last ten years. Ten articles from each field of study were chosen (5 written by native and 5 written by non-native Iranian authors) as the corpus of analysis. The articles were selected from those journals that were representative of each discipline, utilizing the Scientific Journal Ranking (SJR) to ensure the credibility of the publications. In order to guarantee the comparability of the corpora, the researcher concentrated on data-based research articles, as delineated by Swales (2004), who distinguishes between data-based and theory-based articles. Swales (2004) suggests that these two types of articles should be analyzed separately, as they serve different communicative purposes and target different audiences. By selecting only data-based

research articles, the researcher aimed to maintain consistency and validity in the comparison of the corpora. To ensure precision, all quotations, footnotes, tables, figures, and references were deliberately omitted from the analysis. It is essential to note that this study did not evaluate disciplines in isolation, but rather juxtaposed a range of disciplines categorized as soft (social) and hard (natural). The primary rationale behind this approach is to mitigate the influence of any single discipline on the study's findings. Table 1 presents the descriptive statistics for the corpus, delineating the characteristics of the data from the two disciplines under examination in this investigation.

To achieve the objectives of the present study, the researcher employed quantitative research design utilizing text analysis as the primary research method to examine academic research articles authored by two groups of writers. In addition to utilizing a quantitative analysis approach, an in-depth examination of all occurrences of stance and EMs was conducted within the given context in order to identify and understand their pragmatic usage. This method allows for a comprehensive exploration of how these markers are employed in various situations, providing a more nuanced and insightful perspective on their functions and implications. The methodology employed in this study is based on Halliday's SFL approach and, more specifically, on Hyland's (2005b) interactional metadiscourse concept.

Table 1. *Text corpora*

Sub corpora	Number of documents	Number of words		
Native English	30	Soft disciplines:14851	Hard disciplines: 13152	28003
Non-native Iranian	30	Soft disciplines:16111	Hard disciplines: 11768	27879
Total	60	30962	24920	55882

Data Collection Procedure

The data collection period spanned the last ten years, focusing on the discussion sections of research articles. Initially, a selection of reputable journals was curated, from which 30 articles each in the soft sciences and hard sciences were randomly chosen, ensuring representation across various disciplines. The selected articles, all in PDF format, were first converted into Word format and stored electronically. These documents were then thoroughly searched for EMs to minimize the risk of overlooking or skipping any elements. Besides electronic searching, manual analyses were conducted to determine the type and frequency of the identified elements, thereby ensuring the validity of the results. Special attention was taken to ensure that context-sensitive analyses were performed. Since the length of the two corpora varied, all EMs were calculated per 1000 words, following the methodology used in previous studies (e.g., Dafouz-Milne, 2008; Hyland, 1998, 2005b; Mauranen, 1993). Subsequently, the data were meticulously transcribed into an Excel file, enabling its quantitative analysis and statistical treatment. Chi-square statistical tests were then employed to evaluate the statistical significance of observed value disparities, with the predetermined significance level set at <0.05.

Data Analysis Framework

The examination is predicated upon Hyland's (2005b) Interpersonal Model of Metadiscourse, wherein overt writer-reader interaction is effectuated through the utilization of EMs. The specific focus of this study encompasses EMs, namely: personal asides, reader pronouns, questions, directives, and appeals to shared knowledge. Table 2 delineates Hyland's (2005b) Interpersonal Model of Metadiscourse, featuring an exclusive listing of the aforementioned EMs.

Table 2. *EMs of Hyland's (2005b) model of discourse*

Category	Function	Examples
Engagement Markers		
Reader Pronouns	Pronouns that directly address the reader	"What do you think about this, dear reader?"
Directives	Instructions or commands directed at the reader	"Consider this perspective as you analyze the data."
Personal Asides	Statements or comments directed at the reader "	As you can see, this concept is crucial for our understanding."
Appeals to Shared Knowledge	References to common understanding or knowledge shared with the reader	"We all know the importance of this principle in our field."
Personal Asides	Statements or comments directed at the reader	"As you can see, this concept is crucial for our understanding."
Questions	Interrogative statements aimed at the reader	"Have you considered the implications of this finding?"

RESULTS

Overall Distribution of EMs in Soft Sciences Research Articles

To ascertain potential disparities in the utilization of total Engagement Markers (EMs) in soft sciences research articles between native (English) and non-native (Iranian) authors, the frequency of examined categories per 1000 words was meticulously calculated. As depicted in Table 3, native (English) authors utilized 326 EMs out of 14851 corpus words, yielding an average frequency of 21.951 per 1000 words. In contrast, non-native (Iranian) authors employed 137 EMs out of 16111 corpus words, resulting in an average frequency of 8.503 per 1000 words.

Table 3. *Total frequency of EMs across native vs non-native soft sciences RAs*

	Native	Non-native
Total words	14851	16111
EMs in soft sciences RAs	326	137
Frequency per 1,000 words	21.951	8.503

To determine the significance of the disparity between the two corpora sets, the Chi-square statistical test was utilized. As indicated in Table 4, the observed Chi-square value (x2 = 77.151) was found to be statistically significant at the α level (p = .000 < .05) with a degree of freedom of 1, signifying a notable difference between these two groups in their utilization of EMs.

Table 4. *Chi-square test of EMs*

	Observed N	Expected N	Residual	Chi-Square	EMs
1.00	326	231.5	94.5	*df*	77.151[a]
2.00	137	231.5	-94.5	Asymp. Sig.	1
Total	463				.000

Note: 1 = Native academic RAs
2 = Non native academic RAs

As shown in Table 4, native (English) authors exhibited a greater utilization of EMs in their soft sciences research articles. These linguistic devices serve a pivotal role in contextualizing the text and reflecting the author's comprehension of their intended reader's requirements (Hyland, 2005a). The contrast in the application and frequency of EMs between the two corpora sets is visually depicted in Figure 1.

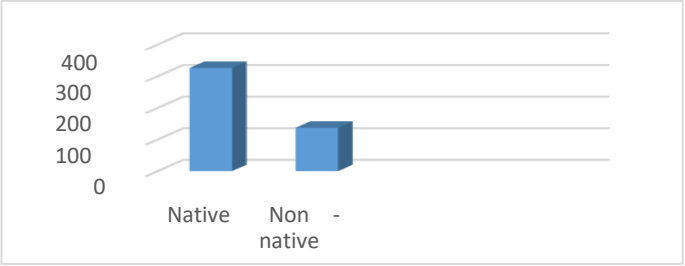

Figure 1 Overall distributions of EMs across soft sciences RAs

The divergence in the utilization of EMs in soft sciences academic research articles between native (English) and non-native authors can be linked to cultural influences. Native (English) authors demonstrated a greater incorporation of these linguistic elements to engage with their readers and situate themselves within the discourse, as compared to their non-native counterparts. The result of the present study was in line with that of Al-Zubeiry (2019), Faghih and Rahimpour (2009), Gholami and Ilghami (2016), and Seyri and Rezaee (2021) who found that native speakers of English employed more EMs than Iranians counterparts. According to Gholami and Ilghami (2016), the results of the analysis can be attributed to native writers' proficiency and awareness of how to incorporate EMs in their written prose and interact with their audiences. The results of the present study went against the study of Marandi (2003) and Abdi (2009) who found that native (English) and non-native (Iranian) did not differ in their frequency and use of overall EMs.

Categorical Distribution of EMs in Soft Sciences Research Articles

To investigate potential disparities in the use of EMs subcategories between two groups of authors, the frequency of each category per 1000 words was computed for two sets of soft sciences research articles. The results, detailed in Table 5, indicate that native authors utilized 326 instances of EMs out of 14851 corpus words, yielding an average frequency of 21.951 per 1000 words. In contrast, non-native Iranian authors employed 137 instances of EMs

subcategories out of 16111 corpus words, resulting in an average frequency of 8.503 per 1000 words.

Table 5. *Categorical distribution of EMs across native vs non-native soft sciences RAs*

Total words	Native			Non-native		
	14851			16111		
Categories of EMs	F per1000 W	Percent	Raw	F per1000 W	Percent	Raw
Reader pronouns	11.312	51.533	168	3.041	35.6	49
Directives	7.878	35.889	117	4.655	54.744	75
Appeals to shared knowledge	2.154	9.815	32	.744	8.759	12
Personal asides	.538	2.453	8	.062	.729	1
Questions	.067	.306	1	0	0	0
Total	21.951	100	326	8.503	100	137

Note: F = Frequency W = Words

Based on the data presented in Table 5, reader pronouns emerged as the most prevalent item in the EMs subcategories, constituting 51.53% of the total instances, followed by directives and appeals to shared knowledge, which accounted for 35.88% and 9.815% respectively. Personal asides and questions were the least frequent, comprising 2.45% and 0.30% of the total, respectively. In contrast, for the group of Iranian authors, directives were the most prevalent at 54.74%, followed by reader pronouns at 35.76%. Appeals to shared knowledge and personal asides accounted for 8.75% and 0.72% respectively, while no instances of questions were found in the research articles authored by non-native (Iranian) writers. These findings are visually depicted in Figure 2, highlighting the contrasting patterns of EMs usage between the two author groups.

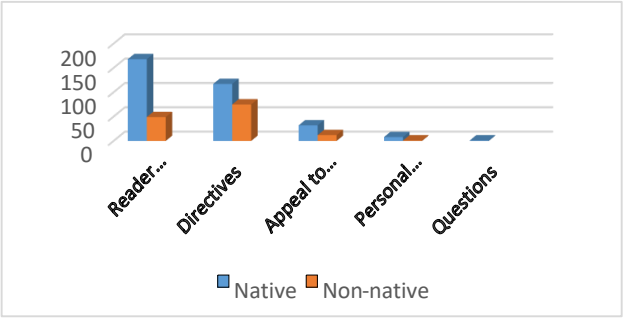

Figure 2. Categorical distribution of EMs across soft sciences RAs

Despite the observed disparities in the utilization of EMs subcategories in soft sciences research articles authored by native (English) and non-native (Iranian) writers, the significance of these differences has come under scrutiny. Consequently, a Chi-square test was employed to rigorously compare the frequency of EMs used by these two distinct author groups. The summarized outcomes of this statistical analysis are presented in Table 6, offering a comprehensive evaluation of the observed distinctions in EMs usage.

Table 6. *Chi-square test for EMs subcategories across native vs non-native soft sciences RAs*

Categories	Observed N Native	Observed N Non-native	Expected N	Residual Native	Residual Non-native	Chi square	*df*	sig
Reader pronouns	168	49	108.5	59.5	-59.5	62.258	1	.000
Directives	117	75	96	21.0	-21.0	9.188	1	.002
Appeals to shared knowledge	32	12	22	10.0	-10.0	9.091	1	.003
Personal asides	8	1	4.50	3.5	-3.5	5.444	1	.020
Questions	1	0	-	-	-	-	-	-

Note: N = Number

The results of Chi-square test presented in Table 6, reveal significant differences in soft sciences research articles written by two groups of writers in the utilization of EMs subcategories. Specifically, all EMs, including reader pronouns ($p = .000 < .05$), directives ($p = .002 < .05$), appeals to shared knowledge ($p = .003 < .05$) and personal asides ($p = .020 < .05$) were observed to be more prevalent in soft discipline research articles authored by native English writers compared to their Iranian counterparts. Since the frequency of questions was zero in soft sciences research articles written by non-native (Iranian) authors, Chi-square test was not run for this subcategory.

Overall Distribution of EMs in Hard Sciences Research Articles

To analyze the total distribution of EMs in scholarly articles within the hard sciences authored by native (English) and non-native (Iranian) writers, the researcher conducted a frequency analysis using two distinct corpora. As depicted in Table 7, the scholarly research articles composed by native authors exhibit a frequency of 19.692 EM instances per 1000 words, while those authored by non-native writers demonstrate a frequency of 11.896 EM instances per 1000 words.

Table 7. *Total frequency of EMs across native vs non-native hard sciences RAs*

	Native	Non-native
Total words	13152	11768
EMs in soft sciences RAs	259	140
Frequency per 1,000 words	19.692	11.896

A Chi-square test was employed to assess the significance of the disparity between the two corpora. As indicated in Table 8, the observed Chi-square value ($\chi 2 = 35.491$) was found to be statistically significant at the α level ($p = .000 < .05$), with a degree of freedom of 1, suggesting a notable distinction in the utilization of EMs between the two groups (p value < 0.05).

Table 8. *Chi-square test of EMs*

	Observed N	Expected N	Residual		EMs
1.00	259	199.5	59.5	Chi-Square	35.491[a] 1
2.00	140	199.5	-59.5	*df*	
Total	399			Asymp. Sig.	.000

Note: 1 = Native academic RAs 2 = Non-native academic RAs

Table 8 illustrates a higher frequency of EMs utilized by native (English) authors in their hard sciences research articles. As posited by Hyland (2005a), these linguistic devices play a pivotal role in establishing contextual relevance and demonstrate the author's adeptness in addressing the informational requirements of their audience. The disparity in the utilization and frequency of EMs between the two article groups is visually depicted in Figure 3.

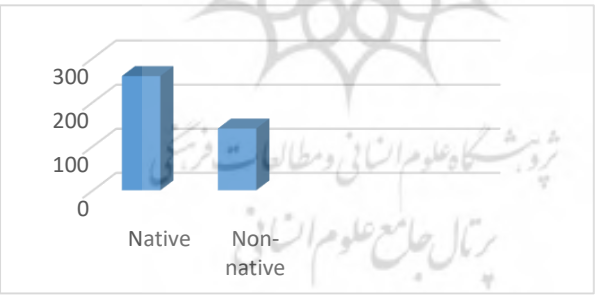

Figure 3 overall distributions of EMs across hard sciences RAs

The utilization of EMs in academic research articles within the hard sciences is often influenced by authors' cultural backgrounds. The overuse of EMs by native academic authors serves to establish direct communication with readers and employs language that captures their attention and sustains their interest, fostering a sense of connection between the writer and the reader.

Categorical Distribution of EMs in Hard Sciences Research Articles

To analyze the categorical distribution of EMs in hard sciences research articles, the frequency and percentage of each EM category per 1000 words were computed. Table 9 presents the descending order of distribution for EM subcategories based on their frequency in the research articles. As depicted in the table, the average frequency of EMs per 1000 words in hard sciences research articles authored by native (English) writers was 19.692, while those authored by non-native Iranian writers exhibited an average frequency of 11.896.

Table 9. *Categorical distribution of EMs across native vs non-native hard sciences RAs*

Total words	Native			Non-native		
	13152			11768		
Categories of EMs	F per1000 W	Percent	Raw	F per1000 W	Percent	Raw
Reader pronouns	10.264	52.123	135	7.307	61.428	86
Directives	8.059	40.926	106	3.569	30	42
Appeals to shared knowledge	1.216	6.177	16	1.019	8.571	12
Personal asides	.076	.386	1	0	0	0
Questions	.076	.386	1	11.896	0	0
Total	19.692	100	259	11.896	100	140

Note: F = Frequency W = Words

Based on the findings presented in Table 9, reader pronouns emerged as the most prevalent category of EMs at 52.12%, followed by directives and appeals to shared knowledge, which secured the second and third positions with average frequencies of 40.92% and 6.17% respectively. Personal asides and questions were identified as the least frequent examples of EMs subcategories, each exhibiting an average frequency of 0.38%. Conversely, in the case of Iranian authors, reader pronouns were the most prevalent at 61.42%, followed by directives and appeals to shared knowledge at 30% and

8.57% respectively. Notably, no instances of personal asides or questions were observed in Iranian hard sciences research articles. These contrasting outcomes are effectively represented in Figure 4.

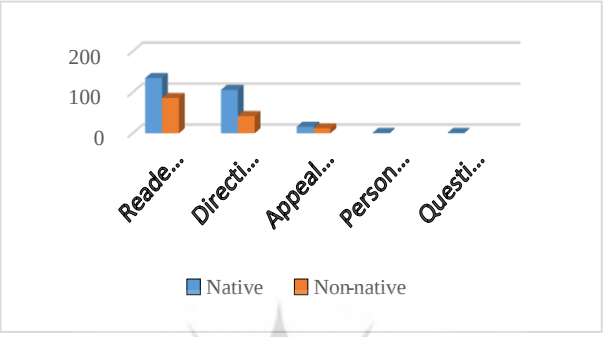

Figure 4 Categorical distribution of EMs across hard sciences RAs

A Chi-square test was conducted to assess the significance of differences between hard sciences research articles authored by native (English) and non-native (Iranian) academic writers. The findings are succinctly summarized in Table 10.

Table 10. *Chi-square test for EMs subcategories across native vs non-native hard sciences RAs*

Categories	Observed N Native	Observed N Non-native	Expected N	Residual Native	Residual Non-native	Chi square	*df*	sig
Reader pronouns	135	86	110.5	24.5	-24.5	10.864	1	.001
Directives	106	42	74.0	32.0	-32.0	27.676	1	.000
Appeals to shared knowledge	16	12	14	2.0	-2.0	.571	1	.450
Personal asides	1	0	-	-	-	-	-	-
Questions	1	0	-	-	-	-	-	-

Note: N = Number

Table 10 presents the results of the Chi-square test, indicating significant disparities in the distribution of reader pronouns (p = .001 < .05) and directives (p = .000 < .05) within hard sciences research articles authored by native (English) and non-native (Iranian) writers. However, no significant differences were observed in the frequency of appeals to shared knowledge between the two groups. Notably, the frequency of personal asides and questions in hard sciences research articles authored by non-native (Iranian) writers was zero, thus the Chi-square test was not applicable to this subcategory.

DISCUSSION

Regarding intercultural variations, the study highlighted the differences in the use of EMs between native (English) and non-native (Iranian) writers in the discussion sections of research articles across both soft and hard sciences. According to Clyne (1987), norms and conventions of academic discourse genre is closely interwoven with writers' culture and writers' cultural background affects their employment of linguistic devices. As the results showed, native (English) authors employed more examples of EMs to project themselves into their texts and interact with their readers, either by focusing their attention or including them as discourse participants than their non-native counterparts. The result of the present study was in line with that of Al-Zubeiry (2019), Faghih and Rahimpour (2009), Gholami and Ilghami (2016), and Seyri and Rezaee (2021) who found that native speakers of English employed more EMs than non-native counterparts. Overuse of EMs by native academic authors allow them to address their readers directly and use language that grabs their attention and keeps them interested. This creates a sense of connection between the writer and the reader, making the reader feel more engaged with the topic being discussed. However; the results went against the study of Abdi (2009) and Marandi (2003) who found that native

(English) and non-native (Iranian) did not differ in their frequency and use of overall EMs.

Regarding categorical distribution of EMs in soft sciences research articles, reader pronouns, directives, appeals to shared knowledge and personal asides were mainly detected in the academic papers authored by native English authors. Extensive employment of these devices by native academic authors allows them to feel the presence of their readers, pull them along with their argument, attract their attention, regard them as discourse participants, and led them to right interpretation in the related field. According to Hyland (2005b), employment of reader pronouns allow writers to address and involve their readers in a given written prose and give the readers a sense of membership with similar goals and understanding as the writer. The results of the analysis revealed that, native academic writers are more efficient in establishing a connection with their readers. By employment of these devices, they create a sense of immediacy and make the writing more personal and relatable. Additionally, they enhance the clarity of their statement by directly addressing the readers and guiding their understanding. This inclusivity and engagement contribute to a more captivating and inclusive academic writing style (Hyland, 2005b). Regarding directives, it seems that native academic authors are more sensitive to directing and guiding their readers to effectively convey their message. The findings of this study demonstrate that the effective use of directives significantly enhances a writer's perceived expertise. By providing clear and specific instructions, authors successfully engage readers and facilitate a smoother writing process. This clarity not only minimizes confusion and ambiguity but also ensures that readers understand exactly what is expected of them and the actions they need to undertake. Furthermore, the data suggest that writers who incorporate shared knowledge and clear signals effectively prompt readers to recognize familiar concepts, thereby reinforcing the writer's authority in their field and cultivating a sense of belonging among the audience. Additionally, the frequent inclusion of personal asides appears to foster a deeper connection and empathy between the writer and the reader, enhancing the overall

engagement with the text. These results underscore the importance of strategic communication in academic writing, highlighting how specific rhetorical choices can influence reader interpretation and involvement (Hyland, 2005b).

As it is evident, native English authors are more sensitive to make the content more relatable and interesting to the reader by representing their perspective and connecting with the audience on a more personal level (Hyland, 2005b).The results of the present study was in line with those of Seyri and Rezaee (2021) who found that instances of EMs namely reader pronouns, directives, appeal to shared knowledge and personal asides are prevalent in the academic research articles written by native (English) authors. However, the results went against those of Jalilfar and Mehrabi (2014) who found no significant difference in the distribution of directives across Persian and English academic research articles.

With regard to categorical distribution of EMs in hard sciences research articles, the difference between native and non-native in terms of the authors' use of reader pronouns and directives reached the significance level. Native authors inserted more instances of reader pronouns in their academic research papers compared to non-native ones. The result of the present study ran for Seyri and Rezaee (2021) who found that reader pronouns and directives were frequently found in the academic research articles written by native (English) authors. It is of note that the results went against those of Jalilfar and Mehrabi (2014) who found no significant difference in the distribution of directives across Persian and English academic RAs. Considering appeals to shared knowledge as the subcategories EMs, significant difference was not found in two sets of hard sciences research articles written by two groups of writers. The results of the present study turned out to be in contrast with the study of Seyri and Rezaee (2021) who found the examined category was mainly detected in academic research articles written by Native (English) authors. In general, when academic writers refer to information that is commonly known or accepted by their audience, it can help them build a connection with their

readers, encourage interaction, increase reader interest, and enhance their understanding of the specific type of writing.

CONCLUSION AND IMPLICATIONS

This study examined cross-cultural as well as interdisciplinary variation on the use of EMs in hard and soft sciences academic research articles authored by native English and non-native Iranian authors. By examining sixty academic research articles in hard and soft sciences, the research aims to elucidate the similarities and disparities in the overall and categorical distribution of EMs across two sets of corpora. Regarding overall distribution of EMs, the findings reveal that native English speakers exhibit a higher frequency of EM incorporation compared to their non-native Iranian counterparts in both hard and soft sciences research articles. Furthermore, significant differences were observed in the categorical distribution of EMs namely directives, reader pronouns, appeals to shared knowledge, and personal asides in soft sciences research articles authored by two groups of writers. No instances of questions were found in soft sciences research articles written by non-native Iranian authors. Similar to soft sciences research articles, native English academic authors incorporated more instances of reader pronouns and directives in their hard sciences research articles. No examples of personal asides and questions were detected in hard sciences research articles written by Iranian academic writers.

Regardless of the discipline (whether soft or hard), writers from different cultural background incorporated reader pronouns and directives differently in their academic research articles. So it can be concluded that incorporation of reader pronouns and directives were tied to writers' culture.

The challenges faced by non-native speakers in effectively writing in a second language are multifaceted, encompassing factors such as language proficiency, disciplinary variation, cultural differences, and first language

literacy. While English for Academic Purposes (EAP) books aim to enhance writing skills, some have focused solely on grammatical and lexical aspects, neglecting the importance of EMs in effective communication. Incorporating EMs is crucial for clarity, coherence, and engagement in writing, and materials designed for language learning should emphasize their significance. Furthermore, understanding the cultural and disciplinary variations in writing styles and conventions, as highlighted by this research, can foster better communication and collaboration in academic settings, aiding writers in adapting their writing style to effectively engage with diverse audiences and fields of study (Hyland, 2005b). The study underscores the importance of EMs in effective writing for non-native speakers, advocating for their inclusion in language learning materials. Additionally, it highlights the significance of understanding cross-cultural and cross-disciplinary variations in writing styles, enabling academic writers to engage more effectively with diverse audiences and fields of study. Ultimately, this awareness can foster better communication, collaboration, and appreciation of different perspectives in academic research endeavors.

From a methodological point of view, the present study has some shortcomings in the way it was conducted. Specifically, because the study relied on analyzing written texts (a corpus-based approach), it was not possible to fully understand the thought processes of the writers who used EMs to express their opinions or connect with their readers. To overcome the drawbacks of studies that rely solely on analyzing written texts, researchers have the options to employ alternative research methods including interviews, surveys, think aloud and observations to gain a more profound insight into the cognitive processes that writers engage in while using specific language markers. Additionally, by studying the processes that writers go through when using specific markers of EMs, researchers can gain a deeper understanding of the cultural and disciplinary differences in academic writing. Future research also should focus on studying research articles written by both novice learners and experts in different fields. The goal is to investigate how

the level of proficiency in a given language affects the use of certain language features called EMs. This knowledge can then be used to develop more effective teaching strategies and resources for ESL students and other learners who want to enhance their writing skills in an international context.

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