The Comparative Study of Interactional Metadiscourse Markersin English Scientific Articles of Hard and Soft Disciplines

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ABSTRACT

This is a corpus-based investigation on interactional metadiscourse markers containing hedges, boosters, self-mentions, attitude markers and engagement markers in the discussion and the conclusion sections of 120 English research articles of hard and soft disciplines including chemistry, medicine, economic psychology and tourism management. The corpus was comprised of 160344 words. The selected corpus was analyzed using Hyland's (2005) model of interactional markers. This study employed quantitative approach, including frequency counts and text analysis. Several chi-square tests were carried out to clarify the probable differences. The results indicated thatthere was no statistically significant difference between hard and soft sciences papers in the application of markers in the discussion and the conclusion sections. The findings indicated that the use of interactional elements differed in four majors. The most used markers were in the tourism management corpus and the least ones were in the chemistry corpus. Furthermore, the discussions and the conclusions sections in every majors differed in terms of metadiscourse markers. In the whole corpus, the frequency of markers in the conclusion sections were higher than the frequency of markers in the discussion sections. The study rendered some pedagogical implications.

Keywords: Discussion and Conclusion Sections, Hard Disciplines, Interactional Markers, Research Articles, Soft Disciplines

I. INTRODUCTION

Writing in general and academic writing in particular is dynamic and has got its typical nature in every context; therefore, in advanced academic level, certain linguistic and rhetorical choices must be used by authors for making their research claims acceptable for the members of their discourse communities. Hyland (2009) stated that

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academic writing will be effective if writers incorporate conventions that are familiar to other members of the community. Similarly, Zamel (1998) considers academic writing a separate culture which has its special language with its vocabulary, norms, and sets of rules.

Recently, both scholars and students indicate a remarkable interest in developing academic literacy skills in writing (e.g., Ballard, 1984; Grabe& Kaplan, 1996). So, it is essential for new researchers with diverse language background to learn advanced communication skills in written discourse. In such a context, discourse analysis has widened its focus to include the rhetorical organization of written texts as a function of situational and cultural variables within the discourse community (Conner, 1996). Linguists' interest in discourse in recent years has gradually shifted from the traditional focus on the ideational dimension of texts and speech to the ways they function interpersonally (Hyland, 2004). Such an opinion reveals that writers or speakers not only produce discourses to convey information and to represent external reality but to ensure that the information they send is perceivable and convincing enough for their audience to follow along. To have effective communication, the writers anticipate the expectations, needs, and resources of their recipients, and try to involve and guide them through the texts. Writing or speaking is, therefore, viewed as a socio-communicative process between writers or speakers and readers or listeners (Hyland, 2004, 2005; Hyland &Tse, 2004), and the notion of metadiscourse elaborates how writers or speakers intrude themselves in their texts to have interaction with their receivers. Writing of research articles which imposes strict adherence to its conventions, on top of field-specific to conventional, may pose as potential challenge undergraduate writers who may not be as exposed to as many articles and consequently to the conventions of as their professional counterpart in the same field (Nivales,2011). Hyland (2009) stated that academic writing will be effective if writers incorporate conventions that are familiar to other members of the community.

English language teachers and learners are members of a specific discourse community and deal with Persian or English applied linguistics journals frequently, so they should be aware of the rhetorical features of writing in their disciplines to publish their papers in the related journals (Varastehnezhad&Gorjian ,2018). According to Varastehnezhad&Gorjian (2018), the importance of having knowledge of metadiscourse markers for the English learners and teachers cannot be ignored. Metadiscourse is a concept which is based on a view of writing or speaking as a social engagement (Dafouz-Milne, 2008; Hyland, 2005). It is, therefore, believed to play an important role in organizing the discourse, engaging the audience and signaling the writer's or speaker's attitude (Fuertes-Olivera, P.A., Velasco-Sacrista´n, M., ArribasBan˜o, A., & Samaniego-Ferna´ndez, E. 2001). Many scholars have investigated various aspects of RAs including the functions of metadiscourse markers (e.g. Dahl, 2004; Farrokhi& Ashrafi, 2009; Hyland, 1998a, 1998b; Jalilifar, Zarei&Mansoori, 2011). As a result, it provides the best means of analyzing different angles and dimensions of language in use. Investigation about metadiscourse markers can be beneficial for both written and oral discourse analysis, and it also has some writing skills pedagogical implications. These skills have been a challenging aspect of second language learners in the last two decades or so (Kroll, 1990; Raimes, 1994). Although, writing skills have very perpetual and notorious nature, it always has been one of the main areas of focus for researchers and scholars in academic settings. Researchers (Hoey, 2001; Hyland, 2005; Thetela, 1997) claim that interaction in written texts can be managed in the same way as the spoken text, though with different effects due to the different medium. Intellectual and competent writers

know exactly how to use language to express themselves, their work, as well as to recognize and to negotiate social relationships with their readers. Hyland (2003) has mentioned two reasons why the teaching of writing has gained such a central role in recent years. He stated the vital role of writing skills in professional and academic achievement could be considered as the first reason for giving such a status to writing. The ability to get one's ideas across and communicate effectively is heavily dependent on having high level of writing skills. The second reason, stated by Hyland, is due to the latest developments in writings that are attributed to applied linguistics, which is mainly rooted in the works of scholars such as Kaplan (1966), Swales (1981, 1990), and Conner (1996) in the fields like composition studies, second language writing, and contrastive rhetoric. Contrastive rhetoric as an approach was first introduced by Kaplan (1966) for analyzing the discourse and rhetoric. This approach majorly focuses on studying texts in English and other different languages to gain enough insights about cross-cultural language variations. In the past three decades, metadiscourse features of RAs have been increasingly arousing great attention and interest of linguists and discourse analysts.

In contemporary discourse analysis, the notion of metadiscourse refers to the author's intrusion into the discourse, either explicitly or nonexplicitly to direct rather than inform, showing readers how to understand what is said and meant in the primary discourse and how to take the author (Crismore, 1983, p. 2). Even more recently, scholars such as Adel (2006) define metadiscourse as an element that involves "discourse about the evolving discourse, or the writer's explicit commentary on her own ongoing text" (p. 2). These devices have been applied by the authors for organizing the text, projecting their opinions and engaging their recipients. It is a concept which is based on a view of writing or speaking as a social engagement (Dafouz-Milne, 2008; Hyland, 2005). It is, therefore, believed to play an important role in organizing the discourse, engaging the audience and signaling the writer's or speaker's attitude (Fuertes-Olivera et al., 2001). As a result, metadiscourse tools have been used by many scholars for exploring various dimensions of using language for interaction.

As Hyland (2004) argues, academic writing should not be seen merely as factual and objective. It presents the author's points of view, as well. There are some features for encoding writers' ideas that play the role of mediators for joining them to factual information of the text. Written academic genres have been investigated by many researchers over the last thirty years, especially RAs (e.g., Hyland, 1999, 2000; Swales, 1990). The studies aimed at exploring moves and their pattern of use in this genre (e.g., Harwood, 2009; Hewing's et al., 2010; Hyland, 1999, 2000; Mansourizadeh& Ahmad, 2011). In addition, metadiscourse markers were the focus of the study conducted by Dafouz-Milne (2008).

Scientific articles have some rhetorical characteristics that can better be recognized by studying metadiscourse markers. Various sections of RAs perform various rhetorical functions, and different linguistic devices might be used. This research focuses on the discussion and conclusion parts as a persuasive text type (Abdollahzadeh, 2011; Farrokhi& Ashrafi, 2009). According to Belcher (2009), writing the discussion and conclusion sections of RAs are very complex and challenging for the researchers. The argumentative nature of these sections give more flexibility and freedom to the authors for interpretation rather than description of the research data to reject, accept, discuss or confirm the findings. Very limited research has been conducted on studying these

parts together in hard and soft disciplines and there is a need for new studies to investigate how these sections are written in these two disciplines.

1.1 Statement of theProblem

Each genre has some features unique to itself, which is shaped by the purpose of the discourse community by which that genre is used (Swales,2004). The uniqueness of features of genres can be extended to individual languages as well. Kaplan (1966) posited that each language has its rhetorical patterns, which can bring about variation in rhetorical patterning of a specific type of genre.

In context of Iran, many researchers' desire is being able to publish their scientific articles in the prominent and valid international journals. Unfortunately, many of these articles will be rejected and would not be published in famous journals because they do not involve the required criteria in their writings.

Many Iranian researchers in different fields of study do not have enough knowledge about the types of lexicogrammatical systems and the culture of a target language. Therefore, there is a need to raise Iranian writers' linguistics and rhetorical awareness about the conventions of professional scientific writings (Shirani&Chalak, 2016). The implementation of this study is very significant in the field of English for Academic Purposes (EAP).

1.2 The Significance of the Study

The rationale behind selecting metadiscourse markers in the context of scientific articles for this research is that these tools play crucial roles in creating reader-friendly and persuasive texts. They are also widely applied in various genres such as scientific ones. As to the knowledge of the researcher, very little research has been conducted especially on interactional metadiscourse markers in hard and soft disciplines. The present inquiry tried to present a contribution to the field of cross-disciplinary analysis of metadiscourse markers in scientific articles. This study is also relevant to the field of English for Academic Purposes (EAP) in academic contexts, especially to instructing acceptable norms and conventions of advanced writing that every researcher should be aware of in his/her field of study. To narrow down the study, this research just focused on interactional categories of these markers and the researcher aimed to fill the gap in the literature in regard with appropriate usage of attitude markers, hedges, boosters, self-mentions and engagement markers among different scientific RAs.

Metadiscourse markers' devices have vital roles in the process of elaboration, presentation, and transmission of facts within the persuasive texts. This research tried to stimulate and bring about new ideas for further research and also it has got the contribution to fill the gap of literature.

Metadiscourse markers are widely used by authors and scientific researchers from different cultures and different nations, but they use and interpret them differently. Also, according to the importance of these metadiscourse markers, Hyland (2000) insisted on more teaching and researching of metadiscourse features findings.

To raise the students' awareness of writing an appropriate and reader-friendly text, it is necessary to include adequate pedagogical instructions and programs into our educational settings and systems. As Abdollahzadeh (2011) argued both English as a Second Language

(ESL) and English as a Foreign Language (EFL) students "need to gain sensitivity to and skill with these markers in English, a task which usually involves overcoming several daunting sociolinguistic challenges" (p.296).

The findings of this investigation would be beneficial for material designers, course developers, and curriculum publishers. It would provide M.A. students with enough information and would give them adequate insights about the way they should develop their work for publication and academic activities.

They will learn how to improve their writings' qualities according to the international rules and conventions of using metadiscourse markers. As the application of metadiscourse markers differs in every context, culture, and discipline, academic writers should know how to use these devices for different audiences within each specific discourse community.

Therefore, familiarizing and involving them with academic writings' norms and regulations will improve their sensitivities about the implication of these tools in various academic settings. Therefore, one of the prominent advantages of this current research is being aware of the roles and functions of these devices in engaging and attracting different audiences' attention.

1.3 Purpose of the Study

This study aimed to investigate the types and frequencies of interactional metadiscourse markers containing hedges, boosters, attitude markers, self-mentions and engagement markers in the discussion and conclusion sections of four disciplines, chemistry, medicine, tourism management, and economic psychology English RAs published in international journals. Also, Interactional metadiscourse markers were the focus of this study to explore whether authors within hard and soft disciplines in English RAs acted differently with the subcategories.

Based on the purpose of the study, the following research questions were formulated:

1.4   Research Questions

1. Are there any statistically significant differences between types and frequencies of Interactional Metadiscourse markers (Hyland, 2005) in the discussion and the conclusion sections of English scientific articles in hard and soft disciplines?

2. Are there any statistically significant differences in the use of interactional markers in four majors of medicine, chemistry, economic psychology and tourism management?

3. Are there any statistically significant differences in the use of interactional metadiscourse markers in the discussion and the conclusion sections of the four majors of medicine, chemistry, economic psychology and tourism management?

Based on the research question, the following null hypothesis were formulated;

1.5   Research Hypothesis

H01: There are not any statistically significant differences between types and frequencies of Interactional Metadiscourse markers (Hyland, 2005) in the discussion and the conclusion sections of English scientific articles in hard and soft disciplines?

H02: There are not any statistically significant differences in the use of interactional markers in four majors of medicine, chemistry, economic psychology and tourism management?

H03: There are not any statistically significant differences in the use of interactional metadiscourse markers in the   discussion and the conclusion sections of the four majors of medicine, chemistry, economic psychology and tourism management?

II.   Review of theLiterature

2.1 Theoretical framework

2.1.1 General Approaches to Genre Studies

Hyon (1996, p. 9) classified genre studies into three approaches: "New Rhetoric approach, Systemic Functional approach, and English for Specific Purposes". These traditions, according to Swales (2004), are complementary, rather than competing approaches. The theoretical methodology underpinning this research is Halliday's (1970) Systemic Functional Linguistics (SFL). This theory treats language as a system of meaning-making that is directly related to its certain setting. According to SFL there are two important layers for context, one is context of situation (register theory) and the other one is context of culture (genre theory).

2.1.2 A Brief Introduction to the History of SFL

Historically, the origin of functional linguistics was in the Prague school in 1920s.Quite opposite to formal linguistics, functional linguistics showed a great interest in studying and describing both forms and the related contexts of grammatical items. Two prominent linguists of the prague school were Bronislaw Malinowski and J. R. Firth. They played an influential role in emergence of functional linguistics. To Malinowski, one should pay attention to the literal meaning and also the social situation of an utterance in order to grasp the meaning. The term *context of situation* was coined by Malinowski. Firth and later on Halliday were influenced greatly by the concept of this phrase (Aronoff&Miller;2003Garber,2001). Context of situation refers to the notion of register and context of culture refers to the notion of genre.

Firth had a major role in functional linguistics development by contributing to the idea of language as a system (Rollins, 2012). Functional linguists, do not view a certain clause element just based on the *syntagmatic* relation of form and function, because based on their view, language is considered as a *paradigmatic* system of

resources and understanding this complex system requires the intermingling the elements of form and function. Thus, depending on the context, an individual can choose between various linguistic resources (Young &Harrison, 2004; Rollins, 2012).

In 1970, Michele Halliday developed SFL theory which was deeply influenced by Malinowski and Firth. The appealing characteristic of studying grammar in this approach is precisely and meticulously bridging the gap between linguistic and social structural features. Therefore, SFL as a new approach is radically studying grammar differently from the traditional model that was just based on studying and teaching a bunch of grammatical rules and structures. On contrary to formal linguistics, SFL focuses on language in use and views it as a resource of meaning-making through grammar that creates meaning through wording. Likewise, SFL values meaning in all areas of the language, whereas Chomskyan linguistics isolates semantics from syntax (Chapman & Routledge, 2009; Shore, 1992; Wu, 2000). SFL systematically connects language to context through "texts", considered to be authentic products of social interaction embedded in cultural and social contexts (Eggins, 1994). Two key words that fall under the concept of SFL are rhetoric and metadiscourse. Following is a brief elaboration of the mentioned key-terms.

2.1.3 Rhetoric and Matadiscourse

Scholars defined rhetoric in different ways throughout the history. Ong (1983), defined the notion of rhetoric as the ability to persuade audience either in speech or in a written text by using impressive words. Crystal (2003), explained rhetoric as an effective speech or a piece of text. Hyland (2005), considered rhetoric as an art to persuade people.

Mauranen (1993) observed, modern rhetoric as the valuable tools of effective oral presentation, also a precise means of analyzing discoursal characteristics within different disciplines. Therefore, the traces of the classical rhetoric have put its obvious effect on modern studies of oral and written communication.

Hyland (2005), stated that Aristotle recognized three major features of communication, the speech, the audience, and the text. Furthermore, he distinguished three key elements of argument: language, persuasive tools, and the organization of the argument.

Today, three core elements of persuasion, including*ethos*, *pathos*, and *logos*are recognized. These three elements are intermingled and should work in balance to meet the persuasive ends. In persuasion, all three should work in combination towards persuasive ends. According to Hyland (2005), ethos refers to the character and the credibility of the speaker, pathos refers to the audience's characteristics, and logos refers to the speech and its features such as length, kind of evidence, arrangement and the complexity of it. Hyland (2005), indicated the relationship of metadiscourse and three means of persuasion. He mentioned that metadiscourse highlighting logos when it explicitly creates a link between the elements of the argument. It projects ethos when it reflects the writer's presence and authority, and it conveys pathos when it respects the readers' points of view. The notion of rhetoric is a key element of discourse analysis in which focuses on the strategies or techniques to present the content of a text.

2.2 Metadiscourse

Metadiscourse is a concept which is based on a view of writing or speaking as a social engagement (Dafouz-Milne, 2008; Hyland, 2005). It is, therefore, believed to play an important role in organizing the discourse, engaging the audience and signaling the writer's or speaker's attitude (Fuertes-Olivera, P.A., Velasco-Sacrista´n, M., Arribas-Ban˜o, A., & Samaniego-Ferna´ndez, E. 2001).

Metadiscourse can be recognized as an important means of facilitating written communication, supporting a writer's position and building a relationship with an audience (Simin&Tavangar, 2009). It is important to know that a central aspect of metadiscourse is its context-dependency, which is the closeness between norms and expectations of settings. (Kuhi, Tofigh&Yavar,2013). Many scholars have investigated various aspects of RAs including the functions of metadiscourse markers (e.g. Dahl, 2004; Farrokhi& Ashrafi, 2009; Hyland, 1998a, 1998b; Jalilifar, Zarei&Mansoori, (2011). Metadiscourse features have got different classifications by different scholars. The most recent and clear model belonged to Hyland (2005), that presented the most recent and clear model and he divided metadiscourse markers into two categories of interactive and interactional resources. Interactive resources are dealing with organizing the text and the interactional resources which are the focus of this research are dealing with involving readers into the text and presenting the writer's personal views towards the propositions and the readers. Throughinteractional resources, writers acknowledge their level of intimacy, and the extent to which the reader is involved in the text (Ariannejad&VanciOsma, 2019). In academic writing metadiscourse has been seen as an important pragmatics resources for influencing readers' responses to claims in RAs, (Hyland,1998, Mauranen, 1993).

2.3 Related Studies

In the area of representing the use of metadiscourse in texts in English, a study by Abdi (2002) examined interpersonal metadiscourse following Vande Kopple (1985). The discussion sections of sixty English research articles from social science and natural science journals published in 1999 were selected for the study. His quantitative and qualitative analyses demonstrated that some metadiscourse expressions had different functions depending on the context. One of the main results was that writers used emphatics not to show arrogance, as suggested in some literature (Vande Kopple, 1985) but to reveal their limitations and show humility.

Crismore, Markkanen and Steffenson (1993) examined the application of metadiscourse in persuasive writing of American and Finnish students. The study focused on both quantity and sort of metadiscourse resources. The results indicated that students were used all kinds of metadiscourse, however; the researchers found great type and quantity diversities in the application of the markers.

The findings showed that American students used fewer metadiscourse devices than Finnish students. Males' students employed more markers than females' students. The researchers found gender and cultural variation in the employment of metadiscourse markers. Finally, both American and Finnish students used more interactional metadiscourse markers than textual ones.

Hyland (1999) studied the application of metadiscourse in research articles and textbooks in three fields of

study (Biology, Applied linguistics and Marketing). The data indicated that the frequencies of evidences and relational markers were more in applied linguistics written texts; hedges were preferred by the writers of biology; the number of evidence and endophorics were fewer in marketing textbooks. His investigation also showed that the greatest differences among most kinds of metadiscourse markers both within disciplines and genres belongs to biology. Hyland demonstrated that there are great variations in the application of hedges and connectives across genres in marketing and applied linguistics texts. His study indicated that genre disparities were more than disciplinary ones, and the research articles displayed fewer disciplinary differences.

This study aimed to investigate the types and frequencies of interactional metadiscourse markers containing hedges, boosters, attitude markers, self-mentions and engagement markers in the discussion and the conclusion sections of four disciplines, chemistry, medicine, tourism management, and economic psychology English RAs published in international journals. Also, Interactional metadiscourse markers were the focus of this study to explore whether authors within hard and soft disciplines in English RAs acted differently with the subcategories.

This study tried to provide a framework for Iranian writers to improve their writing qualities based on the international conventions of academic writings. A cross-disciplinary study of metadiscourse markers would not only give them enough information and insights about the function of interactional devices in developing argumentative roles of discussion and conclusion sections of English RAs,but would also familiarize them with the techniques used by expert international writers to create a connection between scientific data and writers' viewpoints in order to persuade their special discourse community, Halliday (1994) believes that there are linguistic variations due to different linguistic functions that may exist in different disciplines. The results of this study is beneficial for instructors of academic writing, and can raise their awareness about the different functions of interactional tools in various academic disciplines.

Dastjerdi and Shirzad (2010) investigated the effect of explicit teaching of metadiscourse markers on EFL learners' writing abilities at three levels of Advance, Intermediate, and Beginners. They found that explicit instruction of meta-discourse makers significantly increased EFL learners' writing ability at three levels. Their findings also revealed that Intermediate EFL learners took more benefits of familiarity with discourse markers than those at the other levels in their writing ability. In other words, Intermediate EFL learners improved their writing more immensely than the other groups.

Jalilifar (2011) examined discussion parts of 90 articles in two disciplines (Psychology and Applied linguistics) between Iranian writers who write in both English and Persian. Analyzing the data indicated the differences in function, frequency, and types of these devices within the texts. Jalilifar stated that the significant differences in the usage of metadiscourse tools are due to the unawareness of ruled and conventions of the target language and its rhetorical features, having inadequate knowledge of Persian writers about English academic writing, lack of explicit pedagogical exposure of sociolinguistic and pragmatic conventions and rules of English academic writing for Iranian researchers. Iranian researchers should be taught about the role of metadiscourse devices within the discourse community of academia.

In a study by Abdi (2011), the distribution of interactive and interactional metadiscourse strategies was analyzed in the socio-generic structure of research articles from social and natural sciences and the results showed that though globally similar in many ways, different sections of research articles (i.e., Introduction, Method, Results, and Discussion) which follow different cognitive genre types (i.e., conviction, description, argumentation, etc.) use interactive and interactional strategies differently.

Pooresfahani, Khajavy, and Vahidnia (2012) studied two categories of discourse markers (interactive and interactional) in Iranian research papers within two disciplines of Engineering and Applied Linguistics. They selected eight papers for these two fields of study. They use Hyland's (2005) model for interpersonal metadiscourse markers. The result revealed that both disciplines used these two kinds of metadiscourse tools, the papers indicated that these two disciplines used interactive markers more than interactional markers. Results showed that Iranian researchers focused more on discourse markers that help them to organize the patterns of their writings and they used a very few of interactional metadiscourse markers for engaging and fulfilling the expectations of the audience.

Siami and Abdi (2012) investigated the use of metadiscursive items among Iranian writers of Research Articles (RAs) from social and natural sciences. He suggested that interactive metadiscourse is employed four times more than the interactional ones which are a significantly different proportion in contrast with native English writers. He concluded that the various usage at work among Iranian writers in the appliance of metadiscursive strategies in the two recognized branches of science shows the inherent difference in the nature of the two sciences, while the difference between Iranian and English authors corroborate the claim indicate that the national culture is an influencing factor (Dahl, 2004) in controlling the linguistic and rhetoric selections among academia.

Yazdanmehr (2013) compared interpersonal metadiscourse in English and Persian abstracts of Iranian applied linguistics journals using Hyland's (2005) typology. Frequency and percentage of occurrence of all the categories were calculated and used to make comparisons between English and Persian abstracts. The overall finding was that the Persian abstracts were in all cases lengthier than their English versions, but in both the interactive metadiscursive resources were more prevalent than the interactional ones.

Khedri (2013) compared 60 research articles abstracts from economic and applied linguistics and discovered both similarities and differences in their use of interactive metadiscourse. While the relative frequencies for the different types of interactive metadiscourse followed a similar distributional pattern in both disciplines, the applied linguistics abstracts used markedly more interactive metadiscourse than the economic abstracts for all types except transitional markers.

Ebadi, Rawdhan Salman, and Ebrahimi (2015), conducted a study on the use of metadiscourse markers in Persian and English Academic Papers in the field of geology. In this study the corpus included 30 papers, 15 English articles composed by Native Persian (NP) Geology researchers and 15 English articles composed by Native English (NE) geology's researchers. They showed that the native Persian writers used more interactive metadiscourse devices than the interactional ones in the argumentative chapters of their RAs. Nevertheless, native English writers used more interactional metadiscourse markers than the interactive metadiscourse features in the discussion and conclusion chapters of their research articles.

III.   Method

3.1 Design of the Study

The design of this study is Corpus Corporation. The independent variable of this study was RAs, and the dependent variable was the forms and the amounts of interactional metadiscourse tools in research articles. Also, the design is exploratory since as Dornyei (2005) states, the exploratory design is conducted about a research problem when there aren't any previous studies for the researchers to gain insights for future study when problems are in a preliminary stage of an investigation. Exploratory research is flexible enough toaddress all types of (what, why, how) research questions.

3.2Corpus

The corpus of this research comprised of 120 RAs' discussion and conclusion sections produced by researchers of two hard disciplines and two soft disciplines. Chemistry and medicine are representative majors for hard disciplines and economic psychology and tourism management are representative of soft disciplines. Each majors were represented by discussion and conclusion sections of 30 English research articles.

From 120 English research articles, 60 of them were related to hard disciplines of medicine and chemistry; and the other 60 RAs were related to soft disciplines of tourism management and economic psychology published in the four identified Elsevier Journals' of medicine, chemistry, tourism management and economic psychology. The corpus of this study comprised of 160344 words. All 120 selected research articles have been published between 2009 to 2019 and all of them have experimental design. As Jalilifar (2009) states, experimental articles are valuable tools of signaling and documenting different experimental stages of scientific researches.

The data of the study was small and specialized. Justification for the use of small size specialized corpus can be found in the writings of several authors like Flowerdew and Forest (2009), FuertesOlivera (2008) and Ghadessy (2001). They suggest that the corpus that includes the texts of the same genre and discipline may produce sufficient data for the analysis regardless of their size. Limiting data to a specific genre within a particular discipline also controls possible disciplinary variations (Kanoksilapatham, 2005). Besides, a small corpus enables some analyses that require the hand-coding of metadiscourse markers which otherwise cannot be handled manually within a large data (Flowerdew and Forest, 2009). Therefore, to meet the requirements for the more reliable data, the researcher of the present study chose the discussion and conclusion sections of the RAs with which she tabulated and categorized the desired sections.

3.3Instruments

The analytical framework of this research was the metadiscourse taxonomy proposed by Hyland (2005). There are some reasons behind using this model in this research. This model includes more subdivisions and also separated *Metatext* from *Audience interaction*. This model also tested on both spoken and written corpora so that later on for further research, interested researchers can compare the results of this research with an oral corpus, for instance, news from television and radio. The interactional metadiscourse devices are the best means of highlighting writers' presence within the texts to convey their attitudes and to interact with the readers.

Hyland's (2005) model of interactional resources

Hyland's model for interactional resources			
Interactional Resources	Meant to Involve the Reader in the Argument		
Category	Function	Examples	
Hedges	Withhold writer's full commitment to proposition	Might/perhaps/possible/about	
Boosters	Emphasis force or writer's certainty in proposition	In fact definitely/it is clear that	
Attitude markers	Express writer's attitude to proposition	Unfortunately/I to agree/ surprisingly	
Engagement markers	Explicitly refer to or build relationship with reader	Consider/note that/you can see that	
Self-mentions	Explicit reference to author(s)	I/we/my/our	

3.4 Data Collection Procedure

At the onset of the study, first the articles were downloaded, then the discussion and conclusion sections were extracted and converted into Plain Format. Next, the researcher searched for interactional metadiscourse markers' different types including hedges, boosters, engagement markers, attitude markers, and self-mentions in discussion and conclusion sections of the hard and soft science RAs.The researcher manually analyzed the intended

words in the RAs. According to Hyland (2005), recognizing the metadiscourse features must also be done manually. It helps the researchers to present an actual frequency of discourse markers. By considering the context, the researcher can distinguish the actual metadiscourse markers from non-propositional materials. Thus, the context plays a vitally important role in metadiscourse analysis (Celiesiene&Sabulyte, 2018).10% of the data was double-checked independently by a second researcher who has got Ph.D. degree in TEFL. Also, the field of study of this expert was discourse analysis, and she was familiar with the data analysis phase. The second rater coded 10% of the data, taken randomly from the corpus and finally, the inter-rater reliability was estimated and reported. The inter-rater agreement, measured using Cohen's Kappa formula, was found to be Kappa = 0.929, p = 0.000.After all of these procedures, the gathered data was analyzed via Chi-square data analysis to discover if there is any important difference in the application of interactional metadiscourse tools in both disciplines.

3.4 Data Analysis Procedure

Quantitative analysis was used to discover the differences between the corpora of four disciplines. The quantitative analysis indicated the frequencies of interactional metadiscourse markers in four corpora. A statistical analysis, Chi-square test, was carried out through SPSS version 21. The purpose of this test was to indicate the similarities and differences between the four corpora. This test helped the researcher to compare and examine the frequency of data.

IV.   Results

The significance of the differences between the frequencies of the markers in the soft and hard disciplines was examined through chi-square contingency tables (2 x 5). The columns represented disciplines and rows represented metadiscourse markers. In order to cancel out the effect of the difference in the total word counts of the two types of the corpora (*hard, N = 60298*; *soft, N = 100046*), the frequencies per 10,000 words were compared rather than raw frequencies.

The results of observed and expected counts and adjusted residuals are displayed in Table 1. As can be seen, no cell has expected count less than 5; therefore, the sample size was large enough for the chi-square analysis. The minimum expected count was 12.98.

4.1 Research Question 1

Are there any statistically significant differences between types and frequencies of Interactional Metadiscourse markers (Hyland, 2005) in the discussion and the conclusion sections of English scientific articles in hard and soft disciplines?

Table 1.Observed and Expected Counts for Markers in the two Disciplines

	Disciplines	Total

Markers			Hard	Soft	
	Hedges	Count	113	139	252
		Expected Count	112.8	139.2	252.0
		Adjusted Residual	.0	.0	
	Boosters	Count	40	50	90
		Expected Count	40.3	49.7	90.0
		Adjusted Residual	-.1	.1	
	Self-Mentions	Count	64	78	142
		Expected Count	63.6	78.4	142.0
		Adjusted Residual	.1	-.1	
	Attitude Markers	Count	27	34	61
		Expected Count	27.3	33.7	61.0
		Adjusted Residual	-.1	.1	
	Engagement Markers	Count	13	16	29
		Expected Count	13.0	16.0	29.0
		Adjusted Residual	.0	.0	
Total		Count	257	317	574
		Expected Count	257.0	317.0	574.0

As Table 1. indicates, the observed and expected counts for all the markers (i.e., hedges, boosters, self-mentions, attitude markers, and engagement markers) in both hard and soft corpora were almost similar. This is also evident in the small absolute values of adjusted residuals (ranging from -.1 to +.1).

The results of the Chi-Square analysis, $x^2_{(4)} = .016$, $p = 1.000$, revealed that differences in relation to the frequencies of metadiscourse makers across hard and soft disciplines were not statistically significant. In other

words, although proportionately more markers are used in the soft disciplines, the differences are not found to be statistically different. Put differently, there is not difference between hard and soft disciplines in terms of the frequency of markers used. Therefore, the first null hypothesis was retained and there are not any statistically significant differences between types and frequencies of Interactional Metadiscourse markers (Hyland, 2005) in the discussion and the conclusion sections of English scientific articles in hard and soft disciplines. Since there was no significant association, there was not need to report Cramer's V as the strength of association.

The total words were 32753 in chemistry,27545 in medicine,38955 in economic psychology and 20656 in tourism management articles. The significance of the differences between the frequencies of the markers in the four majors was examined through chi-square contingency tables (5 x 4). The columns represented majors and the rows represented metadiscourse markers. Due to space limitations, percentage values are not reported. The total words are 32753 in chemistry,27545 in medicine,38955 in economic psychology and 20656 in tourism management articles.

The significance of the differences between the frequencies of the markers in the four majors was examined through chi-square contingency tables (5 x 4). The columns represented majors and the rows represented metadiscourse markers. Due to space limitations, percentage values are not reported. The total words are 32753 in chemistry,27545 in medicine,38955 in economic psychology and 20656 in tourism management articles.

The results of observed and expected counts and adjusted residuals are displayed in Table 2. As can be seen, no cell has expected count less than 5; therefore, the sample size was large enough for the chi-square analysis. The observed and expected counts for some of the markers (e.g., engagement markers in chemistry; boosters, self-mentions, and engagement markers in medicine; hedges, boosters, self-mentions, and attitude markers in economic psychology; and hedges, boosters, and attitude markers in tourism) were different, suggesting that these markers are used differently in these four majors. These differences are evident in their relatively large absolute values of adjusted residuals (residual > 1).

4.2 Research Question 2

Are there any statistically significant differences in the use of interactional markers in four majors of medicine, chemistry, economic psychology and tourism management?

Table 2. Observed and Expected Counts for Makers in the Discussion and Conclusion Sections of the four Major

	Majors		
Chemistry	Medicine	Economic Psychology	Tourism Management

		Count	Count	Residual	Count	Count	Residual	Count	Count	Residual	Count	Count	Residual
Markers*Majors	Hedges	83	81.3	.3	148	154.5	-.8	167	184.9	-2.0	359	336.3	2.2
	Boosters	33	29.9	.7	49	56.7	-1.3	51	67.9	-2.6	145	123.5	2.8
	Self-Mentions	45	41.0	.7	86	78.0	1.2	141	93.3	6.5	110	169.7	-7.0
	Attitude Markers	19	20.7	-.4	37	39.4	-.5	32	47.1	-2.7	105	85.7	3.0
	Engagement Markers	2	9.1	-2.6	26	17.4	2.4	23	20.8	.6	34	37.8	-.8
Total		182	182.0		346	346.0		414	414.0		753	753.0	

The results of the Chi-Square analysis, $x^2_{(12)} = 79.486$, p = .000, revealed that differences in relation to the frequencies of metadiscourse makers across the four majors were statistically significant. Put differently, the four majors are significantly different in terms of the frequency of markers used. As a result, the second null hypothesis to the research question was rejected and there are statistically significant differences in the use of interactional markers in four majors of medicine, chemistry, economic psychology and tourism management. However, Cramer's V value of .125 represents a small association between the types of markers and the types of majors.

The total words that were counted in the discussion sections of articles were chemistry 30006, medicine 24033, economic psychology 29192 and tourism management 40435.Chi-square contingency tables (5 x 4) were used to examine the significance of these differences between the frequencies of the markers in the discussion sections of the four majors. The results of observed and expected counts and adjusted residuals are displayed in Table 3. As can be seen, the observed and expected counts for some of the markers (e.g., boosters and engagement markers in chemistry; self-mentions and engagement markers in medicine; hedges, boosters, self-mentions, attitude markers, and engagement markers in economic psychology; and boosters, self-mentions, and attitude markers in tourism) were different. These differences were also evident in their relatively large absolute values of adjusted residuals (residual > 1).

4.3 Research Question 3

Are there any statistically significant differences in the use of interactional metadiscourse markers in the discussion and the conclusion sections of the four majors of medicine, chemistry, economic psychology and tourism management?

Table 3. Observed and Expected Counts for Makers in the Discussion Sections of the four Majors

		Majors/Discussion											
		Chemistry			Medicine			Economic Psychology			Tourism Management		
		Count	Count	Residual	Count	Count	Residual	Count	Count	Residual	Count	Count	Residual
Markers*Discussion	Hedges	80	76.9	.5	153	152.0	.1	164	172.0	-1.0	112	108.1	.6
	Boosters	30	25.5	1.0	50	50.5	-.1	47	57.1	-1.8	42	35.9	1.2
	Self-Mentions	45	46.8	-.3	82	92.6	-1.5	138	104.7	4.7	45	65.9	-3.4
	Attitude Markers	20	18.7	.3	37	37.0	.0	31	41.9	-2.2	36	26.3	2.2
	Engagement Markers	2	9.1	-2.6	28	17.9	2.9	16	20.3	-1.2	14	12.7	.4
Total		177	177.0		350	350.0		396	396.0		249	249.0	

The total words that were counted in the discussion sections of articles were chemistry 30006, medicine 24033, economic psychology 29192 and tourism management 40435. The results of the Chi-Square analysis, $x^2_{(12)}$ = 41.358, p = .000, revealed that differences in relation to the frequencies of makers in the discussion sections of the four majors were statistically significant. Cramer's V value of .108 represents a small association between the type of marker and the discussion sections of the four majors.

The total words in the conclusion sections of articles were 2747 in chemistry,3512 in medicine, 9763 in economic psychology and 20656 in tourism management. Table 4. presents the proportions of all markers in the

conclusion sections of chemistry, medicine, economic psychology, and tourism management majors. The total words in the conclusion sections of articles were 2747 in chemistry,3512 in medicine, 9763 in economic psychology and 20656 in tourism management. As can be seen, the frequencies of the hedges (N = 174.13), and boosters (N = 62.48), self-mentions (N = 148.52) and engagement markers (N = 42.00) in the economic psychology were higher than their respective frequencies in the other majors.

As can be seen, the observed and expected counts for some of the markers (i.e., almost all markers in all four majors) were different. These differences are evident in their relatively large absolute values of adjusted residuals (ranging from .9 to 6.5).

Table 4. Observed and Expected Counts for Makers in the Conclusion Sections of the four Major

	Majors/Conclusion											
	Chemistry			Medicine			Economic Psychology			Tourism Management		
Markers*Conclusion	Count	Count	Residual	Count	Count	Residual	Count	Count	Residual	Count	Count	Residual
Hedges	109	100.7	1.2	117	137.9	-2.7	174	192.6	-2.2	139	107.8	4.4
Boosters	62	41.5	3.9	48	56.8	-1.5	62	79.3	-2.7	50	44.4	1.0
Self-Mentions	55	63.9	-1.4	111	87.5	3.4	149	122.2	3.5	27	68.4	-6.5
Attitude Markers	11	22.4	-2.8	40	30.7	2.0	34	42.9	-1.8	35	24.0	2.6
Engagement Markers	4	12.5	-2.7	14	17.1	-.9	42	23.9	4.7	7	13.4	-2.0
Total	241	241.0		330	330.0		461	461.0		258	258.0	

The results of the Chi-Square analysis for the comparison of marker frequents in the conclusion sections of the four majors. The Chi-square values of $x^2_{(12)}$ = 107.734, p = .000, revealed that differences in relation to the frequencies of the makers in the conclusion sections of the four majors were statistically significant. In other words, the four majors are significantly different in terms of the frequency of markers used in their conclusion sections. As

a result, the third null hypothesis to the research question was rejected and there are statistically significant differences in the use of interactional metadiscourse markers in the discussion and the conclusion sections of the four majors of medicine, chemistry, economic psychology and tourism management. However, Cramer's V value of .167 represents a small association between the type of marker and the conclusion sections of the four majors.

V.   Discussion

The current study aimed at detecting the preferences of using hedges, boosters, self-mentions, attitude markers and engagement markers that are examples of interactional metadiscourse markers based on Hyland (2005) interpersonal taxonomy in the discussions and the conclusions sections of English research articles of two hard and soft disciplines within the four fields of chemistry, medicine, tourism management and economic psychology. Referring to the data analysis, the answers of the research questions were obtained. Based on the captured results,the first research question was answered by calculating and tabulating the frequencies of markers separately for hard and soft disciplines. Table 1. presents the results for proportions of all markers for hard and soft disciplines. As can be seen, the frequencies (per 10,000 words) of the hedges (N = 139.03), boosters (N = 49.77), self-mentions (N = 77.56), attitude markers (N = 33.88), and engagement (N = 15.79) markers in the soft corpus were somewhat higher than their respective frequencies in the hard corpus. This is also evident in the last row showing that in the soft disciplines totally 316.05 interactional metadiscourse markers were used per 10,000 words and while in the hard disciplines 257.55 markers were used per 10,000 words.

 The Results concerning the first research question indicated that there was no statistically significant difference between the hard and soft sciences in their use of interactional metadiscourse markers in their discussion and conclusion sections. These findings are partially in line with those of Hyland (2005), Hyland (2004), Akbarpour, Sadeghoghli (2015), but run counter to those of Ghahremani Mina and Biria(2017).

Hyland (2005) analyzed 240 published research articles from eight disciplines. The results indicated that the soft disciplines like philosophy, marketing, sociology and applied linguistics' papers, employed the highest rate of interactional devices than the science and engineering papers. Results of the frequency analysis in the preset study similarly indicated that proportionately more metadiscourse markers were used in the soft disciplines in comparison to the hard disciplines, but no statistical significance was found.

Of course, there are differences between the two studies that makes the comparison of the results a little difficult. First, the present study focused only on the discussion and conclusion sections, while Hyland's study investigated full articles. Second, Hyland did not run any inferential statistics to make sure that differences were statistically significant. As a result, if we only consider descriptive frequency counts, the findings of the present study are in line with those of Hyland. By the same token, Hyland (2004) attempted to explore how advanced second language writers deployed interactional metadiscourse markers in their doctoral and masters' dissertations. He found that there were substantial variations across disciplinary communities. In particular, the soft knowledge social science disciplines employed more metadiscourse overall (56% of the normed count). Similar to Hyland

(2005), no inferential statistics was used.

A similar argument can be made in relation to Akbarpour and Sadeghoghli (2015). They intended to find out if different authors of research articles in diverse fields drew on interactional devices in their writings in different ways. The whole corpus comprised of seventy research articles in different fields of economics, humanities, life sciences, social sciences, law, mathematics, physical sciences and medicine. The results showed that hedges were the most frequently occurring categories in the whole corpus, and that the fields such as economics, mathematics, physical sciences, humanities, and social sciences used more interactional markers than the fields like health sciences and medicine. In other words, soft sciences (economics, law, social sciences, and humanities in this study) tended to exploit more interactional devices than hard sciences (health sciences, medicine, and mathematics & physical sciences in this study). However, similar to Hyland (2005), they did not employ any inferential analysis to examine the significance of the differences.

However, the findings of the present study were somewhat in contrast to those of Ghahremani Mina and Biria (2017). Their study aimed to identify interactive and interactional metadiscourse in a sample of 100 English research articles (discussion sections) written by Iranian writers utilizing Hyland's taxonomy. The findings showed that writers used hedges, boosters, and self-mentions more frequently in the medical science articles compared to those in social sciences.

In the present study, the proportion of interactional metadiscourse markers was higher for the soft disciplines. However, it should be mentioned that the nature of the corpus in their study was somewhat different. They selected articles written by Iranian authors, but the corpus of the present study comprised articles from mostly international writers published in scholarly journals.

The second research question was answered by calculating and tabulating the frequencies of markers separately for the four majors. Table 2. presents the proportions of all markers for chemistry, medicine, economic psychology, and tourism management. As can be seen, the frequencies (per 10,000 words) of the hedges (N = 358.73), boosters (N = 144.75), attitude markers (N = 104.57), and engagement markers (N = 33.89) in the tourism management corpus were higher than their respective frequencies in the other three corpora.

This third research question was answered by calculating and tabulating the frequencies of the markers separately for the discussion and the conclusion sections of the four majors. Table 3. presents the proportions of all markers in the discussion section of chemistry, medicine, economic psychology, and tourism management majors. As can be seen, the frequencies (per 10,000 words) of the hedges (N = 164.43), and self-mentions (N = 138.39) in the economic psychology corpus, boosters (N = 49.52), attitude markers (N = 36.62), and engagement markers (N = 27.88) in the medicine corpus were higher than their respective frequencies in the other corpora.

Table 4. present the proportions of all markers in the conclusion sections of chemistry, medicine, economic psychology, and tourism management majors. As can be seen, the frequencies of the hedges (N = 174.13), and boosters (N = 62.48), self-mentions (N = 148.52) and engagement markers (N = 42.00) in the economic psychology were higher than their respective frequencies in the other majors.

Concerning research questions 2 and 3, it is worth mentioning that no particular study has compared the use of interactional metadiscourse markers across the four majors of medicine, chemistry, economic psychology and tourism management. However, the significant differences among these four majors, even between the two majors belonging to the same discipline (hard or soft), suggest that it is the nature of a specific major rather than the generic discipline that determines the use of interactional metadiscourse makers by the authors. Given the significant differences between majors in the same discipline, the findings may also imply that the way different majors are categorized as belonging to the same discipline needs revision or expansion. That is, some new features need to be incorporated in our categorization system. More research, however, is needed to provide support for this implication.

VI.   Conclusion

According to Amiryousefi and EslamiRasekh (2010), metadiscourse has played an important role in making persuasive writings on the basis of the people's expectations and norms; therefore, it is regarded as a novel and interesting field of research. Hyland (2005) has regarded metadiscourse as a concept of interaction among the writer/speaker with their texts from one side and between them and hearer/reader from another side. To sum, firstly, the results of this study indicated that, both groups of soft disciplines and hard disciplines writers used interactional metadiscourse markers in their articles. It proves the interdisciplinary peculiarities of metadiscourse markers usage, and also it indicates that these elements have got universal nature. Although the number of the markers were more in soft sciences papers, but there were not found any statistically significant differences between the application of these markers in both disciplines. The outcomes of this research are in line with Hyland and Tse (2004),who suggested that "metadiscourse use vary in two corpora, and there were also substantial variations across disciplinary communities. Social science disciplines employed the more metadiscourse markers in their texts" (p.144).

Secondly, considering the four disciplines of economic psychology, tourism management, chemistry and medicine, all majors used interactional metadiscourse markers, but the highest number of the markers were found in tourism management's corpus and the lowest number of them were found in medicine's corpus. It indicates that soft science corpus such as tourism management papers are more subjective than hard science corpus such as medicine which focus more on the objectivity of the subject matter. This is in line with Tajeddin& Alemi (2012), who claimed that soft-knowledge fields' articles are typically more interpretive than the hard sciences ones.

Thirdly, the outcomes of this research showed that, in the whole corpus, the interactional metadiscourse markers used both in the conclusion and the discussion sections of the English research articles, but the markers were used more in the conclusion sections than in the discussion sections of the articles. The results of this study are in line with Salahshoor&Afsari, (2017), that stated that writers were aware of the subjective and argumentative natureof discussion and conclusion sections and these sections were more explicitly interpersonal and evaluative.Therefore, the first hypothesis of the study can be confirmed since the findings showed that there are not

statistically significant differences between types and frequencies of Interactional Metadiscourse markers (Hyland, 2005) in the discussion and the conclusion sections of English scientific articles in hard and soft disciplines. Meanwhile, the second and the third hypothesis of this study can be rejected because the results indicated that there are statistically significant differences in the use of interactional markers in four majors of medicine, chemistry, economic psychology and tourism management. Furthermore, the result of this study revealed that the differences in relation to the frequencies of makers in the discussion sections and also in the conclusion sections of the four majors were statistically significant. Finally,the data of this research indicated that the English rhetorical system differs in different disciplines. One chief reason could be the disciplinary culture differences that manifested in writing norms. Each discipline has got its especial writing conventions. Writers have got various rhetorical strategies and choices that fit to that particular discourse community.

VII.   Pedagogical Implications

The implementation of this study is very significant in the field of English for Academic Purposes (EAP). As, many Iranian researchers in different fields of study do not have enough knowledge about the types of lexicogrammatical systems and the culture of a target language. Therefore, there is a need to raise Iranian writers' linguistics and rhetorical awareness about the conventions of professional scientific writings (Shirani&Chalak, 2016).

Some implications would arise from this study. One of the implications is the fact that the results of this study can provide researchers, teachers and syllabus designers with more well fashioned insights into the nature of texts produced by authors of hard and soft sciences. Besides, further research into the metadiscourse practices could be facilitated and induced via this study, either within the genre of research articles or other genres, not to say the suggested implications for non-native postgraduate students to improve the text type in their proposals or theses. The findings, therefore, could offer opportunities for teaching academic writing to novices who are trying to produce research articles in different disciplines.

Also, the research carries wider implications in terms of generic awareness on the issue; the findings can be of considerable help to English for Academic Purposes (EAP), advanced writing and seminar course instructors to raise their students' awareness and refine their understanding on sound types and functions of metadiscourse markers in their writings.

It may be argued that students learn to produce scientific texts by having access to the published articles or completed theses; however, several different writing features such as metadiscourse markers, among others, may remain uncovered for novice writers, especially when it comes to various types of metadiscourse markers. Besides, it should be noted that scholars and students write for different types of audience, work toward different writing goals, and in different genres, all of which could influence their use of metadiscourse markers.

Students might receive instructions on metadiscourse markers during their Master of Applied Linguistics-Arts & Social Sciences (MA/MS) and Natural Sciences (NATSCI) universities courses and programs, but they are

not aware of and familiarized with different purposes and rhetorical functions and types of metadiscourse markers. The students can be given various writing assignments and enough practices, in order to gain sufficient experiences in employing metadiscourse markers for different text types, disciplines and occasions with different purposes.

VIII.   Limitations of the Study

As is the case with all human production, this study has some limitations which need to be considered before making any interpretations. This study was about the comparison of the use of metadiscourse markers in hard and soft disciplines. It should be remembered that factors like culture, language, and field of study affect the use of metadiscourse markers in different genres and may change the result of this study (Hyland, 2000). The sense of culture is reflected in many studies of contrastive rhetoric where the rhetorical choices made by writers will inevitably be influenced by cultural norms, values, and belief systems prevailing in particular sociocultural contexts (e.g., Connor, 1996; Kaplan, 1966).In cross- disciplinary research the same term culture could be used to refer to professional, disciplinary culture (Atkinson, 2004).It has been observed that in academic writing the cultural and disciplinary cultures often interact and jointly shape the discourse structures and rhetorical strategies, particularly those of RAs (Flottum et al., 2006;Yakhontova, 2006). Writing in a second language is thought to be influenced to some extent by the linguistic and cultural conventions of the writer's first language and this may influence how the writer organizes written discourse (Discourse Structure), the kind of Script or Scheme the writer uses, as well as such factors as topic, audience and paragraph organization (Knoy, 2000).

Although this research highlights a number of interesting issues, some limitations must be acknowledged. Manifestly, readers must keep in mind that a study such as the present one has its own restrictions. The major one is that the present study limits itself to just two types of disciplines and just four fields that were medicine, chemistry, tourism management and economic psychology. Interested researchers can use more than four majors for broad and comprehensive analysis. In addition, in this study, the written medium was used to investigate the types of metadiscourse markers in written texts. Therefore, researchers can investigate the markers via analyzing spoken medium too. The other limitation of the study was using just one framework for analysis of metadiscourse markers. The researchers who are interested in this field can use more than one framework or model for analysis to gain more powerful results.

A criterion for the selection of the research articles was the date of their publication (Time relevancy). This point was considered very relevant in the study because of the possibility of time influences on the style of the writers. Thus, by considering this time limit, it was tried to minimize that time influence. The other limitation can be the selections of research articles for the study but the reason for this limitation is to confine the scope of this study to RAs' genres and not the other genres such as newspapers' genres in order to manage this study in practice. Given the fact that the study examined only 120 English RAs, they may not have been a true representation of the larger population of English RAs. Other studies with larger samples could be done to ensure the external validity of these findings.

Delimitations of the study limit the scope of the research. One of the delimitations of the study was ignorance of the authors' gender. In this study the gender of the authors was not considered while it may influence the way of writing as well as the use of metadiscourse markers in RAs. Therefore, in addition to cultural differences, the impact of gender on the use of rhetorical devices is yet another significant factor which is not an issue for the researcher yet, although "[…] the gender of the writer could influence how much or what type of meta-discourse is used" (Adel, 2006, p. 198).

IX.   Suggestions for Further Research

This study examined the types and frequencies of interactional metadiscourse markers in 120 research articles written by authors of soft and hard sciences. However, to obtain more accurate and detailed results on the issue and also to extend our knowledge of the genre, the number of RAs can be added to for further research. Further research could also look at the use of metadiscourse markers in other sections of the RAs and find out what types and functions are dominantly used in these parts.

Since the identification of metadiscourse markers, writers' intention of using them, to be exact, is the most demanding part of this work, interviews with the writers themselves in this regard could be helpful in bringing out the intended types. Besides, the role of gender can also be taken into account for the possible differences between the use of metadiscourse markers by male and female writers which is not considered in this research. This research needs to be replicated with a view to accounting for the intervening variable of time in order to get more accurate and valid result.

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