

Analysing the Metadiscourse Markers in the Conclusion Sections of Academic Research Articles: A Corpus-Based Study

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Abstract

Article writing plays a significant role in academic writing in all the major fields of education. According to Hyland (2004), analysing the text's metadiscourse can be valuable for examining academic writings and assessing multiple discourse communities' rhetorical characteristics and priorities. In academic writing, metadiscourse markers play a pivotal role in improving coherence and clarity. The current research aims to investigate the metadiscourse marker's (MDM) frequency, percentage, differences, and implications in the academic research article's conclusion. A mixed-methods approach has been used for the data analysis for the current study. Researchers have used Hyland's (2005) taxonomy model as a framework. Six selected meta-discourse markers— transitions, Endophoric markers, evidential, hedges, boosters, and attitude markers—have been selected to accomplish this analysis. The corpus of 11027 words has been collected from 60 research articles (15 from each) belonging to four disciplines: chemistry, biology, sociology, and sociolinguistics. MetaPak software is used as a tool for analysis to extract the above-mentioned selected markers. Further, manual analysis was done to see whether the software's results were authentic. The findings revealed that interactional metadiscourse markers were more frequent than interactive meta-discourse markers in conclusion sections of both social and natural sciences. Furthermore, hedges are the most frequent among the interactional discourse markers in the conclusion section. This study reveals that the frequent use of hedges indicates that the writers are not confident in their findings and opinions.

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1 Introduction

One of the most popular formats for academic writing is the research article (RA) (Gilbert et al., [1984](#)). Regarding the conceptualisations of RA, Hyland ([1998](#)) stated that it is "just reporting or explaining natural facts with hardly any human intervention. Simply put, "scientific text considered as being a neutral descriptive medium" tends to be discovered in the case of the RA. Bruce ([2005](#)) said that RA is recognised as a social genre used as a means of communication in the members of a particular discourse community. Any specific subject of knowledge can relate to an academic communication genre, which is regarded as a crucial methodological challenge in a discipline. RA is, therefore, founded on acceptable techniques and ideologies to convey information (Hewings, [2006](#)).

Research articles, which allow researchers to communicate their findings, add to the body of knowledge, and engage in intellectual discussion, are significant in the academic genre. Moreover, the conclusion section of the research article is significant because the writers not only summarise their findings but also give implications of the findings. The conclusion facilitates the reader by helping them understand the writer's perspective on a topic and the summary of the findings compactly and comprehensively (Deng & He, [2023](#)).

Keeping our concern of study in account, it is necessary to know the importance of metadiscourse markers. Zellig Harris was the first to use this term in 1959. Metadiscourse, which makes the text appealing for readers help the author connect to his audience, is a crucial component of the rhetorical qualities of RA (Hyland, [2005](#)). According to Hyland (2005, p. 143), metadiscourse markers are aids to social communication that help to create knowledge within a profession. Many academics have defined the concept of metadiscourse. Metadiscourse markers help in both reading and understanding the perspective of a writer. To regulate their viewpoints and convictions, authors cast themselves into their reasoning in academic environments through metadiscourse markers.

Williams (1981, p. 212) gives the same definition of meta-discourse, who states "writing about writing". According to him, metadiscourse elements offer a mechanism to converse with the viewer about the topic or propositional material. Similarly, metadiscourse describes a certain sort of interaction between the author and the reader. Keeping in view the models of metadiscourse markers, different scholars presented different models, such as Hyland ([2005](#)). The researchers selected Hyland ([2005](#)) model for examining the metadiscourse markers in the conclusion section of RA.

According to that, metadiscourse markers are divide into two classes Interactive and Interactional each of which is divided into five subclasses. Interactive markers include, frame markers, evident ails, transitions, endophoric makers, and code glosses. When writing interactive meta-discourse, the writer considers the reader's requirements, wants, and interests in addition to trying to meet those needs and wants. While, interactional discourse markers comprise hedges, boosters, attitude markers, engagement markers, and self- mention (Zhou & Jiang, [2023](#)). The interactional component focuses on the author's intention to make himself obvious and to incorporate the reader by anticipating their reactions.

Although many studies have been taken on MDMs in multiple disciplines and in various sections of academic research articles, but only a few researches have been done on the use of metadiscourse markers in the conclusion section of RA. Even if the research is conducted, they are done to analyses the use of metadiscourse markers in all other sections except the conclusion. As far as metadiscourse markers in the conclusion section are concerned, they have been studied

in comparison with other portions of research articles such as abstract and introduction (Liu & Zhang, 2021). Thus, this gap motivated us to analyze the application of meta-discourse markers in the conclusion section of RA.

The findings of present study will assist the readers as they understand the usage and implications of selected metadiscourse markers. Moreover, it will also give insight into difference in percentage and frequency of metadiscourse markers in the concerned section. In addition to that, it will also guide the reader about how writers use the discourse marker in order to convey their perspective in the conclusion section of RA (Arizavi et al., 2023). The objective of the present study is to investigate the difference in frequency and percentage of selected MDM in the conclusion sections. So, Hyland (2005) model is employed to get deeper understanding in the implications and differences of the selected metadiscourse markers in the conclusions of the research articles.

The following questions have been designed for the accomplishment of the above-mentioned objectives:

1. What is the difference in frequency and percentage of selected MDMs in the conclusion section of interdisciplinary academic research articles?
2. What are the implications of the selected meta-discourse markers in the conclusion section of the research article?

2 Literature Review

An academic research article's conclusion section is essential for summarizing the key results and consequences of the study. Beyond the specifics of the conclusion, investigators also intentionally express their opinion, viewpoint, and perspective about their individual research and the larger research community through metadiscourse (Wu & Paltridge, 2021). In a study Batool, Majeed, and Zahra (2019) investigated the use of hedges and boosters in opinion articles of Pakistan. 47927 articles were collected randomly from 50 opinion articles randomly. This study was carried out by using Hyland's 2005 taxonomy model. Moreover, for the analysis of data, they use Matapak software. The results of this research revealed that Pakistani writers use boosters (480) frequently than hedges (457) in their opinions.

As far as their implications are concerned, writers used hedges and boosters either to make their writings more convincing or less assertive (Boginskaya, 2023). Interactional markers were studied in a research by Cao (2014) in the result and discussion section of selected fields (English language teaching, biology, economics, and civil engineering). The four articles were collected from each discipline and then analyzed by the Hyland taxonomy model. In addition to that, they used Chi-square test for comparison of the frequency in these four disciplines. The findings showed that boosters were mostly employed in the soft sciences than the hard sciences, while there was a lack of presence of self-mentions and engagement markers in two hard science fields (Chung et al., 2023).

Similarly, Estaji and Vafaeimehr (2015) analyzed the implication of MDM in introduction and conclusion parts of forty-two research articles within two fields (electrical engineering and mechanical engineering). The corpus of 41484 words was analyzed according to the Hyland (2005) model. Moreover, they used Chi-square test for frequency of the MDMS. The results indicated that boosters were the most frequent, hedges were the second most frequent, and attitude markers were the rarely occurring discourse markers (Khaghaninejad et al., 2021). In English and Persian master's theses Mirshamsi and Allami (2013) examined the use of metadiscourse markers in the discussion and conclusion sections. This study was aimed at analyzing and compare the use of interactive and interactional metadiscourse markers between Iranian learner and native English speakers. The corpus of sixty master's theses was collected and examined by using the Hyland

(2005) model. The findings indicated that interactive and interactional metadiscourse markers are mostly used by native English writers rather than native Persian and EFL learners (Soylu et al., 2023).

In English Master Thesis Zahra, Roya, and Sahla in 2105 examined the interactive and interactional metadiscourse markers in thesis’s conclusion. The thirty master's theses in English were selected to analyze the difference in frequency of interactional and interactive discourse markers. Hyland’s (2005) taxonomy model was employed in this research as a research methodology. The findings revealed that the interactional metadiscourse markers were frequent than the interactive ones. In the light of above-mentioned literature review, it is having been explored that only one article about master theses has specifically worked on conclusion section.

While, other studied conclusion section in comparison with other sections like introduction, discussion and conclusion. Despite many researches on metadiscourse markers, more researches are required to get deeper understanding of the usage and percentage of metadiscourse markers across various discipline in article’s conclusion. The conclusion section of research articles across the selected fields (Chemistry, Biology, Sociolinguistic and Sociology) has not been explored yet in terms of use of metadiscourse markers (Boginskaya, 2023). Therefore, this gap motivated us to shed more light that how metadiscourse markers are manifested in research article’s conclusion across four fields (Biology, Chemistry, Sociolinguistics and Sociology). The purpose of current research is to study the use of Metadiscourse markers in the conclusion section of RA which will fill the gap in the light of above-mentioned literature review. Moreover, Hyland’s (2005) taxonomy model has been used to find the type and frequency of Meta discourse markers in the selected portion of articles. The current research addresses the two main questions. First one is related to frequency and percentage, while second is about the implications in the selected discourse markers in the conclusion section of RA (Wang & Hu, 2023).

3 Methodology

The various classification models of metadiscourse markers have been given by different scholars such as Vande Kopple (1985), Crismore (1993) and Adel (2006). The renowned model of Hyland (2005) pertaining to taxonomy of metadiscourse serves as the foundation for the current investigation.

Category	Function	Example
Interactive resources	Help to guide the reader through the text	
Transitions	Express relations between main clauses	In addition, but, thus, and finally, to conclude, my purpose is
Frame markers	Refer to discourse acts, sequences or stages	
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, in other words
Interactional resources	Involve the reader in the text	
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	Express writer’s attitude to proposition	Unfortunately, I agree, surprisingly
Engagement markers	Explicitly build relationship with reader	Consider, note, you can see that
Self-mentions	Explicit reference to author (s)	I, we, my, me, our

Figure.1 The interpersonal model of Hyland (2005) of metadiscourse

This framework is divided into two classes: interpersonal and textual features. According to this interpersonal marker are divided into two groups. One is known as an interactive and the other as an interactional marker. The five additional types of interactive markers—logical connectives,

frame markers, endophoric markers, evidential, code glosses, and transition markers—help the reader understand the text. The interactive elements are those that draw the reader in and keep them interested in the content. Furthermore, there are five different kinds in the interpersonal category: hedges, boosters, attitude markers, self-mentions, and engagement markers.

Table 1 Metadiscourse markers to be analyzed

Interactional Markers	<i>Hedges</i>	<i>Boosters</i>	<i>Attitude Markers</i>
Interactive Markers	Transitional	Evidential	Endophoric Markers

The current study analyzes only three markers from each of the two above mentioned main categories. Among interactional markers, hedges, boosters, and attitude markers were selected, while among interactive markers, transitional, evidential, and endophoric markers were analyzed because they were present more frequently than the rest of the markers. This has been shown in table number 1. Finally, keeping in view the research questions and data, it was so true to employ both qualitative and quantitative methods. The quantitative method has been used for the frequency and percentage of the selected discourse markers, while the qualitative method has been used for the interpretation and implication of the selected MDM in conclusion section of RA. This data was primarily divided into two fields based on the academic data available on the internet. Out of those two fields of soft sciences and natural sciences, two more sub-fields were selected for the acquisition of the conclusions.

3.1 Data Collection and Procedure
Table.2 Description of Data collection

<i>Fields</i>	<i>Subfields</i>	<i>No. Of Articles</i>	<i>No of Words</i>
Natural Sciences	Biology	15	1817
	Chemistry	15	2125
Social Sciences	Sociolinguistics	15	3420
	Sociology	15	3665
Total	4	60	11,027

After acquiring a total of sixty articles, the conclusions of all the articles were extracted and separated for Matapak analysis. The corpus selected for the current research contains 11027 words, so an exploratory research design was followed. MetaPak software has been used as a research tool (Gilber et al., 1984). This research tool is beneficial in extracting and analyzing the values and frequencies of the textual and interpersonal features, as proposed by Hyland (2005). Before analysis, the data was cleaned by using a tool, textfixer.com. After extraction of conclusions a single word file was made. Unicode UTF 8 coding was used to convert word file into a TXT file. In addition to that, data was put into MetaPak software for analysis. The frequencies of the corpus were analyzed twice: once by MetaPak software and again manually to check whether selected metadiscourse markers were performing their functions according to the frequency shown by software or not. After that, the data was put into Microsoft Excel to make Excel sheets. In the end with the help of MetaPak software, metadiscourse analysis was aptly done. Finally, data was

analyzed to understand the author’s perspective and point of view.

4 Findings and analysis

This section clearly describes the findings of the current study which were obtained using Hyland’s (2005) interpersonal model of metadiscourse as a framework. This corpus-based study was conducted using MetaPak software. The findings showed the percentages (relative to their respective word count) and frequencies of the selected metadiscourse markers in the interdisciplinary academic research articles’ conclusion. And, therefore, based on these findings the implications of the results were drawn about the writer’s way of interacting with their readers through the conclusion section specifically. First the frequencies and percentages of selected three Interactive MDM such as Transitions, Endophoric Markers, and Evidential were taken. Table.3 & Graph.1 show their presence for social sciences. Same was done for the conclusion sections of natural sciences. In this Chemistry and Biology were selected (table.4 & Graph. 2). Then, a comparison of interactive MDMs within social and natural sciences was made (table.5 & Graph.3). Next, all the above three steps were repeated for the selected three Interactional MDMs, which were Hedges, Attitude Markers, Boosters in social and then in natural sciences along with their comparison. They are as follows:

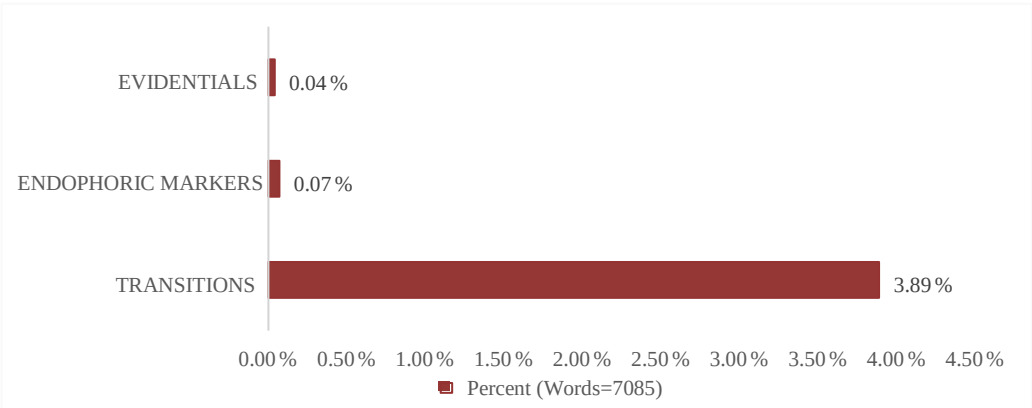
4.1 Interactive Metadiscourse Markers

Table 3 and graph 1 illustrate that out of the selected three Interactive MDMs in social sciences Transitions dominated with the highest frequency of 276 (3.89%).

Table 3 - Interactive MDMs in Social Sciences (Sociology and Sociolinguistic

Interactive Metadiscourse Markers	Freq of MDMS in SS	Percentage
	(Words In SS=7085)	
Transitions	276	3.89%
Endophoric Markers	5	0.07%
Evidentials	3	0.04%
Total (N)	284	4.00%

Graph 1 - Interactive MDMs in Social Sciences (Sociology and Sociolinguistics)



While Evidential occurred least in the data, almost non-existent, with a frequency of only 3 (0.04%). Endophoric Markers were also really less with a frequency of 5 (0.07%).

Table.4 - Interactive MDMs in Natural Sciences (Chemistry and Biology)

Interactive Metadiscourse Markers	Freq of MDMs in NS	Percentage
(Words=3942)		
Transitions	167	4.23%
Endophoric Markers	0	0.00%
Evidential	0	0.00%
Total (n)	167	4.23%

Graph.2 - Interactive Metadiscourse markers in Natural Science (Chemistry and Biology)

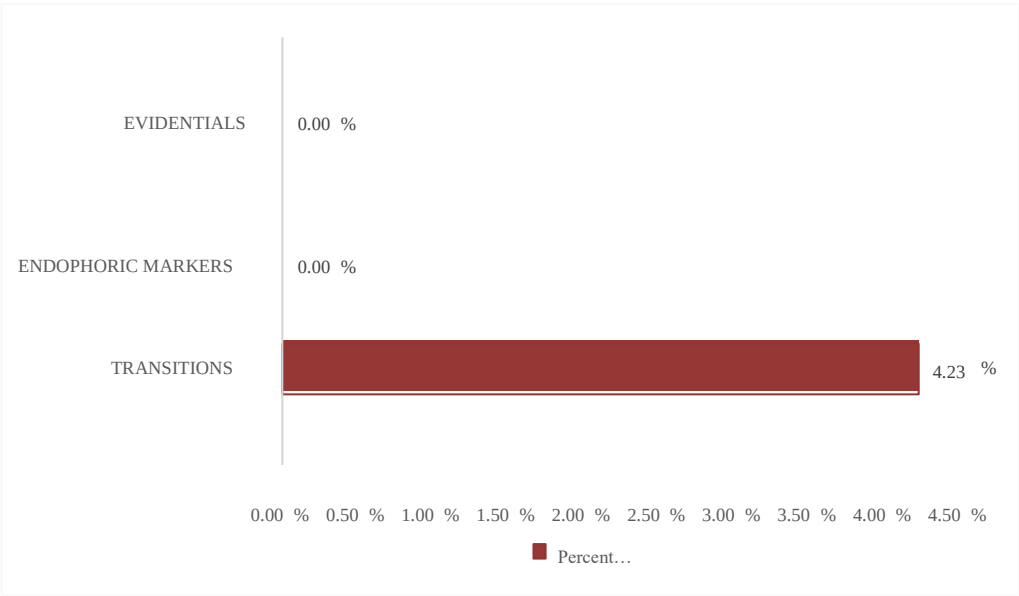


Table 4 and graph 2 show that except for the bulky presence of Transitions with a frequency of 167 (4.23%) the rest of the selected two MDMs Endophoric Markers and Evidential are completely non-existent with zero frequency.

Table. 5 - Comparison of Interactive MDMs between SS and NS

Interactive MDMs	Frequency of MDMs in SS	Percentage	NS f of MDMs	Percentage
(Words=7085)			(Words=3942)	
Transitions	276	3.89%	167	4.23%
Endophoric Markers	5	0.07%	0	0.00%
Evidentials	3	0.04%	0	0.00%
Total (N)	284	4.00%	167	4.23%

Graph.3 - Comparison of Interactive MDMs between SS and NS



Table 5 and Graph 3 are showing the comparison of Interactive MDMs between social and natural sciences and the difference is quite visible. Transitions occurred in the highest percentage, according to the relative word count of each, with 3.89% and 4.23% respectively in social and natural sciences. Endophoric Markers and Evidentials were used scarcely in the conclusion section of social sciences while in natural sciences they were completely absent. So, the comparison showed that the selected three Interactive MDMs occurred more in NS than in SS

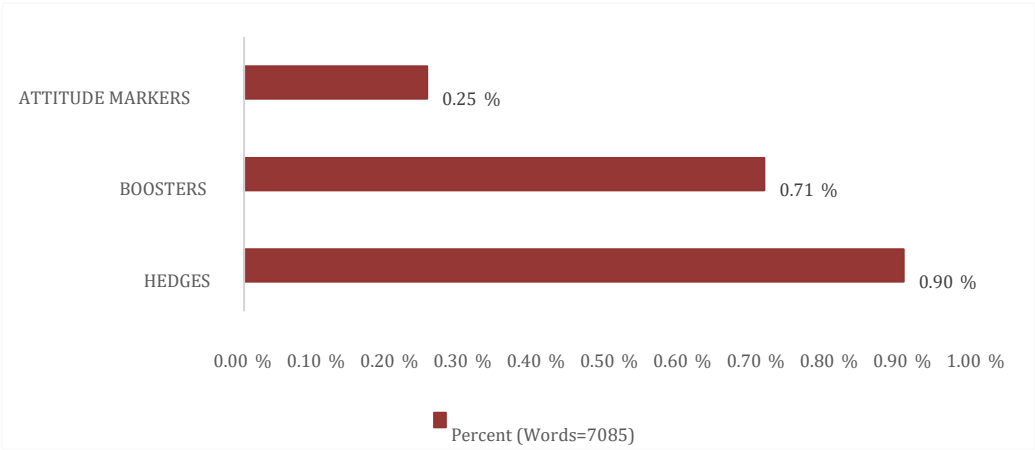
4.2 Interactional Metadiscourse Markers

There is table 6 and graph 4 which demonstrate the interactional MDMs in SS. Moreover, table 7 and graph 5 give representation of interactional MDMS in NS. Next is the comparative table and graph of interactional MDMs in NS and SS shown by table 8 and in graph 6.

Table.6 Interactional MDMs in Social Sciences (Sociology and Sociolinguistics)

Interactional Metadiscourse Markers	Frequency of MDMs SS	Percentage
	(Words=7085)	
Hedges	64	0.90%
Boosters	51	0.71%
Attitude Markers	18	0.25%
Total (N)	133	1.86%

Graph.4 - Interactional MDMs in Social Sciences (Sociology and Sociolinguistics)

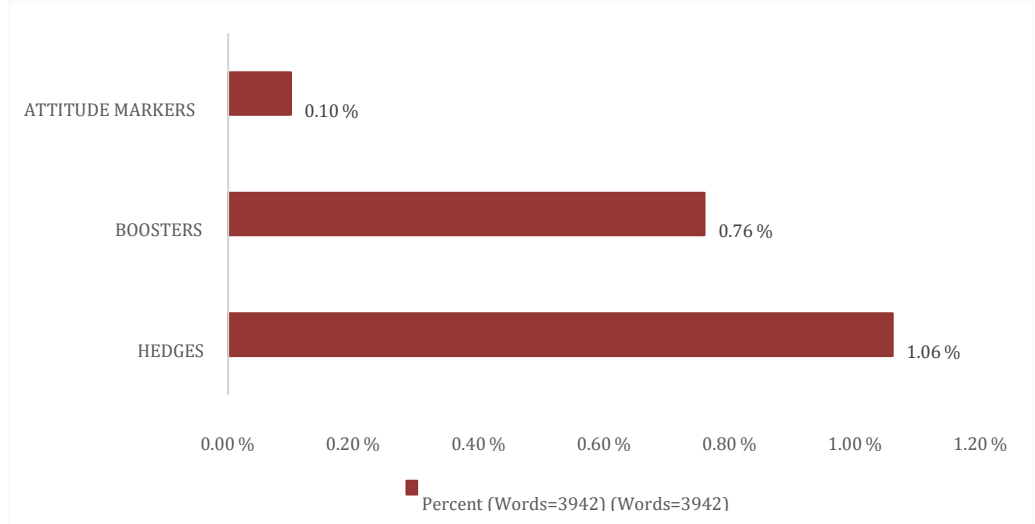


Concerning the frequency and percentage of the selected three Interactive MDMs in SS, Hedges were at the top with the frequency of 64 and 0.90% respectively. Attitude Markers were the least occurring with 0.25% and frequency was 18. The stats of Boosters were in between (0.71%) with a frequency of 51.

Table.7 Interactional MDMs in Natural Sciences (Chemistry and Biology)

Interactional Markers	Metadiscourse Frequency of MDMs in NS	Percentage
(Words=3942)		
Hedges	42	1.06%
Boosters	30	0.76%
Attitude Markers	4	0.10%
Total (N)	76	1.92%

Graph. 5 - Interactional MDMs in Natural Sciences (Chemistry and Biology)



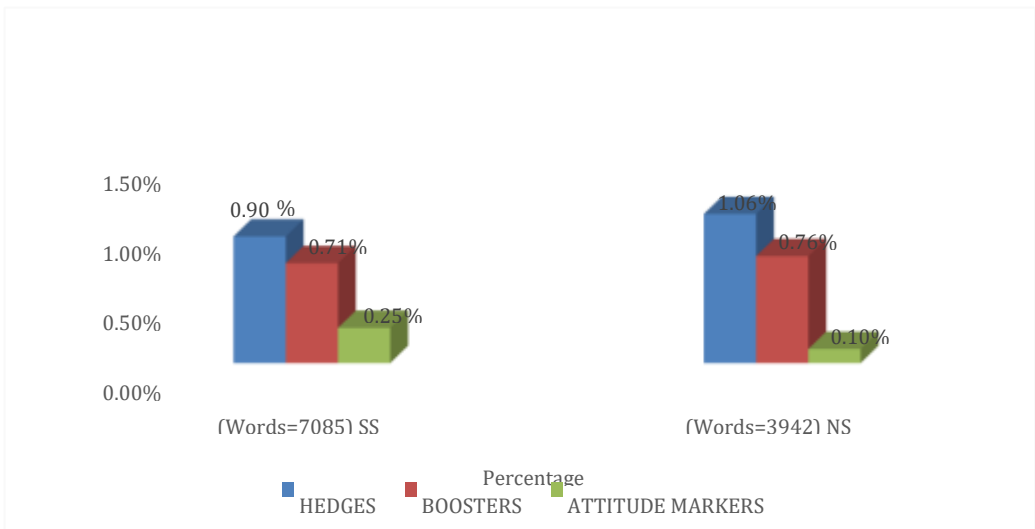
Graph 5 and table 7 represents hedges had the highest percentage of 1.06% with 42 frequency. Boosters were after with 0.76% and 30 frequency. And, attitude Markers were the lowest with a

frequency of only 4 and 0.10%.

Table.8 Comparison of Interactional MDMs between SS and NS

Interactional MMs	Frequency of MDMs In SS (Words=7085)	Percentage	Frequency of MDMs in NS (Words=3942)	Percentage
Hedges	64	0.90%	42	1.06%
Boosters	51	0.71%	30	0.76%
Attitude Markers	18	0.25%	4	0.10%
Total (N)	133	1.86%	76	1.92%

Graph 6 - Comparison of Interactional Metadiscourse markers in Social and Natural Sciences



Graph 6 and Table 8 show that Hedges, Boosters, and Attitude Markers occurred with similar (decreasing) trends in the conclusion sections of interdisciplinary academic RAs, whether social sciences or natural. The only difference were the ratios with which they occurred.

In both categories of disciplines Hedges were highest in percentage and frequency, 0.90% (freq 64) in SS and 1.06% (freq 42) in NS. Attitude Markers were the least occurrence in both with a frequency of 51 (0.71%) in SS and 30 (0.76%) in NS. Boosters were in between the two with a frequency of 18 (0.25%) in SS and 4 (0.10%) in NS.

The differing point was the ratio. The selected three Interactional MDMs occurred more in natural sciences than in social sciences.

5 Discussion and Implications

This section presents the qualitative discussion of the quantitative data presented and analyzed in section 4 using MetaPak software which is built on Hyland's (2005) model. Interactive MDMs are discussed first followed by Interactional ones.

5.1 Interactive Metadiscourse Markers

As mentioned earlier in this category of MDMs three out of five, given by Hyland (2005), were chosen which were Transitions, Endophoric Markers, and Evidentials.

Transitions

Transitions are the interactive markers exploited to deal with text-internal realities through which the writers add, contrast, and conclude, so, these are usually conjunctions and adverbial phrases of addition, comparison, and consequence as proposed by Hyland (2005) (Abbas 2018).

According to Table 5 and Graph 3 out of the three selected interactive MDMs it was the

Transitions which were found to be of the highest percentage in the conclusion sections of the RAs in social and natural sciences. In SS they were covering 3.89% of their total word count while 4.23% of their total count was in NS.

The most prominent of them were and, but, also, further, and because with percentages

70.28%, 8.33%, 6.15%, 2.17%, and 2.17% (of 3.89%) respectively in SS. And, for NS 80.83%, 5.92% for and, and also (of 4.23%) respectively. So, and was significantly dominant of all. And, also, further, are seen for 'addition', and but for contrast. This can be seen through following examples:

1. At the same time, it also requires interpersonal and attitudinal change deeply rooted in the norms of everyday life of Chicago's South and West Sides. (Sociology)
2. These are one-pot syntheses as far as the reactions proceed in the same reactor, but it is more than that (Chemistry)

Implications

The higher usage of transition markers in the conclusions of both SS and NS showed efficient connectivity in academic writings while serving their function of addition, contrast, and consequence. Thereby, making the academic conclusion portion of articles comprehensively compact. This is because conjunctions and adverbials act as efficient text connectors. While conclusion section is supposed to remind the reader of all the important contents and findings of the article comprehensively in a nutshell.

5.2 Endophoric Markers

Writers employ Endophoric markers (EM) to refer to the other parts of that same text. In Table 5 and graph 3 there is meager percentage of EM in the conclusion section of social sciences which was 0.07% (only 5 times occurrence in total word count). While in the case of natural sciences EM were completely non-existent. Section, part, below were found in conclusion sections of social sciences. For instance:

1. In particular, the mixing of honorific and non-honorific expressions discussed in section. (Sociolinguistics)

Implications

Appropriate usage of Endophoric markers in academic writings help the reader to comprehend and absorb smoothly the information being presented. Therefore, the lack of this interactive strategy may indicate, this sort of, loss in connection of the writer with the reader. In our case the meager use of EM in the conclusion sections of academic RAs of SS and their complete absence from those of NS indicate something. And, most seemingly, this has to do with the shorter length of conclusion sections of the research articles on natural sciences. This is also evident from their word count comparable to that of the social sciences. Although, an equal number of articles were collected for this study. i.e. 15 articles for each of the four disciplines. There existed a big gap in the word count of both categories of fields (i.e. 7085 for SS and 3942 for NS) So, in the act of

keeping the conclusion part shorter in length, the writers avoid referring to the already existing information again and again. Also, in the case of social sciences, though their conclusion sections were lengthier than those of natural sciences, the percentage use of EM was extremely less. Writers seem to avoid back and forth referring thereby giving readers a chance of getting stray.

5.3 Evidentials

Evidentials represent factual truthfulness of propositions usually taken from other sources (Hyland, 2005; De Haan, 2005; Nuyts, 2005).

Table 5 & Graph 3 showed the scanty presence of this interactive strategy in SS which was 0.04% (frequency 3 of 7085). In fact, in social sciences evidentials were found only in the data of sociolinguistics. And, in the data of sociology, they were completely non-existent.

In the data of NS, evidentials were also not found (0%).

So overall only three (3) evidentials were found in the conclusion sections of sociolinguistics.

These were according to and cited. This is shown in the given example from data.

1. Dialects are varieties of a language according to the users of a language; registers are varieties of that language according to the uses of that language. (Sociolinguistics)

Implications

The use of these markers is to show the strength in the stance of the author by making him sound authentic with having staunch grip on the prior successful studies of others. This makes his/her own studies more believable to the audience Batool (2019). So, their absence may show weakness because evidentials strengthen the writer's stance by quoting others similar to them. Yet, another fact is also valid they are mostly used in persuasive and debatable discourses. Therefore, in our case, their absence is comprehensible as the shorter length of the conclusion sections of RA of natural sciences does not allow a plethora of references from other studies to validate their point. So, for both of our categories (SS and NS) of four disciplines, we can say that writers might be focused just on their experimental research and reported findings with their pieces of evidence of the entire study which could be subject to further studies or confirmations. This is also in line with the occurrence of Endophoric markers in our data and study.

5.4 Interactional Metadiscourse Markers

As mentioned earlier in this category of MDMs three out of five, given by Hyland (2005), were chosen which were Hedges, Boosters, and Attitude Markers.

Hedges

The truth value of judgment is withheld by the help of use of hedging (Hyland 2005). So, this strategy of hedging helps the writer sound confidently uncertain in any argument thus making it subject to further confirmation.

Hedges to be the highest of the three selected interactional MDMs. 0.90% and 1.06% (relative to their respective word count) in social and natural sciences as shown in table 8 and graph 6. The most frequently occurring of them were may, would, could, might, about with percentages of 34.37%, 6.25%, 4.68%, 4.68%, and 4.68% (of 0.90%) respectively in SS. And, for NS could, may, about, suggest, might, and indicate were frequent in existence with 21.42%, 19.04%, 11.90%, 9.52%, 9.52%, and 7.14% (of 1.06%) respectively.

Modal verbs were used mostly in all four disciplines of social and natural sciences. From data the following examples are taken from Sociology and Sociolinguistics:

1. This may have been due to limitations in individual study designs, small populations, and

regional cultural differences. (Sociology)

2. We are well aware of the fact that a real pedagogic proposal for the teaching-learning of an FL, would only be viable if it. (Sociolinguistics)

Implications

Modal verbs projected meanings of possibility, suggestions, and future prediction, or also their usage showed the writer's intention of presenting his/her stance in a softer realistic tone by adding the needed human element of uncertainty. Thereby, it made their research discourse more reliable which was subject to further undiscovered possibilities.

The reason for NS having more hedges than SS could be due to the experimental nature of studies conducted in them. As their factual nature appreciates infinite undiscovered possibilities so this was then visible in their writing style for presenting their findings through research.

5.5 Boosters

Boosters are linguistic devices that show certainty with confidence in the stance of the writer towards the truth value of the proposition.

Table 8 and graph 6 showed almost similar percentages of boosters in both SS and NS i.e.

0.71% and 0.76% respectively. Should, show(s/ed), clear (-ly) were more in SS with percentages 31.37%, 19.60%, and 9.80% (of 0.70%) respectively. While in NS demonstrate (s/ed), should, found were more with percentages 26.66%, 20%, 20% (of 0.76%) respectively. Boosters are shown by giving examples from data:

1. The secondary intervention should include early detection of PPD by. (Sociology)
2. Benzyl propylene glycoside has demonstrated a potential ability to attenuate NAFFP development. (Biology)

Implications

Boosters were found 2nd highest in percentage after hedges in both categories.

Should reinforce the obligation in the writer's stance of presenting his/her view (after the research being done and findings being gained) in the conclusion sections. This also showed the writer's broadened view of thinking in that particular area, that now after studying several studies and conducting his/her research he/she can put forward strongly what he/she foresees. Found, show (s/ed), demonstrate employed that writer wanted to report his/ her findings and the findings of other researchers.

5.6 Attitude markers

Attitude Markers are the writer's affective attitude embodiment of "surprise, importance agreement, frustration, obligation, and so on" (Hyland, 2005, p. 53).

Attitude markers were used the least in the conclusion sections of the RA of social and natural sciences i.e. 0.25% and 0.10% respectively as shown by (table 8 & graph 6). Important, essential, and preferred came up frequently with 44.44%, 11.11%, and 11.11% percentages (of 0.25%) respectively in SS. While for natural sciences important (-ly) was the only frequent attitude marker with 75% of 0.10%. Examples taken from data (Chemistry and Sociology) are given below:

1. It requires logical changes in the reaction conditions to moderate reactivity, minimize byproducts, circumvent or reverse side reactions, and importantly. (Chemistry)
2. They may do so through a refreshingly humanized depiction of gang members which is essential to evaluating gun violence beyond statistics. (Sociology)

Implications

Important is generally the most commonly occurring attitude marker in the academic discourses of research articles. It emphasizes emotional value judgment on the part of readers by gaining their attention toward that particular statement. (The same was found here).

So, we can say through the aid of attitude markers writers present their subjective feelings and intentions. But since our concern was academic writings which are all built on the foundation of research so here the room for subjective value addition is less than in other argumentative writings.

That is the reason why the frequency of occurrence of attitude markers is quite less compared to hedges and boosters in both social and natural sciences. And, particularly in the conclusion sections of academic RA the goal of writers was to present factually what they found rather than talking about their specific feelings. This makes sense even more in NS because of the objective nature of its study.

The findings of this study confirmed that interactional metadiscourse markers are used more than interactive ones in the conclusion sections of interdisciplinary academic RAs. This goes in line with the study, by Khedri (2012), which found heavier usage of interactional MDMs in the discussion and conclusion sections of RA. Moderate usage of Boosters and comparatively efficient usage of Hedges, with modality, go parallel with the findings of Abbas 2018.

The findings of this study regarding Transitions go along with the findings of (Hyland & Jiang, 2016; Cao & Hu, 2014; Khedri et al., 2013) who found them few of the most significant MDMs in different sections of academic discourses. However, our findings of Transitions go against those of Abbas 2018 where they were found least in RA of soft and natural sciences. Also, for Evidentials our findings go against Abbas 2018 and Mu et al. (2015) who found them frequent in RA.

6 Conclusion

A corpus-based approach was used to analyze the employment of interactional and interactive metadiscourse markers in the conclusion sections of academic RAs in the natural and social sciences. The model of Hyland (2005, p. 98) holds that interactional metadiscourse play a crucial role in imparting new knowledge and "making academic claims". The present study made an attempt to compare the frequency and percentage of MDMs in the conclusion sections of the RAs in the two main fields of natural science and social science. The structure adopted in this study was the taxonomy model of metadiscourse markers suggested by Hyland (2005). Findings of the current study showed that the diversity in the usage of interactional and interactive markers in the research data. It was found that interactional markers were more frequent than interactive markers in both the natural and social sciences. Moreover, the findings showed that the presence of hedges was the highest of the three selected interactional markers in both social and natural sciences, respectively, which means the writers are less confident in their findings. The attitude markers were least used in the conclusion sections of social and natural sciences articles, which implies that writers gave their conclusions on the basis of their experimental findings irrespective of their own feelings and emotions.

6.1 Recommendations for Future Research

This study encompasses only six metadiscourse markers in four selected fields of the natural and social sciences. Furthermore, the researchers addressed only six metadiscourse markets in the current study. Future researchers have the opportunity to redirect their research either towards all the interactive and interactional metadiscourse markers or towards the rest of the four discourse markers, which are not addressed in this research. In addition to that, the researchers may also select other disciplines for research other than biology, chemistry, sociology, and sociolinguistics. To confirm the findings future researches can be done on investigations employing larger sample

sizes from various research articles. Thus, findings of this research will help the students in understanding the application of selected MDMs in the conclusion section academic RAs.

7 References

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