

# COMPARATIVE STUDY OF DISCOURSE MARKERS IN SCIENTIFIC AND NON-SCIENTIFIC ACADEMIC ARTICLES: A FOCUS ON BIOLOGY AND ENGLISH LINGUISTICS

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## ABSTRACT

Discourse markers are significant keywords in academic writing that assist in structuring the thoughts and assist the reader with the convoluted arguments and its integrity. The paper has adopted a quantitative methodology to analyze discourse marker use in two academic genres biology (a scientific genre) and English linguistics (a non-scientific genre). The paper analysed the frequency and functions of different kinds of discourse markers, including causal, contrastive, additive, and exemplification markers, in 10 articles altogether of each of the genres. It was found that biology articles attempt to employ causal and contrastive markers to establish logical connections and present cause-effect relationships, whereas English linguistics articles attempt to employ additive and exemplification markers to develop arguments and provide examples. The findings revealed that discourse markers when used in academic writing are very much influenced by the genre specific structural and argumentative needs. The study adds to the improved knowledge of how discourse markers operate in various academic fields in different ways.

**Keywords:** Discourse markers, Academic, Words, Quantitative analysis, Biology, English linguistics, Genre analysis, Argumentation, Coherence.

## 1.1 Introduction

Discourse markers such as however, therefore, and for example, etc., are very crucial to enhancing the flow of ideas in a text and to assist in their logical organization in academic writing. These signs act as guides, and they control the reader on the arguments, elaborate and create links among various thoughts. They allow organization of the text and make sure that the reader can trace the development of the arguments either by elaboration or contrast or by cause and effect (Halliday and Hasan, 1976).

In the various fields, however, discourse markers are employed differently, as they vary with the argumentative and communications requirements of the various writing styles.

Scientific writing, such as biology, is frequently concerned with the description of empirical information, causality and the logical reasoning. In non-scientific academic writing, such as English linguistics, it is typically necessary to use indicators that will allow the theories to be elaborated, abstract concepts to be made clear, and examples should be used to prove the theoretical statements (Hyland, 2004). Based on these dissimilarities, there is need to explore the functions of discourse markers in various genres which help in the establishment of coherence and organization of the argument.

The paper is aimed at comparing the use of discourse markers in the academic articles of English language and biology. This is primarily

aimed at examining the nature, occurrence and use of discourse markers in the two genres as well as explains their role in coherence, argument and elaboration in an academic writing.

## 1.2 Research Questions

In this paper, the following research questions are addressed.

Q1: What are the discourse markers in Biology and English Linguistics Academic Article?

Q2: What are the roles of discourse markers in creating coherence and argumentation in the biology versus English linguistics academic articles?

## 1.3 Research Objectives

The objectives of the paper are.

1. To find out the kind of discourse markers employed in the articles of biology and English linguistics.
2. To study the role of the discourse markers in the elaboration and development of arguments in English linguistics and organization of logical relations in biology.

## Literature Review

### 2.1 Discourse Markers in Academic Writing

Discourse markers in academic writing refer to academic writing that is used to express meaning and create an association between sentences within a text. Discourse markers play a very important role in academic writing as they are used to inter-relate ideas and arguments in a reasonable manner and as a means of taking the reader through the text. Halliday and Hasan (1976) found out the discourse markers as cohesion devices and needed to make a piece of writing coherent and comprehensible. Discourse markers can be of various types: add (e.g. furthermore, also), contrast (e.g. however, on the other hand), cause and effect (e.g. therefore, because), exemplification (e.g. for example, such as). All the varieties of discourse markers have various functions of organization and structuring of the text in such a way that the reader could better perceive the connection between various ideas.

### 2.2 The purpose of Discourse Markers in Science Texts

Scientific writing particularly in the field of biology will in many cases require the use of

discourse markers that will tend to provide causal relationship and induce logical connection between the research findings. Hyland (2004) says that scientific writers use discourse markers to control the reader in the process of testing the hypothesis, presenting the information and concluding. Causal markers like there, therefore, because, are particularly frequent in the context of the scientific texts because they are applied to justify the associations between variables, as well as to defend the argument organization of the paper. The use of contrastive markers like, however, and on the other hand among others is also common in scientific writing as a means of reflecting contradictory opinions, contradictory results and limitations. These indicators constitute part and parcel of the provision of a balanced image of the research and its identification in the available literature (Hyland, 2004).

### 2.3 Discourse Markers of Non-scientific Writing

Non-scientific academic writing, in contrast, uses additive and exemplification marks more frequently, e.g. English linguistics. These cues are applied in the effort to create theoretical concepts, incorporate evidence and explain abstract concepts. Swales (1990) noted that additive markers like in addition and furthermore are used in writing about linguistics in the process of elaborating previous points and expanding on the points that have been put across. The markers of exemplification, which include the terms: for example and in particular are helpful in presenting a theory as well as making it more approachable to the reader through the means of concrete instances or cases.

Biber et al. (1999) observed that there are a lot of differences in the use of discourse markers in scientific and non-scientific writing. Scientific genres including biology are based on signs of causality and contrast due to the necessity of logical organization and the argumentative presentation of empirical facts unlike non-scientific ones like linguistics, which have a greater variety of discourse markers, with a focus on exposition, elaboration and description of complex concepts.

## 2.4 Previous Literature on Use of Discursive Markers in Academic Writing

A number of researches have been conducted on the use of discourse markers in scholarly writing with particular emphasis on how discourse markers are used in different genres. Biber et al. (1999) conducted a study to compare the use of discourse markers in various types of writing and they discovered that the discourse markers of causal and contrast are mostly used in scientific writing and more discourse markers of additive and exemplification are prevalent in non-scientific writing genres. On the same note, Fahnestock (2005) concentrated on the significance of the contrastive markers in scientific writing with regard to the presentation of the alternative theories and the opposing arguments.

On the contrary, the studies by Swales (1990) and Hyland (2004) concentrated on utilizing the additive and exemplification signs in non-scientific texts including linguistics. These indicators are essential in the creation of theoretical concepts and the underpinning of the complicated arguments so as to elucidate and further elaborate concepts and concepts.

## Research Methodology

### 3.1 Quantitative Research Design

The study employed the quantitative type of research design to examine the application of frequency and types of discourse markers in a biology and English linguistics article of study. Corpus based approach was taken in an attempt to collect and analyse data of a few articles under both genres systematically. The analyzed data is concerned with the frequency of the discourse markers and its distribution among the various categories: causal, contrastive, additive, and exemplification markers.

### 3.2 Data Collection

The sample is 10 articles of each genre - biology and English linguistics that are published within

the last five years in reputable peer-reviewed journals. Journals such as Nature, Cell and Science and English linguistics journals such as Journal of English Linguistics, Applied Linguistics and Language and Literature are used to select the articles in biology and English linguistics respectively. Such articles were determined based on their relevance, length of the articles, and their publication in high impact journals.

The data collection procedure involved the extraction of the discourse markers of the selected articles and further co-classifying them into four broad categories i.e. causal markers, contrastive markers, additive markers and exemplification markers. Each type of discourse marker was then tabulated and analysed with regard to its frequency.

### 3.3 Data Analysis

The data analysis is performed through the application of descriptive statistics of the frequency of each type of discourse marker in the articles on biology and English linguistics. All discourse markers in the chosen articles have been identified and classified according to the purpose (causal, contrastive, additive, exemplification).

1. Frequency Count: The number of each discourse marker type is as a proportion of each 1000 words.

2. Comparative Analysis: A comparative analysis is carried out to examine the difference in the frequency and the distribution of discourse markers in the two genres.

## 4. Results and Data Analysis

The data was analyzed through negotiation of meaning to examine the frequency of discursive markers.

The results of the frequency analysis in both the biology and English linguistics articles of each of the types of discourse marker used are summarized in the table below.

Table 1: Frequency Table of Biology and English Linguistics Articles

| Discourse Marker Type | Biology Articles | English Linguistics Articles |
|-----------------------|------------------|------------------------------|
| Causal                | 35               | 25                           |
| Contrastive           | 30               | 15                           |
| Additive              | 20               | 40                           |
| Exemplification       | 15               | 20                           |

#### 4.1.1 Analysis of Frequency Table

a. **Causal Markers:** Articles in biology have more causal marker 35 times than articles in English linguistics (25 times). This is in line with the requirement of the scientific genre in defining the cause-effect relationships and logical relationships between the findings of the research.

b. **Contrastive Markers:** The contrastive markers are more frequently used in the biology articles (30 occurrences) compared to English linguistics articles (15 occurrences). This is also according to the aspect of scientific genre in emphasizing on opposing theories, findings or alternative viewpoints.

c. **Additive Markers:** Additive Markers: Additive markers are those that are more add on to English linguistics articles (40 instances) than to biology articles (20 instances). This means that the non-scientific genre employs more the extension of arguments and addition of information to clarify the theories.

d. **Markers of Exemplification:** Exemplification Markers are more prevalent in articles in the field of English linguistics (20 instances) than in articles in the field of biology (15 instances). It is translated that in the writing of English linguistics, the abstract theory usually requires an example to explain.

#### 4.2 Thematic Patterns of Discourse Markers Use

With the help of the thematic analysis, it was possible to realize several key trends in usage of discourse markers in both genres:

##### 4.2.1 Biology Articles

a. **Causal Markers:** The cause and effect relations between variables are mostly made with the help of the causal markers such as there, therefore, because, and as a result. These are very crucial markers of relating findings to answers and explanations in the scientific field.

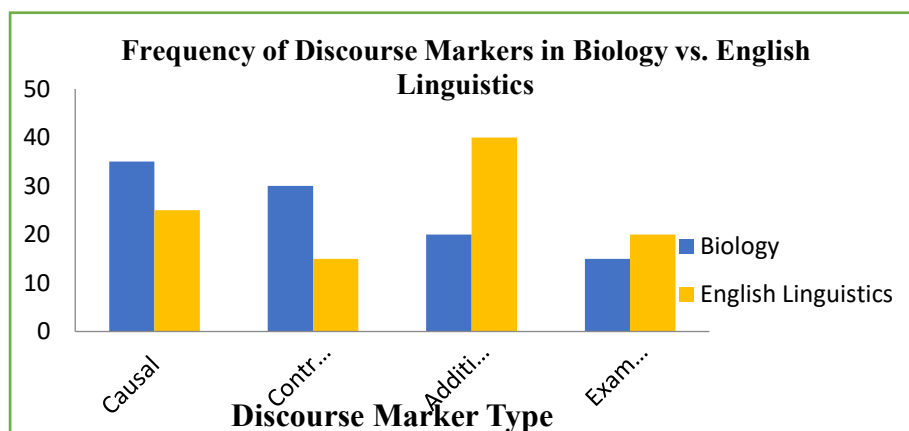
b. **Markers of Contrast:** These markers are applied in order to present alternative points of view, comparing different research results, and the shortcomings of the current research results. These markers include however, on the other hand, etc. These indicators play a critical role in giving a balanced view of the study.

##### 4.2.2 English Linguistics Articles

a. **Additive Markers:** Additive markers such as in addition, furthermore, and moreover are applied in elaborating the arguments, providing the supporting evidence and raising new information to expound the theoretical concepts in a better way. These are indicators in development and growth of thought in theoretical discussions.

b. **Exemplification Markers:** Exemplification markers, e.g. for example or such as are widely used to provide concrete examples in order to explain the abstract theoretical concepts. With the help of these markers, complicated ideas are made simpler to understand and comprehend by the reader.

#### 4.3 Comparative Analysis



The graph that is used to compare the two genres reveals that there is a major difference in the type and functions of the discourse markers used in

the articles in the fields of biology and English linguistics. Such variations are in line with the various writing objectives and study questions.

## Biology

The use of mostly causal and contrastive marks is caused by the nature of the genre of science as it is oriented to building logical relations between the results of the experiments, cause and effect relationships, and other perspectives. The importance of clarity and rationality in presentation of the scientific data presupposes the need to resort quite often to the signs which demonstrate the structure of the arguments and the logical flow of the ideas.

## English Linguistics

English linguistics articles present more additive and exemplification marks so that the authors can add ideas to their theoretical abstracts, elaborate ideas, and to demonstrate abstract theories in the form of concrete examples. This is characteristic of the more discursive style of the genre, the aim of which is not always to define and describe difficult theoretical concepts, but rather to determine strong logical links and causal relationships.

These differences, due to their genres, demonstrate the relevance of the role of the discourse markers to the communicative requirements of the specific disciplines. In scientific texts like biology, one deals with logical arguments and empirical data presentation as opposed to linguistics writing where one deals with elaboration, theorization, and explanation of abstract concepts.

## Findings and Discussion

### 5.1 Key Findings

According to the examination of 10 articles in the field of biology and 10 articles in English linguistics, the following crucial findings were observed.

**i. Causal Markers:** Biology texts heavily rely on the use of causal marker: the scientific requirements to represent the cause-and-effect relationships and logical statements. On the other hand, in the English linguistics articles, the use of causal markers is less often, which is associated with the focus of the genre on theoretical research and the elaboration of arguments rather than on empirical studies.

**ii. Contrastive Markers:** In the biology articles, contrastive markers are more frequently used than in English linguistics articles, indicating

that the genre is concerned with introducing other theories and research findings in addition to the gaps left in the existing literature.

**iii. Additive and Exemplification Markers:** The number of markers of additive and exemplification in the article is greater, and it is explained in the English linguistics articles as the genre is rather about elaboration and development of the information and presentation of the theoretical concepts by examples. These indicators are very significant in making the abstract ideas more concrete and understandable to the readers.

### 5.2 Discussion

It is the results of this research that reveal that there are great variations in the usage of discourse markers in the biology and English linguistics academic articles. Causal and contrastive markers are widely used in the biological articles, which comply with the scientific demand on the cause-and-effect connections and the introduction of various perspectives. Contrastingly, English articles on linguistics are not like this, where there are more additive and exemplification markers to elaborate more on theoretical thoughts and bring the abstract concepts to life.

The findings of this study are consistent with the findings of earlier studies, including those by Biber et al. (1999) and Hyland (2004), which have attributed that scientific writing presents causal and contrastive marks of logical relationships and non-scientific writing, on the other hand, presents additive and exemplification marks of elaborating and explaining arguments. This research also demonstrates that the emphasis of biological writing is in the field of logical construction and the emphasis of linguistics writing in the field of theoretical expansion and clarification.

The results indicate the need to teach the use of genre specific discourse markers when writing academic texts. Students of biology must be trained to use causal and contrastive marks plus those in linguistics to use additive and exemplification marks to develop clarity and expansion of arguments. Further studies might be based on the expanded scope of this study to study other academic fields and spoken language to explore the role of discourse markers in diverse situations. This paper shed light on



the need to consider genre-specific conventions of writing when discussing the application of discourse markers and justifies the relevance of purposeful teaching when it comes to academic writing.

### 5.3 Implications of the research to Academic Genres Writing

The implications of the findings of this research on academic writing, in particular, biology and English linguistics are as follows:

In the case of Biology writing, the writers in the biological sciences are advised to be keen on the usage of causal and contrastive markers in showing the logical argument as well as using cause and effect relationship in their research findings. This is highly required to ensure that the scientific papers are concise and rational. Writers in the English linguistics field must be sensitive to the fact that a broader range of discourse markers are available to them, including additive markers and exemplification markers, and that can be employed to elaborate on theoretical concepts, elaborate on arguments and provide concrete examples to readers in an attempt to explain complex ideas.

### Conclusion

This paper quantitatively compared application of discourse markers in both biology and English linguistics academic articles in which there is a high difference in frequency and use of discourse markers in each field. The articles in biology focus on determining logical relations with the help of causal and contrastive markers as well as the presentation of empirical findings when the articles in English linguistics focus on the elaboration of arguments and explanation of abstract ideas with the assistance of more additive and exemplification markers. These results indicate the genre-related demands of academic writing in any given field, and the significance of comprehending how the discourse markers are used to organize and convey arguments within any given academic text.

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