

An Intercultural Investigation of Interactive Metadiscourse Markers in Research Articles by Pakistani & British Engineers

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Abstract

This study aims to investigate the use of Interactive metadiscourse markers in engineering and technological research articles written by Pakistani and British engineers. The objectives of the study were to investigate and to compare the use of interactive Metadiscourse markers between the two sub-corpora. This study has followed Hyland & Tse's (2004) "Interpersonal model" of metadiscourse. For this purpose, we built a specialized corpus of engineering research articles contained with two sub-corpora of British and Pakistani RA's, 100 in each. Pakistani research articles were selected from X category research journals recognized by HEC (Higher Education Commission) and Britain papers were selected and downloaded from research repositories published between 2010 to 2016. The corpus consists of 1087091 words. A mixed methods research (qualitative and quantitative) was employed. Before analyzing the frequency of data, the extracted markers (according to Hyland's (2005) taxonomy of metadiscourse markers) were checked and filtered carefully through the manual examination of the markers into the source texts and the frequencies of occurrences were updated accordingly. The statistical analysis of the data was done using the chi-square test by SPSS v.20. The result of the test indicated that there is a significant difference between both sub-corpora ($\chi^2 = 10.478$, $df = 4$, $p = .033 < 0.05$). Taken together, the results indicated that British writers used interactive markers more than Pakistani writers. Pakistani writers used more frequently endophoric markers, code glosses, and frame markers. However, British writers used less endophoric markers, code glosses, and frame markers than Pakistani writers. The only two sub-categories of interactive were used by Pakistani writers with a slightly higher rate than British writers are code glosses and frame markers. On the other hand, British writers used more frequently transition markers and evidential. The result of the analysis shows cultural differences, and it is fascinating that Pakistani engineers used frequently sub-categories of interactive markers in their research articles. Finally, it was also disclosed that British research articles have relatively clear usage of all sub-categories properly as compared to Pakistani engineers. The study has implications for ESL teachers, novice researchers, curriculum designers, and textbook developers.

Keywords: corpus, interactive markers, metadiscourse, native vs non-native writers

1. Introduction

Academic writing is considered as one of the important concerns of native and non-native English students, for achieving success in their education at the tertiary level. Students pay special attention to their studies and this develops communicative competence and consequently, they get involved in the process of research. After this stage, they start to write work of great quality like thesis and research articles (Lee & Casal, 2014). According to Hyland (2009b) & Tardy (2006), novice research scholars are mostly trying to conduct original research and to present propositional content without considering the requirements of text and reader. This indicates that they are mainly concerned to complete their research work as per the process and requirements of the research cycle. However, the writers must keep in mind the knowledge of the readers about the topic before writing. This helps writers to guide and to limit the propositional content as per the requirements of readers.

Academic writing functions as the identity to researchers as it provides strength to academic writers to present ideas and helps writers to represent their personal voice (Hyland, 2011). Generally, writers use impressive vocabulary, for achieving the attention of their readers and at the same time also involve them in discourse. Academic writers, in particular, research writers present findings and arguments in their research writings. Therefore, it is also necessary for these writers to get their readers' attention by credible and persuasive elements in their writing for communicating their research. Similarly, Hyland (2001) highlights that academic writers should use "familiar ways of expressing their arguments, representing themselves, and engaging their audiences" (p.549). Academic writing needs clarity and consistency in the information presented by writers, for it helps readers to understand academic and scientific communication. In addition to clarity and consistency, interactivity is also a core element of writing, which should also be focused on by research writers. According to Williams (1981), writing is parted into two stages. The first stage comprises the information (propositional information) which is conveyed by the author and the second stage of writing comprises the phrases and words that play the role of interactive features in writing, and this level of writing is called Metadiscourse (Williams, 1981).

Research on meta-discourse markers got considerable attention in the field of applied linguistics over the past few decades, especially in the writing genre, it includes various components like composition, academic writing, and discourse analysis (Feng, 2014). Though the Metadiscourse field of research is very much of interest, even though there is not a single agreed definition, nor there is agreement on its classification and way of identification of markers.

Metadiscourse is a term coined by Zellig Harris in 1959 (as cited in Hyland, 2005, p.3) for the purpose to understand the use of language. His motive was to understand how language is employed by speakers and writers to guide readers. This earlier concept of the term metadiscourse did not become popular in the time of 1960s till the 1970s (Sultan, 2011). However, later, the concept got considerable attention, and it was introduced in applied linguistics in 1980. Then it was developed by various researchers: like Williams (1981) Vande Kopple (1985) and Crismore (1989) by introducing new definitions of the term and taxonomies. Writers generally use different linguistic features to engage themselves in their text for a better

understanding of the information discussed in the paper such as (however, means). Writers often comment on the information by using attitude markers i.e. surprisingly or fortunately etc.

There are generally different terms that are used for the term metadiscourse such as, non-topical material (Lautamatti, 1978), meta text (Enkvist, 1978), gambits (Keller, 1979), and metatalk (Schiffrin, 1980).

Crismore, Markkanen&Steffensen (1993, p.40) explain metadiscourse as “Linguistic material in texts, written or spoken, which does not add anything to the propositional content but that is intended to help the reader to organize, interpret and evaluate the information given”. According to Hyland (2005) “It’s a cover term for the collection of devices used by the writers for different purposes, it includes clearly organizing their texts, engaging readers in text and indicate them about his/her feelings, thoughts and opinions about their presented material and their readers/audience” (p.37). Metadiscourse helps writers and speakers in arranging discourse in such a way that it looks like they can present with their readers and listeners in a particular context.

The English language is used as a Lingua franca in academic contexts for publishing scientific publications in ESL and ELF countries. Scholars, academics, and postgraduate students participate in the field of research. Therefore, the academic text needs to be examined, to do research and also support the novice researchers to understand the needs of the readers. This is necessary for the writers to get familiar with the skills of organizing and commenting on the information. For this writer from any discipline should try to use Metadiscourse as per the requirement in the text. As Hyland (2005a, p.195) states that “metadiscourse provides a link between texts and disciplinary, social or professional cultures.”

Aims and Objectives of the study:

This study aims to investigate the use of interactive metadiscourse markers in engineering and technological research articles written by Pakistani and British scientific writers. The purpose of the investigation is to highlight contrastively the ways to organize the ideas and present them in the Engineering and technological research articles written by Pakistani and British writers. The objectives of the study are to investigate and compare the use of interactive Metadiscourse markers cross-culturally between Pakistani and British Engineering & technological research articles.

To achieve the aim of this study the following research questions have been developed:

- How far are interactive metadiscourse markers used in Pakistani Engineering research articles?
- How far are interactive metadiscourse markers used in British Engineering research articles?
- Is there any significant difference between Pakistani and British engineering research articles’ use of interactive metadiscourse markers?

2. Literature Review

Various terms, definitions, and taxonomies are presented by researchers on metadiscourse. Each taxonomy or theory shows its advantages and disadvantages with time. Some researchers like Vande Kopple (1985), Crismore (1993), Adel (2006), and Hyland (2005) started to improve the taxonomy and boundaries of metadiscourse. Hyland & Tse (2004) developed the taxonomy of metadiscourse almost sixteen years ago. They divided metadiscourse into two categories. Namely, interactive, and interactional resources. Interactive resources are used to guide and organize the text as per the reader's requirements. On the other hand, Interactional resources are mainly used especially for presenting the authors' stance and engaging the readers in text. Both categories are further divided into five categories (see details in table 1).

Hyland & TSE'S (2004) Interpersonal Model

The succeeding and the most followed research model is of Hyland & Tse (2004). This is the model of the study followed in this research. In this model, the names of the major categories of metadiscourse markers with distinction (interactive and interactional) have been employed from Thompson & Thetela's (1995) (as cited in Hyland, 2005).

Table 1: Interpersonal model of metadiscourse (Hyland, 2005)

Category	Function	Examples
Interactive	Help to guide the reader through the text	Resources
Transitions	express relations between main clauses	in addition; but; thus; and
Frame markers	refer to discourse acts, sequences or stages	finally; to conclude; my purpose
Endophoric markers	refer to information in other parts of the text	noted above; see fig; in section 2
Evidentials	refer to information from other texts	according to X; Z states
Code glosses	elaborate propositional meanings	namely; e.g; such as;
Interactional	Involve the reader in the text	Resources
Hedges	withhold commitment and open dialogue	might; perhaps; possible; about
Boosters	emphasize certainty and close dialogue	in fact; definitely; it is clear that
Attitude markers	expresses the writer's attitude to proposition	unfortunately; I agree;
Self- mentions	explicit reference to author (s)	I; we; my; me; our
Engagement markers	explicitly build relationship with reader	consider; note; you can see that

Note: Reprinted from an interpersonal model of Metadiscourse (Hyland, 2005, p. 49)

2.1 Interactive Markers:

According to Hyland (2005), Interactive metadiscourse markers are related to the authors' information about the reader. It also supports authors to organize the information given in the text as per the requirement of the reader. As Hyland (2005, pp.49) explains the role of interactive markers and states that the author with the help of interactive markers will become able to consider "reader's knowledge, their interests, and rhetorical expectations and processing abilities". This category of the markers is specially focused on by the writers to fulfill the requirements of the textual organization and the needs of the readers. This supports readers in understanding the matter discussed by the writer. Moreover, it helps the authors to limit the text and provide arguments that support the reader to understand the authors' required interpretation.

Hyland (2005) divided interactive markers into five subcategories which are described below.

2.1.1 Transition Markers

According to Hyland (2005, p.50) "Transition markers are mainly conjunctions and adverbial phrases". These phrases are employed by the writers to help their readers to understand the connections between steps in an argument. Moreover, transition markers are comprised of internal devices for different purposes. It includes addition, comparison, and consequence. The addition is used by the writers to add elements to an argument, for example (and, moreover). Comparison marks are used in the argument for different purposes. For example, similar (equally, similarly), different (however, on the other hand). Consequence refers to relations that inform the readers that a conclusion is drawn or justified (in conclusion, consequently, etc).

2.1.2 Frame markers

Frame markers are the second sub-category of Interactive metadiscourse markers. According to Hyland (2005), Frame markers contain a wide range of metadiscourse features that are particularly used for different purposes in discourse organization. It includes sequencing, label stages, goals, and shift topic. Sequencing is used to sequence different parts of the text (first, then), label stages are used to explicitly discuss the stage of the text (to summarize, at this stage), announcing goals are used for announcements in the discourse (my purpose, the goal of the study), shift topic is used for pointing the moving in the next topic or idea (back to, shift to).

2.1.3 Endophoric markers

Endophoric markers is a collection of expressions that are used to refer to other sections and parts of the text in the text itself. For example (see fig.6, as noted above, below in table x). moreover, it helps the readers to understand the important concept in the text by directing them to the specific sections or information in the text.

2.1.4 Evidentials

Evidentials are used in academic writing to refer to sources of information from other textual material. Such as research papers, conference papers, review papers, and books, etc. For

example, According to Z, X states, (Y, 2017). According to Hyland & Tse (2004), Evidentials are the strategies employed by the researchers/writers to refer to other texts as a source of supplementary information.

2.1.5 Code Glosses

Code glosses is the last marker in the interactive category of metadiscourse. it contains a wide range of words that are used to present additional information in different ways, such as, “by rephrasing, explaining or elaborating what has been said” (Hyland, 2005, p. 52). This is the strategy followed by writers for ensuring that his/her reader can understand and recover the writer’s intended meaning. Phrases that are functioning as code glosses usually start such as, in other words, this is called, etc.

2.2 Interactional Markers

Interactional markers are the second category of the model of metadiscourse. It refers to the method of the researchers, writers conducting interaction through commenting on the text or the information given in the text. With the help of interactional markers, writers present explicitly their views on the text and engage their readers in the text.

Hyland & Tse’s (2004) have divided metadiscourse categories into two categories of Interactive and Interactional and then these two categories are comparable with other typologies (Vande Kopple (2002), Crismore et al. (1993), and Milne (2003) for which the categories were labeled as textual and interpersonal markers in above-mentioned typologies. The main important difference between Hyland & Tse (2004) typology and others’ (mentioned above) is that Hyland and Tse (2004) model contains both the interpersonal and interactive markers. Moreover, the categories of metadiscourse markers in Hyland & Tse (2004) and Hyland (2005) have similarities to the categories of Vande Kopple (2002), Crismore et al. (1993), and Milne (2003) except for some terminological and labeling variations. It can be noticed that Hyland (2005) did not include the ‘Illocutionary markers’ in his categorization which is included in ‘frame markers’. Researchers/authors write expressions such as *asto sum up*. Next, we can see that Hyland’s subcategory of ‘evidentials’ is not presented in this table because it has the textual function, however, Milne’s ‘attributors’ and Vande Kopple’s ‘evidentials’ show interpersonal function.

2.3 Previous studies

Lee & Casal (2014) researched the use of Interactive and Interactional metadiscourse across linguistics in Engineering disciplines. They selected results and discussion sections of 200 master’s theses written by English students and Spanish students in English and Spanish languages, respectively. Therefore, the corpus of the study contained 2 sub-corpora, for each sub-corpus the researcher selected 100 master’s theses. Theses that were published between 2007 and 2013 were selected for the study. In each sub-corpus 20 master’s theses were selected from five disciplines of Engineering. names of the disciplines are the following: Chemical Engineering, Electrical Engineering, Mechanical Engineering, Civil Engineering, and Industrial & Systems Engineering. English theses were collected and selected from three universities of the USA (Midwest), on the other hand, Spanish theses were collected from six universities of Mexico and Spain. The number of words in English theses was 349376 and in Spanish, it was

321,087. The study employed Hyland's (2005) model of metadiscourse and Antconc concordance tool and later the results of the frequencies were normalized per 10000 words and then the researchers carried out statistical analysis through the Chi-Square test. The results after normalized frequency show that English students' use of both categories of metadiscourse was higher than the Spanish students. However, in some sub-categories of markers, Spanish students used slightly higher metadiscourse in their theses. The percentage shows that English students used 381.0 Interactive category and 251.7 in the interactional category, whereas Spanish students used 308.9 interactive markers and 205.9 were used Interactional markers in their theses. The study reveals significant differences in the use of metadiscourse markers in English student's theses.

Farrokhi & Ashrafi (2009) investigated textual metadiscourse markers in three disciplines. It includes Mechanical Engineering, Medicine, and Applied Linguistics. The data were normalized per 1000 words. The finding of the study reveals significant differences in the use of textual metadiscourse markers in three disciplines as well as in the writing of native and non-native writers. The whole corpus contained 30 research articles. The total number of words in the corpus was 58,705. A Chi-square test was used to find the significant difference in the three disciplines. The results revealed that the higher use of textual markers was found in medical articles which were 60.68, Applied Linguistics 57.65, and mechanical Engineering use of markers were 54.17 which is the lowest number of frequencies among the other two disciplines.

Behnam & Mirzapour (2012) examined Intensity markers in Electrical Engineering and Applied Linguistics research articles. They selected abstract and conclusions sections of articles and the rest of the sections of research articles were excluded. The data for the corpus were 20 articles for each discipline. The model of the study was adopted by Quirk et al. (1985), see the description of the model (Behnam & Mirzapour, 2012). The concordance software was used LIWC (Linguistic Inquiry and Word count). All the occurrences were rechecked manually. The data were normalized per 1000 words. The findings of the study indicated that the use of Intensity markers is higher in the Applied linguistics discipline than in the Electrical Engineering discipline.

Keshavarz & Kheirieh (2011) investigated the use of Metadiscourse features in the research articles produced by native English writers and non-native speakers of English in the two disciplines namely: Applied Linguistics and Civil Engineering. The model of the study was Hyland & Tse (2004) and researchers of the study used Antconc software for finding the frequencies of metadiscourse markers in a corpus of 120 research articles. The chi-square test was used to compare the results. The results also revealed that there is a significant difference in the use of metadiscourse markers between the two disciplines. It is also found that writers of Applied Linguistics articles used more metadiscourse markers than Civil Engineering.

Abbas, Mahmood & Yasmeeen (2016) investigated metadiscourse markers in Pakistani press reportage. The size of the corpus was 2.3 million words and they employed Antconc 3.4.4. version for extracting metadiscourse frequencies from the corpus. The model of the study was Hyland's (2005) and they investigated Interactive and Interactional metadiscourse markers. The whole percentage of the markers in the corpus was 8.42. Their study explored the results of Interactive which was 59.62 and Interactional were 40.38 percentages. The subcategory of 'Transition markers' was used most frequently by Pakistani writers of the main dimension of Interactive markers. The study also revealed that the use of 'evidentials' was used very least in

the corpus and it showed that Pakistani writers do not cite the other resources in their reporting. However, Engagement markers were used most frequently in the corpus which is part of the Interactional markers category. The use of attitude markers was found least in the corpus. They concluded that, by employing metadiscourse markers, writers will be able to assert themselves and they can also facilitate their readers.

Mahmood & Yasmin (2016) researcher intending to explore how Pakistani researchers use metadiscourse techniques in their academic writing. For this, the researchers selected ten English and Economics Mphil research thesis as data for the study of metadiscourse. They selected major parts of the thesis for analysis, it includes a section of Introduction, a section of the method, and a section of results. The model of the study was Mauranen's Taxonomy (1993). Next, the researchers used two categories of the markers for investigation, and that were previews and reviews. The findings of the study were surprising, researchers of Economics used more metatextual features than English linguistics (department) researchers. Moreover, they concluded that Pakistani students are not aware of the rhetorical functions of the English language. However, the researchers also acknowledge the importance of meta-textual categories and claim that the research in metadiscourse in the Pakistani context is almost not present.

Ahmad (2016) examined Interactive and Interactional markers in the letters to the editors written by British and Pakistani writers in Broadsheet Newspapers. The model of the study was Hyland (2005) for identifying metadiscourse markers in the corpus. In this study, the researcher applied a systematic sampling technique for building the corpus of the study. The total number of letters in the corpus was 50 and this number was divided by 25 letters in each sub-corpus. British letters data were collected from The Guardian and Daily Telegraph, on the other hand, data for Pakistani letters were collected from Dawn and The News Newspapers. The results revealed that some sub-markers of the interactional category were used more than the interactive within both sub-corpora. The study suggested that young learners should focus also on interacting with the audience rather than focusing on the textual organization in the writing discourse.

Asghar (2015) examined interactive and interactional markers in the small corpus of Academic writing of Pakistani learners at the tertiary level. The data for the corpus was built on 11 written texts, the number of words in each written text was about 450 which were written by 3 females and eight male students. All the students belong to the undergraduate level. The text was written by the students in one of the writing activities of the class. The writing tasks were given as opinion-based writing. Students were asked to respond to their American friends for explaining their concept of Pakistani nationals. The study employed Hyland's model (2004) of interpersonal metadiscourse for finding the features of metadiscourse markers in corpus through quantitative and qualitative analysis of the text. The results pointed out that, only four students became able to write well the purpose of the task and the rest of the seven students started their writing task as they were writing an essay on a mentioned topic. The results of the study emphasize developing awareness of Interactive and Interactional markers into the students' academic writing, which enables them to write more effectively and in a well-structured form.

The summary of the above studies is given in the following table.

Table 2: Summary of the previous studies conducted in the field of metadiscourse

S. No.	Study by	Focus	Register	Corpus Size	Investigation	Model	Tools	Findings
1	Keshavarz & Kheirieh (2011)	Interactive & Interactional metadiscourse markers	Research Articles (Applied Linguistics & Civil Engineering)	120 RAs	Native vs Non-Native Writers' Use of Metadiscourse & Cross-Disciplinary Examination	Hyland & Tse (2004)	Antconc	Significant
2	Abbas, Mahmood & Yasmeen (2016)	Interactive & Interactional metadiscourse markers	Pakistani English Newspaper	2.3 million words	Pakistani press reportage	Hyland (2005)	Antconc	Significant
3	Mahmood & Yasmin (2016)	Previews and Reviews	Mphil Theses (English & Economics)	20 Theses	Pakistani Academic Writing	Mauranen's Taxonomy (1993)	Antconc	Significant difference in both disciplines
4	Ahmad (2016)	Interactive & Interactional metadiscourse markers	Letters to the Editors	50 Letters	British and Pakistani writers broadsheet newspapers	Hyland (2005)	Not mentioned	Interactional were used more than Interactive by Pakistani writers
5	Asghar (2015)	Interactive & Interactional metadiscourse markers	Class writing tasks	11 Written texts	Pakistani learners at tertiary level	Hyland & Tse (2004)	Manual	Significant

From the above review, it is concluded that the research on metadiscourse studies has been conducted almost in many countries. In the Pakistani context, there has been very little research conducted by researchers (see table 2). According to this review, studies on one discipline especially, The Engineering discipline are not found. We have found across disciplinary studies, which contains the discipline of Engineering. Therefore, it creates a literature gap to investigate the culture study of metadiscourse markers in the discipline of Engineering and technology research papers written by Pakistani and UK researchers.

3. Methodology

Bowker and Pearson (2002, p.9) illustrate the word corpus as “a large collection of authentic texts that have been gathered in electronic form according to a specific set of criteria”. In simple words, it is a huge collection of texts stored in computer-readable file formats according to some specific criteria and rules of corpus building. Tognini-Bonelli (2001) explains that the corpus-based approach is actually used to represent the methodology of a study involving corpus. There are several uses of a corpus-based approach in research studies, such as to test a hypothesis, an existing theory/concept, or validating an existing theory of corpus research.”. For this study, A corpus-based approach is regarded as an appropriate approach for

investigating metadiscourse features and according to Al-Rubaye (2015), metadiscourse research studies are crucially corpus-based and focusing on written text.

According to Hyland (2000), a corpus-based approach is considered a suitable approach because it allows the researchers to examine a huge collection of texts with the support of computers. Besides, corpus-based analysis supports the framework of metadiscourse because it contains a list of functional features that can be examined through the corpus, and normally researchers do not have to read the whole text manually. corpus analytic tools would efficiently generate quantitative patterns of the uses of the features and allow us to include qualitative, functional interpretations of such patterns (Tse, 2005).

As per the methodology of this study, we prepared a specialized comparable corpus for this study. Connor, Ulla, Moreno & Ana(2005, p.4) state that comparable corpora and Learner corpora are mostly used in contrastive rhetorical studies. The use of Comparable corpora is increased because research in contrastive rhetoric reached the advanced level. In this research study, we followed Kennedy’s (1998: pp. 70-85) five stages of corpus building. It is consisted of corpus design, planning a storage system and keeping records, obtaining permissions, text capture, and markup.

The purpose of the study is to compare and contrast the cross-cultural use of Interactive Metadiscourse markers in the research articles written by Pakistani and British Engineers. For this purpose, we have conducted a corpus-based study to get answers to the research questions. The main purpose of conducting the corpus-based analysis is to search frequencies of metadiscourse markers and to compare final frequencies between the two sub-corpora of Pakistani and British researchers.

3.1 Description of the corpus of the study

Two tables are given below to illustrate the description of the corpus and the number of words in each sub-corpus.

Table 3: Number of Research Articles

		Pakistani Sub-Corpus	British Sub-Corpus
Engineering Disciplines included in the Main Corpus	Civil Engineering	20	20
	Chemical Engineering	20	20
	Mechanical Engineering	20	20
	Computer System Engineering	20	20
	Electrical and Electronics Engineering	20	20
	Total RA’s in Each Sub-corpora	100	100
	Total RA’s included in the Corpus		200

In the above table, the description of the corpus has been given. The total no of research articles in the corpus is 200. The corpus is divided into two sub-corpora, for each sub-corpora 100 research articles were downloaded. There are articles of 5 disciplines, from each discipline we have collected 20 research articles.

Table 4: Number of words in the corpus

Number of words in Research Articles by Country	By Disciplines					Total number of words by (Sub-Corpora) country
	Civil	Chemical	Mechanical	Computer System	Electrical / Electronics	
Pakistan	62,718	53,689	74,584	98,049	66,158	355,198
British	145,178	134,250	132,511	216,288	103,666	731,893
Total by Disciplines	207,896	187,939	207,095	314,337	169,824	1,087,091 (Total Words in Corpus)

In the above table, we have presented the total number of words counted through the Antconc tool. The total number of words in the corpus is 1,087,091, which is a sufficient number of words in the corpus for the representation of both cultures in the study. However, Pakistani research articles' number of words is 355,198, which is lower than British words in the research articles 731,893. These numbers of words are after deleting the other information from research articles, for instance, references, footnotes, acknowledgments, appendixes, instrument tools given by the end of the paper.

3.2 Coding Process Of Corpus Files

The corpus of this study was coded after the confirmation of the authors' identities. This coding process helps us in corpus building and comparison, of the results between disciplines. In this study, we prepared an Excel sheet and inserted all the information of writers, research titles, journals, locations, issue numbers, year, etc. for each discipline. Moreover, all the research article's files were given special codes to identify them. The following codes are assigned to each discipline of the Pakistani sub-corpora. CivilPk-EngrRA-CE001, Chemical Pk-EngrRA-CH001, Electrical and Electronics Pk-EngrRA-Es_El001, Mechanical Pk-EngrRA-Mech001, and computer system engineering Pk-EngrRA-Comp001. Similarly, for the British sub-corpora, the codes were allotted to each discipline's file just by adding BR instead of PK. For example, CivilBr-EngrRA-CE001, Chemical Br-EngrRA-CH001. In these codes, for example, Pk-represents Pakistani, Br- represents British, RA-represents research articles, CE-represents Civil Engineering. These codes were used in this research article in examples of the corpus, to identify the discipline's text sample.

3.3 Tool of the study

According to Anthony (2005), a corpus of language is not useful without using specialized computer software that actually processes the corpus files into a process that enables the researchers to find the results of required searches easily and understandably. Antconc is a free concordance software tool that has been used by many researchers in the research of metadiscourse, such as (Junqueira & Cortes, 2014; Malmström, 2014; Kondowe, 2014; Keshavarz and Kheirieh, 2011; Abbas et al., 2016; Abdollahzadeh, 2011). The Antconc software, is a single file that is executable, and it is easy to copy and paste at the desired location in the computer and it operates without any installation procedures. Anthony (2005) explains that the concordance program supports the researchers in searching frequencies and displays varied examples effectively in a very short span of time. Therefore, in this research study, we operated Antconc 3.4.4w (Windows) 2014 as corpus analysis software for many reasons. First, it provides a graphical user interface (GUI) that helps the researchers to use it easily. It provides the facility to researchers to search individual words in the corpus and they can also create the words list to search the particular or targeted words in the corpus. However, for words that are comprised of two or more words, then they can search each phrase one by one. Antconc supports well in searching words list, which is comprised of one word, this saves the time of the researchers. Moreover, the Antconc corpus analysis tool kit not only offers the researchers to search the words, but it provides the context of the words in which they occur. In simple words, it provides the complete sentence or paragraph to read it for identifying the metadiscourse items in its context. Moreover, Antconc provides frequencies of each searched word and it provides the option of regex commands which is the source of searching complex instances of metadiscourse list. Such as evidentials, it is not easy to search years in Antconc, therefore, we used some modified and customized regex commands which are specially used in computer programming and they helped us to search citations, years, names, etc.

3.4 Limitations

There are also some limitations to this research study. Firstly, this study is about the articles belong to the Engineering discipline of Pakistan and UK researchers. It covers only the X category of the research journal, it does not cover W, Y, and Z research journals which are also HEC recognized. It does not cover the other research journals which are not approved by HEC. Secondly, some journals in the X category like the research journals of (NED) university are not accessible, similarly, some repositories of British Universities are also not accessible like Oxford (University) repository, this situation does not allow us to include more research journals in our sample (corpus). However, the VPN service of Mehran University helped in accessing all the research articles from repositories and several other university websites from where we collected research articles for building the corpus of this study. The second limitation is that we have included only Pakistani writers for Pakistani sub-corpus, though some journals are publishing foreigners' papers e.g. *International Journal of Communication Network & Information Security (Kohat)*, only a few articles were collected from the above-mentioned research journal. Moreover, in this study, we have investigated Interactive metadiscourse features collectively, the study can be more representative if one could have divided sub-categories of different elements in the result as separate parts. The last limitation is concerned with the British sub-corpus, which we have included their most popular universities repositories.

3.5 Delimitations of the study

The review of the studies given in section 2 (Literature Review) indicates that the research on metadiscourse studies has been conducted almost in many countries. In the Pakistani context, there have been very few little studies done by researchers. According to this review, studies on one discipline especially, the Engineering discipline are not found. we have found across disciplinary studies, which contains discipline of Engineering. This is further pointed to Pooresfahani, Khajavy, Vahidnia (2012) to include more disciplines of engineering in corpus to identify the use of Metadiscourse. We compiled a corpus and extended it to many disciplines in this research. The selected disciplines are following for this cross-cultural study, Civil engineering, Electrical Engineering, Electronics Engineering, telecommunication Engineering, Software Engineering, Chemical Engineering, Computer Engineering, and Mechanical Engineering.

4. Results

In the below table, we have presented descriptive results of Interactive metadiscourse for both sub-corpora. First, we will present the results of each sub-category of Interactive metadiscourse markers concerned to the British and then Pakistani. The results contain two frequencies, one is related to normalized frequency/items per 1,000 words and the other one is its total percentage in sub-corpora. The table presents that the use of Interactive metadiscourse markers in the British sub-corpora is 257.42 per 1,000 words and it is based on 100% in the British sub-corpora. On the other hand, it is found that the use of Interactive metadiscourse markers in Pakistani sub-corpora is found 181.4 items per 1,000 words and it is based on 100% in Pakistani sub-corpora.

Table 5: Interactive Metadiscourse markers in Engineering articles

Category	British Engineering Ras		Pakistani Engineering Ras	
	Items per 1000 words	% of Total	Items per 1000 words	% of Total
Transition Markers	141.70	55.05	80.77	44.53
Frame Markers	32.53	12.64	27.74	15.29
Endophoric Markers	28.80	11.19	36.36	20.04
Evidentials	37.08	14.40	19.61	10.81
Code Glosses	17.31	6.72	16.92	9.33
	257.42	100	181.4	100

Transition markers is the first sub-category of Interactive markers which is used as the most frequent marker in Pakistani sub-corpora. It has consisted of 44.53 % and its frequency per 1,000 words is $f80.77$. On the other hand, code glosses are used least which is 9.33% in the whole sub-corpora with $f16.92$ items per 1,000 words. The rest of the markers use is found moderate with the following items per 1000 words and the frequency of occurrences in the whole corpus. Endophoric markers are used with $f36.36$ per 1,000 words and its total percentage in the sub-corpora is 20.04%. However, frame markers were found with frequency of 27.74 per 1,000

words and 15.29% in the whole sub-corpora. The use of Evidentials is *f*19.61 per 1,000 words and 10.81% in the whole sub-corpora.

Transition markers are the first sub-category of Interactive markers which is found the most frequent markers in British sub-corpora. It consisted of 55.05% in total and the frequency is *f*141.70 per 1,000 words. On the other hand, the use of code glosses is used least which is 6.72% in the whole sub-corpora with *f*17.31 items per 1,000 words. The rest of the markers are found moderately used with the following occurrences per 1,000 words. The use of Evidentials found with *f*37.08 and its total percentage in the sub-corpora is 14.40%. Whereas frame markers were found with *f*32.53 per 1,000 words and 12.64% in the sub-corpora. The use of Endophoric markers is 28.80 per 1000 words and 11.19% in the whole sub-corpora.

Some examples of Interactive markers from Pakistani and British sub-corpora

Transition markers:

Questionnaire-based survey has been conducted by construction managers (i.e. project engineers, construction engineers, project managers, architects, etc) through online web-based system, **as a result**, random data sampling is achieved. Pk-EngRA-CE007

One way to explain **the result** is with reference to the satisfaction on natural boundary conditions in a finite number of terms. Br-EngRA-Mech016

Frame markers:

Keeping in mind the end **goal** to examine and make realities about an episode, we require dependable data from all parts and areas of the network. Pk-EngRA-Es_EI009

At this point, it is important to note that Equation (6) is valid only for smoothly varying bathymetry, that is, it cannot model shallow flow at a vertical bed step or a hydraulic jump formed at a steep slope exactly. Br-EngRA-CE017

Endophoric markers:

As discussed **before** the mixing intensity can be formulated by observing the decrease in drop size, more the decrease in diameter more would be the mass transferred from air to water. Pk-EngRA-CH017

These results are summarized in **Table 5**. **Fig.8** summarizes the network throughout for each of the three test topologies for the baseline and optimized case. Br-EngRA-Es_EI005

Evidentials:

According to the Serban [32] there are variety of mobile translator applications are available. Pk-EngRA-Comp011

The magnitude of this extra cost is not currently known, but the topic is being assessed by the **National Grid (2011)**. Br-EngRA-CH005

Code glosses:

The drawback of this method is that it involves the use of several equipment and devices, **for example:** compressors, heat exchangers, turbines, insulators, and columns. Pk-EngRA-CH005

Research tends to be incremental rather than transformational, **which means** that it is difficult to demonstrate the benefit of research in the short term. Br-EngRA-CE011

4.1 Inferential Statistics

The second research question of the study is about the difference in the use of Interactive metadiscourse markers between Pakistani and British engineering and technology writers' research articles. Answer to the research questions given below points out the differences through the Chi-square test.

The use of interactive metadiscourse markers (Transition markers, Frame markers, Endophoric markers, Evidentials, and code glosses) in engineering RA's texts written by authors from two distinct cultures (Pakistani and British). To determine the association between cultural aspects and the use of interactive markers, a statistical analysis of the Chi-square test of independence was calculated. It compared the normalized frequency values of interactive markers' use in Pakistani and British engineering RA's (achieved through corpus-based analysis)

Table 6: Chi-Square test results of Interactive metadiscourse markers

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.478 ^a	4	.033
Likelihood Ratio	10.403	4	.034
Linear-by-Linear Association	2.287	1	.130
N of Valid Cases	439		

a. 0 cells (.0%) have an expected count less than 5. The minimum expected count is 14.15.

The results of the chi-square test indicate that a strong relationship was found between the culture (both the countries, Pakistan and Britain) and the frequency of interactive metadiscourse markers (Transition markers, Frame markers, Endophoric markers, Evidentials, and code glosses) used in engineering RA's texts, $X^2 = 10.478$, $df=4$, $p = .033 < 0.05$.

**Table 7: Sub-categorical use of Interactive Metadiscourse Markers * Countries
Crosstabulation**

		Countries		Total
		British	Pakistani	
Transition Markers	Count	141.700	80.770	222.470
	Expected Count	130.5	92.0	222.5
	% within Countries	55.0%	44.5%	50.7%
Frame Markers	Count	32.530	27.740	60.270
	Expected Count	35.4	24.9	60.3
	% within Countries	12.6%	15.3%	13.7%
Endophoric Markers	Count	28.800	36.360	65.160
	Expected Count	38.2	26.9	65.2
	% within Countries	11.2%	20.0%	14.8%
Evidentials	Count	37.080	19.610	56.690
	Expected Count	33.3	23.4	56.7
	% within Countries	14.4%	10.8%	12.9%
Code Glosses	Count	17.310	16.920	34.230
	Expected Count	20.1	14.2	34.2
	% within Countries	6.7%	9.3%	7.8%
Total	Count	257.420	181.400	438.820
	Expected Count	257.4	181.4	438.8
	% within Countries	100.0%	100.0%	100.0%

Pakistani engineering writers have used Endophoric markers (a sub-category of interactive metadiscourse markers) (20.0 %) in engineering RA's than British writers (11.2%). Similarly, Pakistani engineering writers have used code glosses (9.3 %) in engineering RA's than British writers (6.7%). However, Pakistani Engineering writers have used Frame markers (15.3%) in engineering RA's than British writers (12.6). Conversely, British engineering writers have used Transition markers (55.0%) in engineering RA's than Pakistani writers (44.5%). consequently, British engineering writers have used Evidentials (14.4 %) in engineering RA's than Pakistani writers (10.8%).

4.2 Discussion

The results reveal that Pakistani and British Engineering writers use all sub-categories of Interactive metadiscourse markers in their research articles. The first question of the study was to probe the use of Interactive metadiscourse in Pakistani and British Engineering research articles. The findings of this research study revealed that British writers use some sub-categories of interactive metadiscourse markers more than Pakistani writers. This major difference in the use of Interactive metadiscourse categories may be attributed to the reality that British writers' first language is English, and they belong to the English culture; therefore, they are very much familiar with the rules of the English language and its structures. The English culture and language background support British writers in the organization and coherence of the text. That makes their writing different from another culture (like Pakistani culture). Results of the chi-square statistical test indicated a significant difference in the use of interactive markers among British and Pakistani writers. The frequency Interactive category of the metadiscourse markers is utilized more by British writers as compared to Pakistani writers. However, descriptive results indicated that Endophoric markers, code glosses, and frame markers were utilized more by Pakistani writers as compared to British writers. Another study is also in line with the present study's results. Mirshamsi & Allami (2013) found that native speakers' use of Interactive metadiscourse markers is higher than the non-native speakers. Lee & Casal (2014) also found a significant difference in the use of both categories of metadiscourse markers among English students and Spanish students.

Below is the discussion, we present the frequencies of the interactive markers and possible reasons for the higher use of markers and lower use of markers in contrast to both sub-corpora results. The results of other studies that matched with the present study is Salek & Yazdanimoghaddam; 2014, Faghieh & Rahimpour; 2009, Ebadi et.al, 2015 and Ozdemir, and Longo; 2013.

Endophoric Markers

Pakistani engineering writers were more likely to use Endophoric markers (20.0 %) in engineering RA's than British writers (11.2%). According to Hyland (2005), Endophoric markers is a collection of expressions that are used to refer to other sections and parts of the text in the text itself. For example (see fig.6, as noted above, below in table x, in the previous section). The results proved that Pakistani Engineers having awareness of the reader's needs, therefore they help their readers to understand the important concept in the text by directing them to the specific sections in the text. The reasons can be different for using Endophoric markers more by Pakistani writers. It can be the demand of the reviewers of their journals. According to Keshavarz & Kheirieh (2011), it can be the need of their topics to refer to the specific sections of their presented information because it is considered the style of Engineering writing, engineers mostly present their arguments by pointing out the graphs, images, figures, tables, and formulas. Moreover, it can be the overuse of Endophoric markers in Pakistani Engineering writing.

Code glosses

Similarly, Pakistani engineering writers were also more likely to use code glosses (9.3 %) in engineering RA's than British writers (6.7%). Pakistani writers employed more code glosses as compare to British writers, it is mainly used to present additional information by employing

various ways such as rephrasing and explaining what has been said (Hyland, 2005). Pakistani writers are employing these strategies extensively because they consider the level of their readers. Readers of their research articles can be students of their disciplines, who belong to rural and urban areas, and therefore, they may be or may not be able to understand the writer's intended meaning in the text. Moreover, Pakistani students and novice researchers may get more help and understanding from Pakistani engineering research articles. Therefore, in our view, Pakistani writers are more sensitive to their readers and they explain and rephrase the information given in the article. On the other hand, British writers' use of code glosses indicates that they have awareness of their readers, mostly their readers are in native English countries. Therefore, they use code glosses least than Pakistani writers. Faghih & Rahimpour (2009) study results are also in line with the present study, the results of the study reveal that Iranian writers used frame markers and code glosses more frequently than native speakers. The same results are pointed out in this present study, where Pakistani writers used more frame markers (15.3%) whereas British writers use frame markers is (12.6%). Use of code glosses is also used more frequently by Pakistani writers (9.3%) as compared to British writers (6.7%).

Frame Markers

However, Pakistani Engineering writers were also more likely to use Frame markers (15.3%) in engineering RA's than British writers (12.6). Frame markers is the collection of words that are used for discourse organization. The results prove that Pakistani writers also use frame markers to organize discourse and they know the importance of it. Paltridge (2006) explains that, in spoken or in written form of language, people usually organize their discourse, and it varies across different cultures of the world. This can be the reason for the lower use of frame markers in British writers' articles.

Transition Markers

On the other hand, Transition markers are used more by British writers (55.0%) as compare to Pakistani writers (44.5%). It proves that British writers are become successful by using more transitions in their writing. This helps the readers how parts of the text are linked with each other.

Evidentials

British engineering writers were more likely to use Evidentials (14.4 %) in engineering RA's than Pakistani writers (10.8%). According to the statistics, English researchers use more evidentials for the reason of applying more support and justification in their academic writing (Noorian & Biria, 2010). The results of other studies of metadiscourse that prove native speakers use of evidentials more than nonnative speakers (Ebadi et.al, 2015) as the present study found the use of evidentials by native speakers of the English language.

Similarly, Ozdemir and Longo (2013) found a significant difference in the use of interactive markers across two cultures. Americans used more interactive markers than Turkish writers. The results of this study are also similar to the present study, the result shows that Pakistani writers use less interactive markers as compared to British writers. The total percentage of interactive markers used by Pakistani writers is 181.4% whereas British writers (257.4) use is more frequent than Pakistani writers.

5. Conclusion and Suggestions

According to the results of this study and discussion, it can be concluded that there are some differences and similarities in the use of interactive Metadiscourse markers in research articles between Pakistani and British engineers. The most significant difference is that British writers used more interactive markers than Pakistani writers in research articles, the percentage is followed (257.4%, 181.4%) respectively. The other difference is that Pakistani writers are using more interactive markers in three sub-categories than British writers. British writers are using two sub-categories namely Transition markers and Evidentials more than Pakistani writers. The chi-square test results in significance difference in both sub-corpora ($\chi^2= 10.478$, $df=4$, $p = .033 < 0.05$.) Pakistani engineers are more like to use code glosses (9.3 %) and frame markers (15.3) in engineering RA's than British writers (6.7%) and (12.6) respectively. This shows that Pakistani engineers are very much concerned to use code glosses and frame markers to organize and clear the information in the text for their readers. To conclude, these differences are highlighting cultural differences, like the use of English as native and non-native and teaching of academic writing and focusing on the use of Metadiscourse markers in both cultures. This view is also supported in previous studies of Metadiscourse which reveals cultural differences in academic writing. The other possible reason for the underuse of Metadiscourse Markers found in research articles is that maybe Pakistani engineers use it more in their thesis writing, it's because thesis writing is different than research articles writing. In that scholars provide comprehensive information for their readers. According to Simin and Tavangar (2009), proper instructions are required for learning and improving the writing of EFL learners through instructors and suitable books that provide activities in textbooks. The study suggests implications for novice researchers, ESL teachers, curriculum, and textbook designers to understand the importance of Metadiscourse markers and play their respective roles to fulfill the requirements of academic writing. Future researchers may investigate disciplinary differences in the discipline of Engineering in Pakistan. They may also conduct studies on learner corpora for assessing the present and post knowledge of learners in Metadiscourse.

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