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**The Difficulties Encountered by Algerian Biology Scientists When  
Hedging in Research Articles: A Corpus-based Study**

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Doctorate in Linguistics and Applied Language Studies.

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## **Dedication**

I dedicate this work to my beloved mother whose prayers, moral support and kind words were of great inspiration during these years. This thesis is my gift to her and to my late father who will always remain in my memory.

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## **Abstract**

This study examines the use of hedging in a corpus of 31 biology research articles published in five national journals, accessed from the Algerian Scientific Journal Platform (ASJP). The data at issue have been analysed from both a quantitative and pragmatic frames. The aim of the quantitative surface analysis is to identify the frequency of hedging types appearing in the target corpus based on the classification of Varttala (2001). How these forms are distributed across the research article sections is also explored. At the pragmatic level, the aim is to highlight the functions of the identified hedges based on Malašková's (2014) classification of hedging functions. Research findings show that Algerian biologists tend to employ different types of hedges with different proportions with lexical verbs as the most numerically used types of hedges, particularly non-factive tentative reporting verbs as 'show, find, and report', verbs which indicate a more positive commitment to the information presented, more frequently than verbs which indicate a more reserved position, such as 'indicate, suggest and seem'. This problem might be attributed to a limited lexical repertoire matched by a lack of appropriate hedging tools. Moreover, the distribution of hedges across the sections of the research article indicates that the results and discussion section is the most hedged and this is mainly due to the textual and research nature and function of this section. Within it, the authors explain their findings and present their claims. Examination of the pragmatic functions performed by hedging indicates that biologists in this research mostly use hedges to express content. The findings of this study can help teachers learn that hedging is an important pragmatic competence. Accordingly, the researcher believes that it should be included in research agendas designed to teach scientific English to non-native authors.

**Keywords:** Hedges, the frequency, functions, research articles

## **List of Abbreviations**

**AntConc:** Anthony Concordancer

**ASPJ:** Algerian Scientific Journal Platform

**CARS:** Create a Research Space

**DOAJ:** Directory Open Access Journals

**ESP:** English for Specific Purposes

**EST:** English for Science and Technology

**FTA:** Face Threatening Act

**IMRAD:** Introduction-Material-Result and Discussion

**OA:** Open Access Journals

**RA:** Research Article

**RGS:** Rhetorical Genre Studies

**SFL:** Systemic Functional Linguistics

**NNSE:** Non-native Speakers of English

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## **General Introduction**

### **1. Rationale of the Study**

The critical role of hedging in academic writing has stirred ample scholarly consideration in numerous studies (Vande Kopple & Crismore, 1990; Hyland, 1994, 1996 a, 1996 b, 1998a, 1998b, 1999; Salager-Meyer, 1994; Varttala, 2001). Hedging piqued the attention in spoken and written discourse, in various disciplines and in different genres. Despite the bulk research on hedging, Hyland (1998 a) claims that little is known about how these forms function.

According to Hyland (1996 a), “hedges are a prevalent feature of research writing in the biological sciences” (p.25). This is highly due to their vital role in the argumentation process. Therefore, research on hedging is significant as the topic tackles how scientists express their arguments and how they can balance their desire to state their claims with precision and, simultaneously, consider the role of the reader in the ratification of knowledge. Hyland (1998a) insists that hedging is among the features which characterise the research article genre by which authors express possibility rather than certainty.

Scientific research articles are regarded as “socially constructed artifacts” (Hyland, 1998 a, p.16). The social nature of research articles dictates on scientists another job more than reporting reality and producing texts, it urges them to persuade the discourse community that their work is compatible with the accepted paradigm. How claims should be expressed is also codified by the imposed conventions. As Blisset (1972) puts it, “ if a scientist is articulate, persuasive, if he goes to the heart of the matter, he is open to attack; as a consequence, everything must be toned down; speculation can obviously be made but it must

be apologized for” (p.141). However, this does not mean toning down the claim itself, but softening the language used to express the claim. Because making claims is risky, hedges help authors modify the strength of the argument without changing its significance. Thus, such reflective insights will deepen our understanding on how scientists write on science and how claims are made.

## **2. Statement of the Problem**

According to Gilbert (1976), publication is the “process whereby a scientist’s research findings are transformed into accredited factual knowledge” (p.281). Absolutely, this is the aim of the scientist doing research after all. However, good scientists are not automatically good writers, let alone if he/she is non-native. Algerian scientists as authors are cases in point. According to Slougui (2009), “Algerian scientists not only have difficulty in writing in English, but they also have difficulty in coping with the conventional style of the English research paper” (p.4).

The ability to hedge appropriately is a problematic issue and a seriously challenging task for both native and non-native writers (Mauranen, 1997). In their research, Hyland and Milton (1997) compared the use of expressions of doubt by Hong Kong and British students in a corpus of one million words. The analysis indicates that L1 students are more tentative when reporting their propositions. On the other hand, L2 students use few hedges and they rather exhibit stronger commitments.

Crompton (2012) analysed hedges in 204 short essays written by undergraduate Arab students who studied at an English university in the United Arab Emirates. The analysis of this corpus was compared with two groups: 189 essays written by English students and 189

newspaper editorials written by native professional writers. Overall, Arab students use fewer epistemic verbs and epistemic adjectives. Crompton (2012) insists on teaching Arab students how to hedge in English. Yagis and Demir (2014) examine hedging in a corpus of 100 research articles on English Language Teaching, written by Turkish and English authors in English. The analysis suggests that native writers use more hedges than their counterparts. In the same vein, Rezanejad et al. (2015) compared the use of hedges in English and Iranian research papers on Applied Linguistics. The results show that native authors use different types of hedges more frequently than non-native authors.

Regardless of the growing body of literature on hedging, it seems that little research has discussed the use of hedges by non-English speaking authors in scientific papers. Moreover, based on the discussion above, studies into the employment of hedging by non-native authors tend to focus on frequency of use. But, is the problem with hedging in their writing a problem of frequency or a problem of appropriateness? Hopefully, the current research is an attempt to fill these gaps in research on hedging.

### **3. Aims of the Study**

Bringing together the quantitative examination of the linguistic realisations of hedges and the pragmatic functions they express is an attempt to offer descriptive and explanatory accounts of the use of hedging by Algerian writers in this work. Such accounts can provide practical data which will be, hopefully, very useful for practitioners, teachers and learners. An effort is made to help better design appropriate teaching materials based on authentic written sources. The aim is to help Algerian authors cope with the conventional features of the research article genre in order to successfully participate in the world of science which is

invaded by the English language. Hedging is a pragmatic competence and non-native writers should be made aware of when and how to mediate their claims.

#### **4. Research Questions and Hypothesis**

This research will attempt to answer the following questions:

- 1) How frequently do Algerian scientists use hedges in biology research articles?
- 2) What are the most used types of hedges in the examined corpus?
- 3) Are hedging forms equally distributed across the rhetorical sections of the research article?
- 4) What is the most hedged section in Algerian research articles?
- 5) What are the pragmatic functions hedges perform in the Algerian corpus?

Given the fact that the amount of hedges writers use in a research paper is, to a large extent, might be dependent on the level of the claim, their position in the wider scientific community and their potential readership, it is hypothesized that research articles authored by NNS and published in local journals for a restricted audience would be featured by a limited and occasional use of hedges.

#### **5. Research Methods**

The present study is based on a quantitative and qualitative analyses of a corpus of research articles in the field of biology. The corpus research articles are extracted from the Algerian Scientific Journal Platform (ASPJ), a website which offers a range of Algerian locally published journals in variant domains. Randomly, 51 articles have been downloaded from 5 journals over the period of 2014 to 2019. Since the targeted journals are not only on

biology, all the papers have been counterchecked by special informants. Also, articles which do not respect the IMRAD format are discarded. Accordingly, a corpus of 31 research articles has been compiled consisting of 69672 token words.

The data are analysed in terms of frequency, distribution of hedges and rhetorical functions. To conduct the quantitative analysis, hedges are classified and grouped into types based on Varttala's (2001) model. The identified forms of hedging are analysed statistically with the help of Anthony Word List Tool software and, then, manually due to the context-bound factor while examining the use of hedging. A decision is also made to distinguish between root and epistemic meanings of modal auxiliaries in the corpus.

The second concern in the corpus analysis is the distribution of hedges through the research article sections (Introduction, Methods, Results and Discussion). This analysis seeks to answer the question of the most hedged section in the Algerian RAs. Once again, the incidence of hedges in each section is counted with the aid of the software and manually to check its validity.

To conduct the pragmatic analysis, the taxonomy of Malášková (2014) is used to examine the functions of hedges. In fact, the taxonomy is based on Hyland's (1998 a) model which considers the content, the reader and the writer as basic elements in the interpretation of hedges, resulting in content-oriented, reader-oriented and writer-oriented hedges. Each function of which is realised by different means of hedging (for example: modal auxiliaries, passive voice, epistemic adjectives, etc.). A principal feature worth emphasising here is the polypragmatic nature of hedges which does not allow for a one-to-one correspondence between form and function. The results of all these analyses are compared with other studies on hedging to check similarities and differences.

## **6. Structure of the Thesis**

This thesis encompasses six chapters. Chapter One is concerned with key concepts and perspectives on discourse analysis. It attempts at defining and discussing the development of discourse analysis as an evolving and vast discipline. The chapter also tackles more particularly written discourse analysis, focusing on the concepts of genre and discourse community.

Chapter Two sheds some light on the concept of hedge and hedging. It outlines the evolvement of hedging from a semantic to a pragmatic entity. Such a portrayal reveals the complex nature of the concept. The chapter also aims at reaching a consensus on defining hedges, which seems to be a problematic matter. The different classifications of the types of hedges, another area of debate, are also presented. In addition, the chapter reviews some research conducted so far on the use of hedging in different disciplines, languages, by native and non-native users and across variant genres.

Chapter Three tackles hedging in scientific research articles. The chapter seeks to provide a context for the use of this phenomenon in the RA genre. How the RA is constructed to meet the expectations of the discourse community is reported. The chapter also examines the functions of hedging particularly in the research article.

Chapter Four describes in some details the research design and methodology devised for this research. The theoretical frameworks for the quantitative and pragmatic levels of analysis, the corpus and the procedures are presented and discussed in this chapter.

Chapter Five is concerned with the results of the analysis of the corpus. The chapter deals with the quantitative analysis of the types of hedges, their distribution across the research article sections as well as the statistical outcomes of the pragmatic analysis.

Chapter Six presents the interpretation of the results obtained in chapter five. An attempt is made to answer the raised questions. The chapter compares Algerian biologists' use of hedges with previous research.

## Chapter One

### Discourse Analysis: Key Concepts and Perspectives

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# **Chapter One**

## **Discourse Analysis: Key Concepts and Perspectives**

### **Introduction**

The chapter highlights the key concepts and perspectives in discourse analysis. Essentially, this first chapter attempts to situate the study in its theoretical framework by providing the reader with necessary explanations pertaining to a discussion of the preliminary concepts, encompassing discourse analysis, genre, and written academic discourse. It starts with portraying sketches of the evolvement of discourse analysis throughout the last decades. The chapter sheds some light on academic discourse with a focus on genre which shapes the textual features and structure of written academic discourse. The latter is the concern of our study namely the research article genre. Therefore, the chapter highlights central concepts related to the concept of genre mainly the discourse community, the communicative purpose and the approaches or traditions towards genre analysis.

### **1.1. Historical Background and Development of Discourse Analysis**

Discourse analysis has grown as an important discipline due to its vastness and distinctiveness. The origin of the word “discourse” is derived from the Medieval Latin word ‘discurrere’, which means a “conversation” (McArthur, 1996). The sketch of the development of discourse analysis is mostly based on Van Dijk (1985) portrayal.

### 1.1.1. Early Beginnings of Discourse Analysis

The very beginning of discourse analysis dated back to the study of language, public speech, and literature. Particularly, it can be traced back to the study of classic rhetoric more than 2000 years. In contrast with the focus of ‘grammatica’ (the historical name of linguistics) which sought to analyse the use and rules of language structures to achieve correctness, rhetoric was concerned with the performance of speech in political and legal settings in terms of planning, organisation and specific operations to achieve persuasive effectiveness (Van Dijk, 1985). In this regard, classic rhetoric combined both modern stylistics and structural approaches of discourse and perceived cognitive and social psychological notions in communicative settings. However, in the middle ages and the seventeenth and eighteenth centuries classic rhetoric “lost much of its importance in the curricula of schools and in academic research” (Van Dijk, 1985, p. 1).

With the decline of classic rhetoric, contemporary achievements and improvements occurred in various fields of humanities and social sciences which paved the way for the emergence of discourse analysis. The young revolution in Russia as an interdisciplinary improvement, under the name of “Russian formalist”, brought new concepts and ideas in anthropology, poetics and linguistics. For example, Primitive but major structural analysis of discourse (morphology, phonology) appeared in one of the most influential books: the *Morphology of the Folktale* by Propp (1928). Further and important works have been inspired by this book and other eminent publications of Russian formalists.

The term discourse analysis was used by the modern linguist Harris in his publication *Discourse Analysis* in 1952. His interest was the distribution of long stretches with a focus on sentential connections and the link between the text and its social situation (Cook, 1989).

According to him (1952), discourse is viewed as “a method for the analysis of connected speech (or writing)” (p.1). Harris treated discourse as connected speech or long stretches of written texts and he was concerned with the examination of “continuing descriptive linguistics beyond the limits of a single sentence at time” and a study of “correlating culture and language” (Harris, 1952, p.2). The analysis of Harris was a starting point that would in the long run prompt the development of discourse analysis in several fields of endeavour. Successively, discourse analysis has been established as a branch of applied linguistics and not a separate discipline.

### **1.1.2. Modern Discourse Analysis: A New Discipline**

The early 1970s, after Harris’ contribution to the field of discourse analysis, witnessed the treatment of discourse as an independent approach within and cross numerous disciplines (Van Dijk, 1985). Van Dijk (1985) explains that this development is the outcome of theoretical, practical and methodological revolutions by paradigm shifts in and within the study of language. Chomsky’s Generative Grammar was, for instance, a paradigm shift in all disciplines. Halliday (1961) improved a Functional-systemic approach to written discourse, highlighting the thematic organisation and the relation between sentences in discourse as well.

In the late 1960’s, criticising and refuting the formal traditional grammar led to the emergence and shaping of sociolinguistics. The latter claimed that the theoretical distinction between competence and performance is problematic and it also refused the ‘ideal speakers’ and ‘homogeneous speech community’ notions and rather called for an emphasis on language variation in social settings. Language variation does not only correspond to variation in phonology, morphology, syntax and stylistic aspects, but also variation in the discourse itself.

Labov (1972), for example, investigated Black English forms of verbal dueling among adolescents (Van Dijk, 1985).

A second development in the early 1970's was pragmatics with the philosophical research of Austin (1962), Grice (1969), and Searle's (1975) speech acts, studies which highly appreciate the relationship between language and action. While sociolinguistics emphasises language variation in sociocultural contexts, pragmatics highlights utterances as forms of social actions. In essence, sentences when used in specific settings perform acts or functions (illocutionary acts) which can be allocated within the speaker's intentions, beliefs, evaluations, or relations between the speaker and the hearer. Van dijk (1985) prompts that "this new dimension added a pragmatic orientation to the usual theoretical components of language" (p.5). This new orientation was present in publications in 1972-1974, yet the actual integration of speech act theory and discourse was apparent later on.

Another stage of the development of discourse analysis is within the framework of grammar, where the investigation of context-free and isolated sentences was questionable. The idea against formal structural and de-contextualized analysis resulted in development in Text Grammar (TG) in German and other European countries (Van Dijk, 1985). The focus has shifted from clause-level unit to semantic macrostructures and rhetorical structures within an integrated perspective. As an example, the study of pronouns and other cohesion markers, of semantic coherence, presupposition, topic and comment and linguistic macrostructures capture the intention of this orientation. This can be found in the works of Dijk (1972), Halliday and Hasan, (1976) and De Beaugrande (1980) which are considered as basic references (McCarthy, 1991).

The early 1980's characterised with intrinsic evolutions in the field of sociology with an attention to everyday social interactions and the interpretation at the micro-level of social society (Van Dijk, 1985). The focus did not only address conversations and dialogues, "but also institutional settings received extensive interest, such as in the discourse analysis approach to classroom talk by Sinclair and Coulthard (1975) in England" (Van Dijk, 1985, p.7). Coulthard (1994) explains that this interest towards oral settings or spoken discourse is justified by the lack of methodology for written discourse analysis. However, he attempted to collect articles of published research to analyse the structure and nature of written discourse. Thus, attention has been shifted to the investigation and analyses of discourse organisation and larger stretches of language.

Written discourse analysis research has been strengthened by the emergence of Genre theory. Paltridge (1997) traces the use of genre as a classificatory term back to the poetics, in which Aristotle grouped literary works into generic types, such as poetry and drama. Also the work of Malinowski (1960), an anthropologist, inspired researchers of the importance of genre analysis. Malinowski states that the understanding and analysis of folktale, as a specific genre, incorporates the composite of texts within the meanings they associate for the particular discourse community to whom it is addressed. Intrinsically, he brings two terms, these are: "contexts of situation" and "context of culture." The first context refers to the physical setting in which discourse is produced and the latter is concerned with a wider scope of sociocultural factors and aspects that affect the production and organisation of discourse (Eggins, 1994). Some researchers questioned how Malinowski could make a cut-line between the two kinds of context. However, the two terms became fundamental to discourse analysis particularly in Australian Systemic Functional approach to genre theory.

Genre theory shares responsibility for prompting interest in discourse. Swales (2001) puts it clearly that “...a focus on genre redrew the map of academic discourse by replacing rhetorical modes such as scientific language with text-types such as research article, term paper, final examination, MA thesis and conference abstracts...” (p.47). Genre<sup>1</sup> analysis of academic discourse, specifically research articles and abstracts, based on Swales’ work has been a basic reference for other outstanding contributions for the development of discourse analysis.

Another development in discourse analysis is the emergence of corpus linguistics<sup>2</sup> as a new intellectual project. Corpus linguistics is a branch of applied linguistics which investigates language through corpora (single is corpus). These latter are authentic and empirical data, an assembly or a collection of naturally occurring texts (Johansson, 1995). To quote Leech’s words (1992), “the term corpus linguistics is a synonym of computer corpus linguistics” (p.106). Thanks to this computer processing, analyses of larger quantities of data could be possible with minimum time and effort as well.

To conclude this portrayal of the development of discourse analysis, one can strongly confirm the endeavour of discourse analysis, which really makes it an endless topic of discussion. This idea is confirmed by Stubbs (1983) who claims that “no one is in a position to write a comprehensive account of discourse analysis. The subject is at once too vast (...) anything at all that is written on discourse analysis is partial” (p.12). Schiffrin (1987) agrees with the vastness of discourse analysis and its ambiguity at the same time. It is an evolving

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<sup>1</sup>For a more detailed discussion on genre, see chapter three, section 3.3.

<sup>2</sup>For a more detailed discussion on Corpus Linguistics, see Chapter Four, section 4.2.

and growing endeavor. Contemporary research in discourse glides from numerous academic disciplines that cross the linguistic border into different fields and domains (Schiffrin et al., 2001). For Van Dijk (1985), discourse analysis is basically multidisciplinary which entails linguistics, poetics, semiotics, sociology, anthropology, history, and communication. The overlapping of discourse analysis with several fields and areas of interests makes it “a pursuit in danger of evaporating into others (Cook, 1989, p.13). Johnstone (2002) considers discourse analysis “as a research method that can be (and is being) used by scholars with a variety of academic and non-academic affiliations, coming from a variety of disciplines, to answer a variety of questions” (p. xi).

## **1.2. Defining Discourse Analysis**

According to Longman Dictionary of Contemporary English (2001), discourse is “a series of speech or piece of writing on a particular subject” (p.338). This definition incorporates both the spoken and written modes of discourse. This was not the case before as the word “discourse” was firstly confused with the French word *discours*, equals to speech, which is not compatible with its counterpart in English in its more current use (Mills, 1997). This confusion rests for a period of time and affects both the reader and writer’s interpretation of literature on discourse. Added to this, the difficulty in defining discourse is the use of the same word in various contexts. Commenting on the complexity in defining discourse, Van Dijk (1997) mentions that his entire 700 pages of two-volume set on discourse could be an answer to “what is discourse analysis”? Stubbs (1983) speaks about the ambiguity of discourse analysis and provides a broad definition saying that

The term discourse analysis is very ambiguous. I will use it in this book to refer mainly to the linguistic analysis of naturally occurring connected speech or written discourse. Roughly speaking, it refers to attempts to study the organization of language above the sentence

or above the clause, and therefore to study larger linguistic units, such as conversational exchange or written texts. It follows that discourse analysis is also concerned with language use in social contexts, and in particular with interaction or dialogue between speakers (p.1).

Shiffrin (1994) claims for two fundamental theories which are basic explorations to discourse analysis: structural and functional approaches to language in general and discourse in particular.

### **1.2.1. Structural and Functional Theories**

The focus of structural (formal) analysis is to describe formal properties and regularities of what utterances show in terms of phonology and syntax. To this end, an assembly of actual spoken utterances which are supposed to represent the speech community are collected and analysed. The speech community is the focus of the analysis and formal analysts attempt to organise the “primary data in as economical a way as possible” (Atkinson et al., 1989, p. 32), with the help of some established criteria and rules in order to investigate the nature of discourse in terms of structure. The structural approach of the study of discourse highly stresses describing the formal nature of discourse by drawing “attention to systematic organisational properties of texts and providing ways of describing them” (Fairclough, 1992, p.15).

The functionalist approach, on the other hand, considers mainly discourse as “language in use”, where language is “a complex cognitive and social phenomenon” (Brown & Yule, 1983, p.1). This trend begins from Firth’s (1964) view that “all linguistics [is] the study of meaning and all meaning [is] function in a context” (p. 8). Hymes (1971), Labov (1972), Halliday (1978) and Bernstein (1970) are among linguists who follow this Firthian view and highlight the function of discourse as a

basis and focus of the analysis of discourse. For example, Halliday (1978) in his book *An Introduction to Functional Grammar* introduces a contemporary orientation of grammatical phenomena where he correlates structure, function, and meaning all together. As such, language cannot be limited to the description of linguistic forms out of the purpose and function which are meant for by users of the language. In this regard, Van Dijk (1997), claims that when language users “actively engage in text and talk”, they both display and construct their roles and identities” (p.3). Thus, the functionalist or social approach emphasises the social dimension of language as “a form of social practice” (Fairclough & Wodak, 1997, p. 258).

According to Shiffrin (1994), these two theories are not varied to the point that makes them different as they seemingly appear and she rather talks about the inseparability of both approaches. She explains that there is a functional flavour in the most structural approaches and a structural presence in the most functional trends. Consequently, she establishes a more balanced position, a kind of a compromise of both structural and functional views of discourse. According to her,

This view captures the idea that discourse is above (larger than) other units of language; however, by saying that utterance (rather than sentence) is a unit of which discourse is comprised, we can suggest that discourse arises not as a collection of decontextualized units of language structure but of inherently contextualized units of language use (p. 39).

In other words, Shiffrin sees discourse as linguistic productions, whether written or spoken which are contextualised. Thus, when analysts investigate discourse they should pay equal attention to extra-linguistic factors as social, political, and cultural aspects which affect the discourse along with the linguistic and formal structures. To this end, Shiffrin argues that the aim for discourse analysis is not merely linguistic and syntactic, but also pragmatic.

Schiffrin (1994) (as cited in Widdowson, 1996) strongly confirms that the multi-disciplinary nature of discourse dictates on the analyst to go beyond the sentence and comprehend the surrounding context which is an inevitable aspect and cannot be detached.

It is difficult to separate language from the rest of the world. It is this ultimate inability to separate language from how it is used in the world in which we live that provides the most basic reason for the interdisciplinary basis of discourse analysis. To understand the language of discourse, then, we need to understand the world in which it resides; and to understand the world in which language resides, we need to go outside of linguistics (p.110).

Malmkjaer (2010) shares the same vision as Schiffrin and defines discourse analysis as “naturally occurring language use” and meaningful language use in context” (p.133). Accordingly, discourse analysis is concerned with establishing a relationship between language and the context in which it is arisen. According to Shiffrin (1994), all the approaches of discourse analysis consider text and context as the two elements which provide information and data of the linguistic and communicative content of an utterance.

### **1.2.2. Text and Context in Discourse**

The terms discourse and text are used by researchers with different connotations within different areas of interest. Some researchers use one term whether discourse or text to mean the same thing, while others make a distinction between discourse and text. According to Rocci (2009), the two terms can be used interchangeably (p.15). He explains that discourse is a composite of texts which represent language. Stubbs (1996), De Beaugrande and Dressler (1981) and Salkie (1995) also use both terms interchangeably on the basis that discourse is manifested in texts. On the other hand, Coulthard (1985) and Crystal (1987) are among linguists who differentiate between the two terms. These linguists associate the term discourse with “speech” and “text” with the written use of language.

Context is the social aspect of language use in general or the specific setting of a given text or speech which includes both the linguistic and non-linguistic factors (Van Dijk, 2009). It is one of the aspects of Chomsky Generative Grammar and then extends in scope with the publication of Harris in (1952) and Hymes' (1964) research in sociolinguistics. Hymes divides context into scene and situation. The setting allocates "the time and the place of speech act and to the physical circumstances." The scene "designates the "psychological" setting or the cultural definition of an occasion" (Hymes, 1974, p. 55). Afterwards, many researchers have shown interest to investigate context and its components. Differently, Halliday and Hasan<sup>3</sup> (1989) provide another categorization of context; they classify it into field, tenor and mode. Field is about the nature of the social interaction including the subject matter being discussed. Tone stands for the social relation between the participants. Mode is concerned about the rhetorical function of discourse in the studies context. On his part, Nunan (1993) points that there are two types of context: the linguistic and non-linguistic context. While the linguistic context denotes the linguistic materials being used as the choice of vocabulary and grammatical structures, the non-linguistic context encompasses the communicative content as a whole like the topic, the purpose, the participants, and the background knowledge behind (p.3). Widdowson (2007) stresses the importance of context for text comprehension. He further divides context into linguistic context or co-text and context of situation. The co-text is the internal relation that bounds the linguistic components all together. Situational context or context of situation refers to the external circumstances of time and place under which communication occurs.

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<sup>3</sup>However, Halliday and Hasan do not elaborate on social and cultural context.

On the whole, one can notice that the term context is generally divided into a linguistic component and a non-or extra-linguistic element. The linguistic or the co-text is concerned with the linguistic materials (words and sentences) that surround the text and have an impact on its meaning. To quote Carter (1993) words:

The internal environment of the text is also an established context, although not such as an obvious one. All textual features whether at word, clause, or between-sentence level are part of an environment: any word relates to those words which surround it both in the immediate vicinity and in other parts of the text. Even whole texts are governed by their textual environment (p.14).

The non-linguistic component of context is a composite of extra factors that affect the production and interpretation of language by its users. According to Schiffrin (1994), context refers basically to the extra-factors which include social, cultural, and personal identities, knowledge, beliefs, goals and wants of people in socially and culturally defined situations. This is because “when we speak or write, we seldom do so by accident; rather we have a social purpose in mind” (Van Dijk, 1997, p. 8). All these elements and the whole process of discourse analysis taking into account the contextual information constitute the fact that data come from people who use the language in its actual and natural situation, not just about how people use language according to theories of linguists (Schiffrin, 1987). In other words, context helps discourse analysts “to see language as a dynamic, social, interactive phenomenon-whether between speaker and listener, or writer and reader” (Crystal, 1987, p.116). Therefore, discourse analysis involves the investigation of text and context (Shiffirin, 1994). Likewise, Candlin (1997) states that “discourse ... refers to language in use, as a process which is socially situated” (p. ix). Hence, discourse analysis is the study of language in use. It can be defined as a “method for analyzing the ways that specific features of language contribute to the interpretation of texts in their various contexts” (Barton & Stygall, 2004, p. 57).

### 1.3. Types of Discourse

Johnstone (2002) suggests that the discipline is named discourse analysis and not for instance “discourseology” because it “typically focuses on the analytical process in a relatively explicit way” (p.3). The procedure of analysis could be either by dividing the discourse under discussion into parts or units of various kinds and it could also need treating the phenomenon in different ways like, for example, preparing given tests. These possible analytical processes and others depend on the problematic issues raised by the researcher and the type of the discourse as well. Cook (1989) states that there are two major types of discourse: spoken and written discourse. Speech and writing modes or forms are highly significant manifestations of the language system, each of which has its own peculiarities and exhibits different linguistic features. Leech et al. (1982) state that “written and spoken language have different functions, different forms and different linguistic characteristics” (p.134).

The spoken form has generally a spontaneous nature which is lacking in the written mode where the writer has to carefully choose his words and think more than once before producing a single word. Speech enables the user of the language to adjust his utterances with the help of intonation and paralinguistic features. Cook (1989) puts it clearly that

Spoken language, as has often been pointed out, happens in time, and must therefore be produced and processed on line. There is no going back and changing or restructuring our words as there is in writing; there is often no time to pause and think, and while we are talking or listening, we cannot stand back and view the discourse in spatial or diagrammatic terms (p.115).

Thus, the speaker could guarantee successful communication and hopefully mutual understanding. The writer also has the opportunity to modify his words and he can use

dictionaries and other sources to ensure his intended message. Yet, the writer cannot clarify the message to the reader afterwards and he can feel sometimes doubtful about the reader's response to his message. Similarly, Shiffrin (1994) explains that "spoken discourse is more fragmented and written discourse is more integrated" (p.189). Fragmentation stands for the rapid move from one idea to another in the spoken discourse compared to writing. Integration in writing means the complexity and length of the structure in the written discourse where the writer has the required time to write longer and more complex stretches. Leech et al. (1982) speak about the differences between the spoken and written discourse and they provide general characteristics of the two types of discourse in the following table:

| <b>Typical Speech</b>             | <b>Typical Writing</b>        |
|-----------------------------------|-------------------------------|
| Inexplicitness                    | Explicitness                  |
| Lack of clear sentence boundaries | Clear sentence boundaries     |
| Simple structure                  | More complex structure        |
| Repetitiveness                    | Non-repetitiveness            |
| Normal non-fluency                | Fluency                       |
| Monitoring features               | No monitoring features        |
| Interaction features              | No interaction features       |
| Features reflecting informality   | Features reflecting formality |

**Table1. Differences between Speech and Writing (Leech et al., 1982, p.139)**

Nunan (1993) stresses the fact that the differences between the spoken and the written discourse are principally associated with the concept of "genre" which shapes the structure and function of the whole discourse whether spoken or written. Brown and Yule (1983) have another view and they assume that "a natural language utterance would be used to fulfill only one function, to the total exclusion of the other. That function which language serves in the expression of 'content' we will describe as transactional, and that function involves in

expressing social relations and personal attitudes we will describe as interactional” (p.1). According to them, the differences between the spoken and written discourse are highly related to the function of the discourse. While the spoken discourse has an interactional function as it is basically set to create social relationships, written discourse has a transactional function as it is designed to transmit knowledge and information. Despite the seeming differences between them, “speech and writing are both forms of communication that use the medium of language, but they do so quite differently” (Knapp & Watkins, 2005, p. 15).

Research into the spoken discourse and written discourse has both grown within the field of linguistics in the past few decades. At the beginning, the spoken communication mode was not studied because most specialists thought that “ordinary talk could not be the object of study for linguistics since it is too disordered; it is an essentially degenerate realization of linguistics competence” (Hutchby & Wooffitt, 1998, p. 22). With the development of technology, researchers could record conversations and consequently have the chance to analyse the discourse. Interestingly, Schegloff and Sacks (1973) claim that, in opposition to the Chomskyan view, oral talks and interactions are not disorganised but they are rather order productions in a systematic manner. As a result, the spoken discourse has been analyzed from different angles be it sociological, philosophical, and linguistic. Such analyses within these perspectives attempt to uncover the nature of face-to face interaction. Within the sociolinguistic perspective, the works of Hymes, Gumperz, and Labov are important contributions to the study of spoken discourse. From the ethnography angle, contemporary orientations of analysis of the spoken discourse appeared in the 1970’s under the Conversation Analysis (CA) approach, like Sacks, Schegloff, and Gefferson (1974) investigations. The research into the spoken discourse has been widened by

perspectives of analysing both the structure and function of authentic discourse within linguistics, namely Genre Analysis (GA) and Systemic Functional Linguistics (SFL).

According to Ferris (2003), written discourse analysis is an approach in applied linguistics and is differentiated from the spoken discourse or conversational analysis. Written discourse analysis is defined as “systemic analyses of the linguistic features and patterns occurring in written texts” (Kaplan & Grabe, 2002, p. 192). These systemic analyses involve the examination of “various levels of language...which interact with a text [including]...intrasentential structure and the discourse structure (Connor & Kaplan, 1987, p.2). Hence, written discourse analysis investigates the linguistic patterns and discourse regularities of language in written areas. It is concerned with discourse organisation, writing conventions and rhetorical devices used in a particular genre. Written discourse offers theoretical frameworks that can help us understand “how different texts are organized and how the process of creating written text is realized at various levels” (McCarthy, 1991, p. 147). Ferris (2003) states that analyses of the written discourse are often used as a research method to study L2 writing. The purpose of these studies could be a) to characterise the nature of L2 writing, b) to compare L1 with L2 writers, c) to identify features of different levels of writers, and d) to assess the effectiveness of various types of instructional interventions. Bahtia (2004) mentions that the analysis of written discourse has witnessed stages, evolving from textualisation to contextualisation as it is apparent in the following table:

| Stages                   | Analysis                                                                                   | Findings                                                                                                                              | Example                                                                       |
|--------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| <b>Textualisation</b>    | Statistical analysis of lexico-grammar                                                     | Passive in EST, nominalisation in legal English, Noun-verb combination in legal text                                                  | Halliday et al (1964), Barber (1962), Crystal and Davy (1969), Spence (1975)  |
|                          | Textualisation of distinctive lexicon grammatical resources                                | Tenses in scientific rhetoric, EN-participate, in chemistry texts, tenses, in reporting past literature, nominals in academic writing | Swales (1974)<br><br>Oster (1981)                                             |
|                          | Text and discourse                                                                         | Relationship between semantic and pragmatic of text, coherent in text interpretation, intertextuality                                 | Van Dijk (1977), De Beaugrande and Dressler (1981)                            |
| <b>Organization</b>      | Textual patterns leading to text types                                                     | Rhetorical structure, rhetorical grammar structures in scientific texts                                                               | Widdowson (1973), Selinker et al. (1973), Tador (1985), Candlin et al. (1980) |
|                          | General global pattern of discourse organization                                           | Rhetorical patterns: problem-solution, schematic structure, macro-structure                                                           | Coulthard (1977), Hoey (1983), Van Dijk (1988)                                |
|                          | Cognitive structure and rational in genres                                                 | Move structure                                                                                                                        | Swales(1981), Bahtia (1982), (1983), Hasan(1985)                              |
| <b>Contextualisation</b> | Cognitive structures and rational in genre                                                 | Genre mixing and change                                                                                                               | Berkonkotter and Hukin (1995), Bazerman (1994)                                |
|                          | Multi dimensional and multi perspective analysis of professional and institutional genre   | Genre across disciplines                                                                                                              | Swales(1998), Bhatia 1990, 2000                                               |
|                          | Language as critical discourse, language as social control, language as social interaction | Language ideology, language as mediated discourse                                                                                     | Faith (1992,1993), Slembrouck (1994), Scollon (1998)                          |

**Table 2. Historical Development of Written Discourse Analysis (Bhatia, 2004, p.12)**

The table reveals the growing research into written discourse analysis within different perspectives and multi-disciplinary orientations across different disciplines. Our study falls

within textualisation as it aims at a discourse analysis of hedges, a rhetorical device, in research articles. Also, it is contextualised as it deals with the scientific research article as a specific genre. Before discussing the concept of “genre” in academic discourse, we will first shed light on academic discourse to highlight some important notions.

#### **1.4. Academic Discourse**

Research into academic discourse has tremendously evolved since the mid-1960s with the study of linguistic properties of scientific English. Since then, studies on academic discourse transcend to include student, instructional discourses and research articles and also consider rhetorical purposes and syntactic forms (Hyland, 2009). According to Hyland (2009), this interest in academic discourse research is mainly related to “the growing diversity of the students who are entering universities as a result of widening access policies, the increased attention given to teaching and learning by funding bodies, and the emergence of English as the international language of scholarship” (pp.3-4). The earliest research on academic discourse seeks to quantitatively analyse the formal linguistic features of broad registers (Barber, 1962; Halliday, McIntosh & Stevens, 1964). Much of the research on academic discourse emphasizes the analysis of linguistic features in various registers and genres, but mainly in written academic registers (Biber, 2006). According to Flowerdew (2002), the aim of such analyses is pedagogical in order to teach students the linguistic characteristics of discourses to enable them understand and distinguish the rhetorical features of academic genres. Then, the research into academic discourse turns to be “narrower and deeper” (Swales, 1990, p. 3). Narrower as it starts to tackle specific genres and deeper as it begins to account for the communicative purposes and not solely formal characteristics. Increasingly, the bulk of research on academic discourse has spawned to highlight various

genres within different disciplines and address thoroughly the communicative purposes of written texts. Thus, the area of academic discourse becomes a developing and fertile space of interest which attracts linguists and scholars in different fields.

Hyland (2009) defines academic discourse as how to think and use language in the world of academia. Language is the central focus of academic discourse. Hyland (2009) classifies academic discourse into four categories. The first type is “research discourse”, the discourse used between researchers which aims at conveying knowledge and information. The second category is “instructional discourse” which is the academic discourse used in universities for teaching purposes. The third category is “student discourse”, the discourse used by students themselves. The last category is “popular discourse”, as for example science journalism which aims at conveying information to a wider community. More specifically, in defining academic discourse, and in particular written academic discourse, Hyland has adopted the social constructionist view based on Merton’s (1968) framework. The social constructionist view “understands reality, knowledge, thoughts, facts, texts, selves, and so on as community generated and community maintained linguistic entities – or more broadly speaking, symbolic entities- that define or “constitute” the communities that generate them” (Brufee, 1986, p. 774). In other words, the whole body of knowledge are produced and defined by a community which dictates these practices. These latter distinguish written academic discourse from other types of discourse, Hyland claims (2002). Hyland (2002) adds that “by focusing on the distinctive rhetorical practices of different communities, we can more clearly see how language is used and how the social, cultural, and epistemological characteristics of different disciplines are made real” (p. 121). Therefore, written academic discourse can be understood as a written production of language by the members of a given discourse community which shares discursive rhetorical practices. Talking about discursive practices

and discourse community leads us to discuss “Genre theory” and the related concept of “register”. Flowerdew (2002) argues that Genre Analysis strengthens the deep and narrow research on academic discourse to the point that reaches its maturity. In the same vein, Swales (2001) claims that “a focus on genre redrew the map of academic discourse by replacing theoretical modes such as exposition, or registral level such as scientific language with text-types such as research article, term paper, final examination, MA thesis and conference abstracts” (p.147).

### **1.4.1. Genre as a Concept**

According to Chandler (1997), “the word genre comes from French (and originally Latin word) which means “kind” or “class” (p.1). Genre as a concept has been defined from different theoretical orientations and approaches. It is a “fuzzy concept, somewhat loose terms of art” (Swales, 1981, p.33). From the New Rhetoric perspective, a genre is “neither a text type nor a situation, but rather a functional relationship between a type of text and a type of situation” (Coe, 2002, p. 197). Paltridge (2006) considers genre a way in which people ‘get things done’ via their use of language in specific settings. Allison (1999) explains that the word genre refers to various kinds of literary and artistic works; yet, its use has been extended by linguists to cover “classes of language and communication in all areas of life” (p.144). Hyland (2003) defines genre as a social entity encompasses grouping texts together; these texts represent the way writers use language in specific recurring contexts. Afful (2005) asserts that the term has been widely used especially, in the field of linguistics, due to the works of linguists such as Swales (1990), Miller (1994) and Bhatia (2004). In his seminal work on genre analysis, Swales (1990) states that

A genre comprises a set of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the genre and influences and constraints choice of content and style. Communicative purpose is both a privileged criterion and one that operates to keep the scope of genre as here conceived narrowly focused on comparable rhetorical action. In addition to purpose, exemplars of genre exhibit various patterns of similarity in terms of structure, style, content and intended audience (p.58).

Swales' definition is described as the much-cited definition and the most influential as well. According to him, a genre is a composite of communicative events. Two significant factors in the identification of a genre which are the discourse community shared "genre knowledge" and the communicative purpose of the discourse. The shared "genre knowledge" between the members of the discourse community are the schematic structures which affect, dictate and constraint the choice of style and content of the discourse. The Communicative purpose of a genre is the feature which keeps the scope of a given genre focused and narrowed and, thereby distinguishes a given genre from another one. According to Zhu (2014), genre can be approached and associated with social constructivism within the sociology of knowledge. Based on this perspective; genre is defined as "socially constructed models" which respond to recurrent communicative problems" (p.27). Bahtia (1993) claims that any discussion about the concept of genre should consider the following features:

- Any genre has a recognizable communicative event, communicative purposes, mutual understanding, members of a discourse community, regular occurrence.
- Genres are 'highly structured and conventionalized' and have constraints for both expressing through lexico-grammar resources and giving discourse values.
- Members of a discourse community have shared knowledge on the genre uses more than newcomers to discourse community.

- In genre creation, members of discourse community use generic resources to express 'private and organisational intentions within the formation of 'socially based communicative purpose.
- The disciplinary and organisational cultures are reflected in the social, professional practices.
- Genres are recognised through a set of textual, discursive and contextual factors as all professional and disciplinary practices have their own principles (p.1).

To put these sets altogether, for Bahtia (1993), genre is considered as also a recognizable communicative event which has a set of communicative purpose (s), these purposes are shared and mutually understood by the members of a professional or academic community. The genre is conventionalized with regularly recurring constraints and practices which impose the form and functional value of the whole genre. These constraints are also socially-recognised purposes. To quote Bahtia's, (1993) definition, a genre is

A recognizable communicative event characterised by a set of communicative purpose(s) identified and mutually understood by the members of the professional or academic community in which it regularly occurs. Most often it is highly structured and conventionalized with constraints on allowable contributions in terms of their intent, positioning, form and functional value. These constraints, however, are often exploited by the expert members of the discourse community to achieve private intentions within the framework of socially recognized purpose(s) (p.13).

Clearly enough, both definitions of Swales and Bahtia share common points. They stress the “discourse community” and the “communicative purpose” notions in the recognition of a given genre. The two concepts are thoroughly examined in the following sections.

#### **1.4.1.1. Discourse Community**

Some scholars claim that the notion of discourse community resembles the sociolinguistic notion of speech community, which has been previously advocated by Labov and Hymes (1972). However, Swales (1990) claims that the notion of discourse community has a different reality from a speech community. He explains that the definition of both notions exhibit shared linguistic forms and shared recurring considerations, yet a cut-line should be made between discourse community and speech community. Swales (1990) defines a speech community as “a homogeneous sociolinguistic assemblage of people who share place and background” (p.19). On the other hand, discourse community is “a heterogeneous socio-rhetorical assemblage who shares occupational or recreational goals and interests” (Swales, 1999, p.19). In other words, while a speech community is a sociolinguistic grouping, a discourse community is a socio-rhetorical community. While the features of discourse in the speech community are shaped by social factors like socialising, group solidarity, the characteristics of discourse of a discourse community are functional “in order to pursue objectives that are prior to those of socialization and solidarity...” (Swales, 1990, p. 24). Another difference between the two notions is concerned with membership: while speech community members inherit membership by virtue of birth, accident or adoption, a discourse community “recruits its members by persuasion, training or relevant qualification” (Swales, 1990, p.24). Therefore, Swales (1990) argues that the discourse community does not replace the speech community notion and vice—versa, each of which has its own definitional aspects and characteristics.

In his definition of genre, Swales (1990) considers the discourse community as “the parent of genre” (p.58). Despite the newness of the concept of discourse community, it has

also attracted considerable attention along with the concept of genre. The discourse community is often perceived as a problematic concept. Many questions have been arisen, those related to defining it: what is discourse community? And those related to how it is organized: what does the community consist of? How is membership gained? What does membership require? In an attempt to answer these and other possible questions about discourse community, Swales (1990) puts it clearly that

A discourse community has a broadly agreed set of common public goals; mechanisms of intercommunication among its members; uses it participatory mechanism primarily to provide information and feedback; utilizes and hence possesses one or more genres in the communicative furtherance of its aims; has acquired some specific lexis and has a threshold level of members with a suitable degree of relevant content and discorsal expertise (p.24).

To say it simply, a discourse community is a group of people who shares similar goals and mechanisms which enable them communicate in order to successfully achieve the community aims. More specifically, Swales (1990) explains that

- A discourse community has a set of common public goals.
- A discourse community has mechanisms of intercommunication among members.  
These include formal and informal forums such as meetings and conversations as well as communication channels ranging from newsletters to more sophisticated means.
- A discourse community uses participatory mechanisms to exchange information.  
These mechanisms are intended to provide information and feedback.
- A discourse community possesses specific genres which vary according to the communicative situation. They help members achieve their goals.

- A discourse community uses a specific lexis: This is a particular type of jargon which disciplinary communities develop.
- A discourse community has a threshold level of members. These are both experts and novices. Endowed with the community expertise, experts help newcomers to socialise by transmitting their know –how (pp.24-27).

Swales has established these sets of characteristics to help define and recognise the discourse community concept. According to him, a discourse community is built upon membership, a social group who shares a set of common knowledge to achieve common goals. Common knowledge includes a set of shared forms and a specific “jargon” developed by the discourse community members in order to meet the set goals. For Swales, what binds the members of the discourse community is not only the shared knowledge of the discourse, but also the “commonality of goals” (Swales, 1990). In this definition of discourse community, Swales also speaks about socialisation of new members into the discourse community world with the help of old members whose job is to transmit knowledge to the newcomers.

To sum up, one can state that discourse community is an outstanding concept in academic communities which represents a “principled way of understanding how meaning is produced in interaction and proves useful in identifying how writers’ rhetorical choices depend on purposes, setting and audience” (Hyland, 2009, p. 66). The discourse community “allows scholars to be inducted into their disciplinary discourse communities through various forms of apprenticeship” (Flowerdew, 2000, p.128).

### **1.4.1.2. Communicative Purpose**

The communicative purpose is an intrinsic feature of the concept of genre since a genre is defined and identified by its communicative purpose. Mirhassani and Reshadi (2001) state that

The essence of the concept of genre, as is now used in applied linguistics, ESP, and rhetoric, is an emphasis on the primacy of communicative purpose and the way in which communicative needs shape or influence both surface and deeper rhetorical structure (p.69).

The communicative purpose shapes the genre and gives it an internal structure. The communicative purpose of a genre is recognised by the expert members of the discourse community. Swales (1981, 1990) explains that in order to embark on a genre analysis of a text, the analyst should recognize the rhetorical/schematic structure of a genre and correlates it to its communicative purpose while identifying the social context to which it belongs. However, doing so is a complex process because defining the communicative purpose is described as being complicated as “the ascription of purpose/function is no simple matter” (Swales, 2004, p. 69). Thus, determining a communicative purpose of a text is complex and cannot, sometimes, be attained from the early stages of analysing a genre, but it has to be recognized through ‘extensive text-in-context enquiry’ (Askerhave & Swales, 2001, p.209).

### **1.4.2. Register and Genre Analysis**

A register is generally conceived as “a language variety viewed with respect to its context of use” (Biber & Finegan, 1994, p. 4). First, register analysis has been used to design English for a Specific Purposes (ESP) course. The latter emerges by the end of the Second World War where a massive development in scientific and technical English occurs with a growing number of people who would like to meet the English language demands as an

international language and the language of science as well. These people want to learn English and they have a specific purpose behind. This stage in ESP development is also associated with the concept of “special language”. The underlying idea is that the language we use varies and is different from one context to another, so as language varies, features which characterise the use of language in each situation vary. The biggest expansion of research into the nature of these features of special language takes place mainly in the 1960’s and early 1970’s with a great focus on written scientific and technical language (Ewer & Latorre; 1969; Swales, 1971; Trimble, 1985). The concept of “register” starts to emerge with the works of Halliday, McIntosh & Stevens in 1964, Ewer and Latorre in 1969 and Swales in 1971. Principally, the objective of their research is to identify the lexical and grammatical forms and properties of texts in various domains and fields of study. The verb choice, the passive voice, the complex noun phrase are among the examples. Then, the identification of the most used features and forms leads to designing an appropriate syllabus. Halliday (1978) defines register as “the semantic configuration that is typically associated with the situation type in question” (p.123). According to him, the situation is determined by field, tenor and mode (see Section 1.2.2). These latter features define “register”. There are different registers such as meeting register, legal register, school register, military register, medical register, etc. Register may be more narrowly defined by reference to subject matter (Field of Discourse), to medium (Mode of Discourse, e.g. printed material, written letter, message on tape etc.), or to level of formality (Manner of Discourse, e.g. formal, casual, intimate, etc.) (Hartman & Stork, 1972, p.194). According to Atkinson and Biber (1994), register analysis has the following characteristics:

- 1) Register studies involve descriptive analysis of actually occurring discourse.
- 2) Register studies aim to characterise language varieties.

- 3) Register studies present formal linguistic characterizations of language varieties.
- 4) Register studies also analyze the situational characteristics of language varieties, and functional or conventional relationships between form and situation are posited (p.352).

That is to say, register analysis has three basic constituents: The situational/communicative description, the description of pervasive and recurring linguistic features and the analysis of the functional relationships between linguistic forms and situational contexts. Linguistic patterns in register analysis are always functional. In other words, register analysis always involves description of the situational context and interpretation of why particular linguistic features commonly and frequently exist in that context. Biber and Conrad (2009) distinguish between register and genre in the following way:

The genre perspective is similar to the register perspective in that it includes description of the purposes and situational context of a text variety, but its linguistic analysis contrasts with the register perspective by focusing on the conventional structures used to construct a complete text within the variety, for example, the conventional way in which a letter begins and ends (p.2).

The first major difference between register and genre is the “texts” considered for the analysis. While the genre approach needs a complete text for analysis, the register perspective might not obligatory require a whole text for the analysis, the analyst could choose a whole or an excerpt for the study. The second major difference between genre and register analysis is the linguistic characteristics considered for the analysis. In the register perspective, the analysis would correlate the linguistic features commonly occurring in a text with the situation of use. For Biber and Conrad (2009), the situational context presupposes the

characteristics of the people who produced the texts, characteristics of the situations and the communicative purposes. Similarly, the genre perspective also involves accounting for the situation of communication and the communicative purpose. But, the textual analysis focuses on the conventional structures used to build up a whole and complete text. For instance, in letter writing, the salutation, introduction, body, conclusion and subscription can be identified. The genre analysis can also regard the abstract, the introduction, the method, result, discussion and conclusion sections in a research article.

### **1.4.3. Genre Analysis**

Genre analysis is an approach to the study of discourse analysis. Genre analysis is “a system of analysis that can reveal a system of organizing genre” (Swales, 1981, p.1). Likewise, Richards and Schmidt (2002) consider genre analysis as an approach to the study of text’s organisation in terms of the communicative purpose of the genre and the stages that writers proceed to achieve the function of the discourse. Kay and Dudley-Evans (1998) argue that analysing genre is “a very powerful pedagogic tool” as it can describe “why a discourse is the way it is” (p.310). Analyses of genre come from three traditions or orientations (Hyon, 1996): the International ESP tradition, the Australian Systemic-functional School and the New Rhetoric approach. Although these approaches inspire their ideas from various sources, they are complementary rather than competing schools (Swales, 2004).

The New Rhetoric approach is also known as North American Genre Theory. This tradition started in the 1960s and 1970s within the era of classical art of rhetoric. Bazerman (1988), who is one of the prominent members of the New Rhetoricians, stresses the role of social context knowledge of a text as a basic source which undeniably helps writers best choose the appropriate rhetoric for a given writing situation. Bazerman (1997) claims that

Genres are not just forms. Genres are forms of life, way of being. They are frames for social action. They are environments for learning. They are locations within which meaning is constructed. Genres shape the thoughts we form and the communications by which we interact. Genres are the familiar places we go to create intelligible communicative action with each other and the guideposts we use to explore the familiar (p.19).

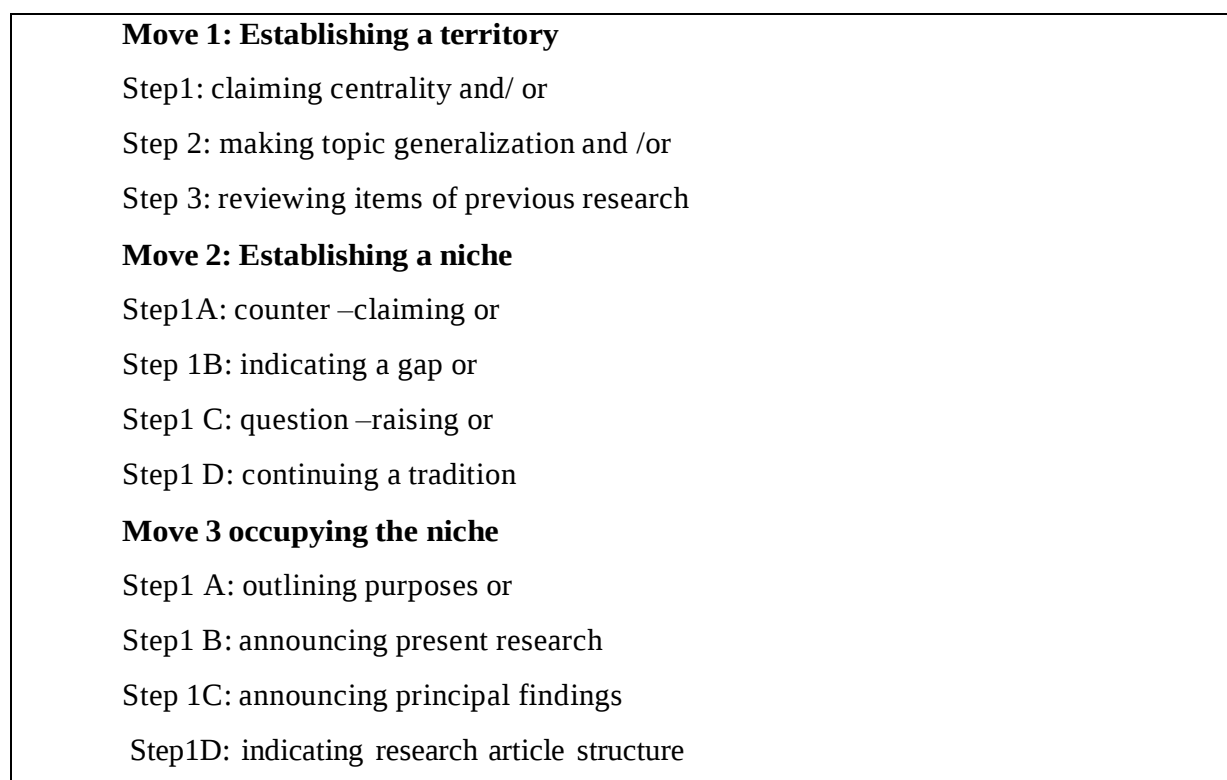
Genre in this approach is defined as “typified rhetorical actions based on recurrent situations” (Miller, 1984, p.159). Likewise, Coe and Freedman (1998) define genre as “a socially standard strategy, embodied in a typical form of discourse that has evolved for responding to a recurring type of rhetorical situation” (p.137). Typification is the key concept within RGS, which stands for recurring situations, goals, and tasks that can recognize textual features of a given genre, these latter “serve as well-known rhetorical problems arising in well-known rhetorical situations” (Bazerman, 1994, p. 18). As such, Miller insists on the fact that genre emerges from recurring social actions in recurring situations which give rise to regularities in form and content as well. According to Bawarshi and Reiff (2010), the analysis of genre within this approach reflects rhetorical responses to the situation in which rhetoric scholars “have focused more on the situational contexts in which genres occur than on their forms and have placed special emphases on the special purposes, or actions, that these genres fulfill within these situations” (p.192). Pedagogically speaking, the research method of the rhetoric tradition has been based on the use of ethnography methods of data collection and data analysis. Yet, no specific pedagogy or method has been improved within the new rhetoric approach, which is justified, according to rhetoricians, by the fact that genre is dynamic and too complex and is acquired via the participation in ordinary and professional settings.

The Australian approach is another approach to genre analysis also known as the Sydney School or the Systemic Functional Linguistics school (SFL). Hyland (2007) believes that Sydney School is “perhaps the most clearly articulated approach to genre both theoretically and pedagogically (p.153). ‘Systemic’ refers to the “system of choices” the use

of the language has to achieve meaning, the semantic choices are not arbitrary, but they are socially and culturally contextualized (Eggins, 2004). This approach applies the Hallidayan analytical framework to texts and focuses on linguistic characteristics of texts. Systemic functional linguistics defines genre as goal-oriented and a purposeful social practice, used by people as members of their culture (Martin, 1984). Genre requires stages to achieve its purpose and is expressed through structural and realization patterns (Eggins, 2007). Thus, the key concept within SFL is realisation, an intrinsic notion which suggests a dynamic relation between language which performs social purposes and context which embodies the categorization of a text type in terms of its communicative purpose (Helen, 2012). According to Halliday (1978), context of situation, called as register, is a composite of field, the mode and the tenor. These three components are related to three major functions: ideational (transmitting the factual information), interpersonal (maintaining the social relations and showing the speaker attitudes and textual (making coherent and cohesive text) functions. Putting these theoretical standpoints into practice, a rich and developed methodology has been improved by the Systemic approach to tackle issues in language learning via the use of texts relating to pedagogical genres used in primary and secondary schools such as narratives, descriptions, reports, etc. Therefore, pedagogically speaking, the Sydney approach to genre has succeeded in constructing the schematic structure and reveals how the combination form-function relation can be realised and explained.

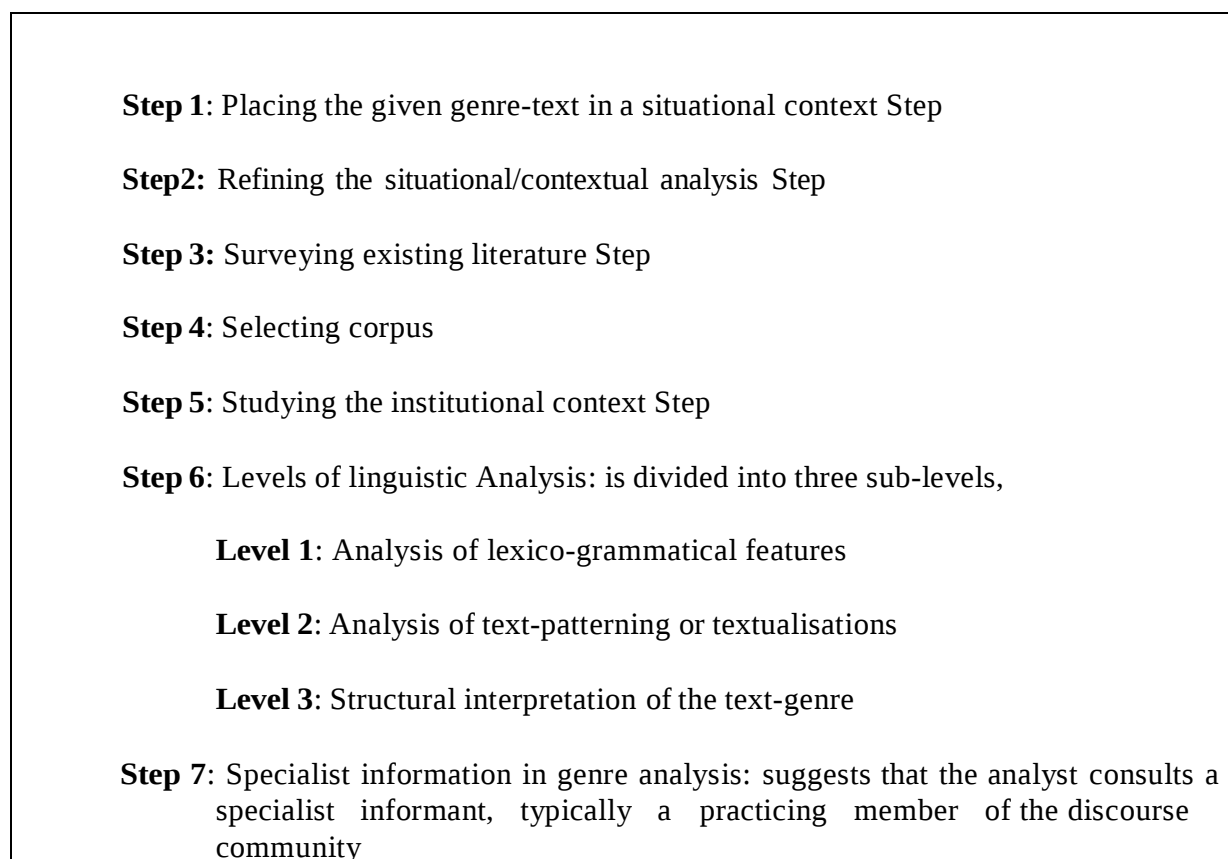
For the purpose of this research, genre is dealt with from an ESP tradition. The ESP approach highlights the deep formal properties and the communicative purpose of genres. With an emphasis on the communicative functions of texts, the ESP movement is described as “pragmatic and non-theory centered and this “applied nature of ESP has been a defining feature of the field from its inception” (Bawarshi & Reiff, 2010, p.42). Thus, the ESP

approach is pragmatic and not theory-centred. Eminent figures of the ESP approach to genre analysis are Swales (1990), who works on academic discourse and Bhatia (1993), who further develops the concept of genre and extended Swales' work to cover texts in other professional contexts. The overall aim of such studies is to develop and improve English for specific purposes (ESP) pedagogy, materials and language resources. The analytical framework of genre analysis within ESP approach is called structural move analysis. Swales (1990) investigates academic genres such as research article while Bhatia (1993) explores more business and legal genres. Swales creates a model which he calls CARS (Create a Research Space) to analyse the research introduction and Bhatia suggests a model to analyze sales letters. Some scholars like Dudley Evans (1997) strongly suggest the teaching of Swales' model as it provides non-native speakers with linguistic and rhetorical resources to gain access to the English language demands.



**Figure 1. CARS Model for Article Introduction (Swales, 1990, p. 141)**

In this model, it is not obligatory to include all of these moves and steps at the same time; it is optional to follow such order (Flowerdew, 2011). Yet, some moves are obligatory because they are functional without which a genre cannot be recognised. The steps within these moves have to exhibit “typical conventionalized verbalization patterns” (Swales, 1990, p. 123). These conventionalised patternings are recognised by the discourse community which Swales (1990) defines as “socio-rhetorical networks that form in order to work towards sets of common goals” (p.24). In addition to Swales’ model, Bhatia (1993) provides a model that could be applicable to any genre. Bhatia (2002) suggests that genre analysis aims to “understand how members of specific discourse communities construct, interpret and use these genres to achieve the community goals and why they write them the way they do” (p.6). His proposed framework consists of seven steps:



**Figure 2. Bhatia’s Model of Genre Analysis (Bhatia, 1993, pp. 209 -212)**

According to Bawarshi and Reiff (2010), the ESP tradition to genre analysis has been the first to define and shape the goals of the discourse community and describe how the overall structure of a genre aid the discourse community to realise the set goals. The ESP perspective on genre analysis has been interested at the macro-level analysis and also considers the lexico-grammatical features of both academic and particular disciplinary discourses (see section 1.5).

In a nutshell, the table below displays the main differences of the three approaches of genre analysis. Clearly, as the table indicates the differences between the discussed approaches are in terms of their view of genre, intellectual roots, primary focus, educational context and sample genres (Lee, 2011).

| Orientation         | Genre Definition                                                | Intellectual Roots | Primary Focus                     | Educational Context                 | Sample Genres                                                           |
|---------------------|-----------------------------------------------------------------|--------------------|-----------------------------------|-------------------------------------|-------------------------------------------------------------------------|
| <b>Sydney</b>       | Staged, goal-oriented process                                   | SFL                | Discourse structure and features  | L1 schools, adult migrants          | Reports, recounts, narratives                                           |
| <b>New Rhetoric</b> | Recurrent social action in response to situated context         | Post-modernism     | Social processes context          | L1 university Composition           | Research report patent, medical record                                  |
| <b>ESP</b>          | Class of communicative events exhibiting patterns of similarity | SFL, Swales        | Discourse structures and features | L2 academic and profession Training | Research articles sales letter, dissertations, academic lectures, vivas |

**Table 3. The Three Schools of Genre Hyland (2004) (as cited in Lee, 2011, p. 29)**

Despite the differences between the three traditions towards the analysis of genre, Bahtia (2004) claims that the aim is “the study of linguistic behavior in institutionalized

academic or professional settings” (p.22). In the same vein, Swales (2009) explains that the differences between the three approaches to genre analysis are less sharp than they may seem (p.5). Approaches to genre in fact share a lot in common and there has been an influence and exchange of ideas between them. He outlines four points of agreement in the approaches as follows:

- A. A balance between constraint and choice;
- B. The role of local contextual colouring in the realization of genre exemplars...;
- C. A greater sense that genres and genre sets are always evolving in response to various exigencies; and
- D. A consequence more nuanced approach to genre awareness-raising and genre acquisition.

Despite these shared characteristics in the three traditions, the present study is situated more within the ESP perspective. It also falls within the lexico-grammatical analysis of genre as it seeks to analyse the use of hedges in biology research papers.

## **1.5. Written Academic Discourse as a Genre**

ESP genre studies can be divided into two types: academic genres and professional ones. The following table illustrates the two genres:

| Academic Written Genre                                            | Professional Written Genre                  |
|-------------------------------------------------------------------|---------------------------------------------|
| Research articles /Book reviews                                   | Business letters / arbitration judgments    |
| Conference abstracts /Textbooks PhD dissertations/ Grant proposal | Environmental reports / mission statements  |
| Submission letters /Peer review report                            | Business emails / committee papers          |
| Undergraduate essays/article bios                                 | Direct mail sales / Letters legal contracts |
| Teacher feedback/ acknowledgments                                 | / Company annual reports legal cases /      |
| Editors' letters / lab. reports                                   | Medical case notes                          |
|                                                                   | Engineering reports                         |

**Table 4. Some Written Genres Studied in ESP Research (Hyland, 2013, p. 103)**

Recently, scholars have shown immense interest in academic genres like the research article genre (Kwan et al, 2012; Adika, 2014), theses (Hewings, 1993; Samraj, 2002; Al-Ali & Sahawneh, 2011; Taherah & Sayyed, 2014), dissertations (Ridley, 2000; Shaw, 2000; Bunton, 2002; Paltridge, 2002), research grant proposals (Feng & Shi, 2004; Feng, 2006). As far as the research article genre is concerned, many studies have focused on academic discourse in science and technical research papers (cf Tarone et al., 1981; Gledhill, 1996; Marco, 2000; Burrough-Boenisch, 2003). The interest has been to examine specific lexical and grammatical features in the scientific language by offering a “grounded description and explanation of language use in academic and professional contexts in an attempt to answer the question: why do professionals use the language the way they do” (Bahtia et al., 2008, p. 163). These studies not only identify the linguistic properties of discourse, but also combine form and function to explain the use of such aspects in a given discourse.

Examples of such analyses include the use of hedges, passive and active form, personal pronouns and verb tense in academic genres. Many scholars, for instance Bahtia

(1994), claims for the importance of such an analysis to the study of genre and many scholars consider the lexico- grammatical analysis as a basic step in the investigation of a genre.

## **Conclusion**

Throughout the chapter, the researcher tried to clarify key concepts and discuss the perspectives in discourse analysis, the latter being a massively evolving and growing discipline. Having presented the development of discourse analysis reveals the vastness and multi-disciplinary nature of the discipline. The portrayal also tells about how the concept of genre has redrawn written academic discourse. Written academic discourse is concerned with the academic language produced by the members of the discourse community which shares discursive rhetorical practices. In turn, these shared rhetorical maxims shape academic genres in terms of linguistic features and overall structure. Therefore, key concepts like the discourse community and the communicative purpose were also discussed. In addition, throughout the chapter, the three traditions towards genre analysis have been presented and reviewed. In spite of the similarities between the three approaches, this study is more situated with the ESP approach. The aim is to analyse the use of hedges in Algerian biology research articles in locally published journals. After examining these theoretical standpoints, the next step is to shed some light on the concept of hedging which is the focus of the next chapter.

## Chapter Two

### On Hedge and Hedging

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## Chapter Two

### On Hedge and Hedging

#### Introduction

This chapter provides a theoretical framework for the concept of hedging in literature. According to Crystal (1995), the concept of hedging is “an area of some neglect” (p.120). Therefore, attention is put on the defining features of hedging in literature, its evolving from a purely semantic notion to a discourse phenomenon, and the various proposed taxonomies of hedging devices. Besides, the chapter comprises the portrayal of the studies conducted on hedging across languages, disciplines and genres.

#### 2.1. Definition of Hedges: A Possible Consensus

Used in different situations and explained in different terms, the concept of *hedges* lends itself to many definitions. These definitions lead to the question whether there is any consensus about the meaning of the term. An overview of these definitions helps state what hedges are, and their possible connotations in the different contexts in which they are used.

The Oxford English Dictionary (1997) defines the verb to hedge as: “to go aside from the straight way; to shift; shuffle, dodge; to trim; to avoid committing oneself irrevocably; to leave open a way of retreat or escape” (p. 272). According to the Oxford Concise Dictionary of Linguistics by Mathews (2005) a hedge is “any linguistic device by which a speaker avoids being compromised by a statement that turns out to be wrong, a request that is not acceptable, and so on” (p.6). To illustrate the term, the following examples are provided:

- [...] instead of saying ‘this argument is convincing’, one might use a hedge and say ‘*as far as I can see* this argument is convincing’.

In some other situations, performing a speech act of giving an order could be expressed as follows:

- [...] ‘carry it into the kitchen!’, one might use an interrogative as hedge and say ‘*could you perhaps* carry it into the kitchen!’ (p.6)

Used in everyday language, as the previous examples show, hedges have a specific meaning for a writer. For Zuck and Zuck (1986), hedges are “the process whereby the author reduces the strength of what he is writing” (p.172). Markkanen and Schröder (1987) define ‘hedging’ as a “strategy” of “saying less than one means” (p.48). In the same line of thought, Crismore and Vand Kopple (1988) consider ‘hedges’ as items which “signal a tentative or cautious assessment of the truth or referential information” (p.185). However, Crompton (1997) seems to be more critical towards these definitions. He not only laments that the offered definitions mix up definition and function of the term, but he also calls for a definitional consensus which he considers necessary for the effective use in academic situations. He argues that a “functionally-based definition of hedging is desirable” (Crompton 1997, p. 11) and suggests that hedges could be viewed as “... items of language which a speaker uses to explicitly qualify his/her lack of commitment to the truth of a proposition he/she utters” (Crompton 1997, p.281). It should be noted that Crompton’s definition, as the ones earlier, also bears the connotation of strategy, that he refers to as “tactics in a defensive position” (Crompton 1997, p. 281).

Markkanen and Schröder (1997) point out that “the ample number of linguistic descriptions on hedging which, sometimes, seems to reach a state of definitional chaos is a problem of many other linguistic concepts, beginning with the concept of language itself” (p.15). The portrayals of literature, nonetheless, indicate that the most commonly used

definition of hedging is the one proposed by Hyland (1998a) who defines hedges as “...linguistic means used to indicate either a) a lack of complete commitment to the truth value of an accompanying proposition, or b) a desire not to express that commitment categorically” (p.1).

Despite their range, the above definitions seem to convey a shared view. They suggest that the concept of “hedges” or “hedging” is a linguistic statement, used by both speakers and writers as a conventional strategy to lessen or to express their lack of commitment towards some assertion. In this research, Hyland’s definition is adopted and the two terms ‘hedges’ and ‘hedging’ are used interchangeably.

## **2.2. Exploring the Concept of Hedge and Hedging**

Straightforward descriptions of the concepts of hedge and hedging are rather rare despite the very existence of the terms in literature. It is the complicated nature and the different facets of the notions which make researchers approach the terms in various fashions. Salager-Meyer (1998) argued that the various definitions, concepts and theoretical assumptions reflect the development of hedging indeed. The concept of hedge has shifted from its origins in logic and semantics to pragmatics and discourse analysis.

### **2.2.1. Hedging as a Semantic Phenomenon**

The earliest investigation on hedging was Zadeh’s study (1965) on *Fuzzy Logic*, where he noticed that some objects and concepts of the natural world cannot easily match the linguistic categories available for describing the universe, particularly with categories such as animals. The primarily linguistically oriented treatment of hedging, however, is found in the study of George Lakoff (1972) in his publication “*Hedges: A Study in Meaning Criteria and*

*the Logic of Fuzzy Concepts.*” The problematic matter in Lakoff’s study was how to relate natural objects phenomena to natural language concepts which encompass, as he claimed, “vague boundaries and fuzzy edges” (Lakoff, 1973, p. 458). He insistently commented that any attempt to restrict truth conditions to natural language sentences to “true”, “false”, and “nonsense” would distort the language natural concepts by describing them as having sharp rather than vaguely defined boundaries. Lakoff (1972) was much more concerned with the linguistic phenomena used to describe the more peripheral members of broad conceptual categories, the logical properties of such elements and their qualitative aspect according not to truth but to grading (Clemen, 1997). To examine the possibility of doing so, Lakoff scrutinized the following group of words and phrases that he later labelled as “hedges”: (*for example, real, regular, actually, almost, as it were, basically, can be view as, crypto-, especially ,essentially, exceptionally, for the most part, in a manner of speaking, in a real sense, in a sense, in a way, kind of, largely, literally, loosely speaking, more or less, mostly, often, on the tall side, par excellence, particularly, pretty much, principally, pseudo-quintessentially, rather, really, relatively, roughly, so to say, somewhat, sort of, strictly speaking, technically, typically, very, virtually,.....* etc. According to Lakoff (1972), hedges are “words whose job it is to make things fuzzier or less fuzzy” (p.195). In fact, the definition offers two functions of hedging, those of making things fuzzier or less fuzzy. The definition may seem simple and straightforward, but the adjective “fuzzy” that stands for describing hedges is fuzzy as well.

### **2.2.1.1 Hedging Expressing More or Less Fuzziness**

Semantic fuzziness is the linguistic resource for the use of hedges “to describe degree of category membership, define similarities and re-define whole categories by re-weighting

attributes of non-members to members” (Vass, 2004, p. 128). Making things fuzzy or vague is the primary function associated with hedges for Lakoff (1973) and many scholars like Salager Meyer (1994) and Varttala (2001). According to Lakoff (1973), “natural language sentences are not often entirely true, false, or non sensical, but rather to somewhat true and somewhat false, and that membership in conceptual categories is not a simple yes-no question, but a matter of degree” (pp.458-9). To make the notion clear, the following examples (Lakoff, 1973) are provided:

- a) A robin is *a sort of* a bird. [ False, it is a bird]
- b) A chicken is *a sort of* a bird. [ True, or very close to true]
- c) A penguin is *a sort of* a bird. [ True, or close to true]
- d) A bat is *a sort of* a bird. [ False, or very close to false]
- e) A cow is *a sort of* bird. [ False] (p. 472).

Lakoff (1972) started with a discussion of the semantic properties of *sort of* as a predicate modifier and its ability to identify the category membership of a concept, as exemplified above. To explain, describing the membership, for example, of penguins to birds, a sentence like “penguins are sort of birds” is to be used rather than an assertive categorical statement as “penguins are birds”. It is the use of “sort of” which demonstrates the degree of membership of penguins to birds by making the relationship of penguins to birds or the relation of category membership fuzzy.

As for the second function of hedges, i.e., hedging expressing less fuzziness, it is worth mentioning that what Lakoff (1973) exactly meant by his definition of hedging in his publication is not clear enough particularly when portraying hedging as a decrease in fuzziness. Nonetheless, such a description of hedging can be grounded on the basis of how

hedges are used in order to provide a precise conceptualisation of category membership of a given object, taking into account the categorisation of natural language concepts. Following hierarchies introduced by him in an analogy with “vegetableness”, one could state that “pickles are vegetables”. Yet, when considering, for example, carrots, it is more evident that the category of carrots can be easily associated with vegetables and, hence, higher in Lakoff’s hierarchy than pickles. Therefore, to be more precise and when describing pickles as vegetables, one can then hedge the sentence as such:

(1) Pickles *can be viewed* as vegetables. (as cited in Varttala, 2001, p. 459)

What urges the use of hedges in such cases is the need to locate or identify the status of a given concept or phenomenon in relation with the conceptual categories of natural language descriptions. This idea is even made clearer by Burns (1991) who explains that “we are sometime faced with a range of cases where a predicate or some other element clearly applies at the one end and certainly fails to apply at the other, but it is not all clear what ought to be said about the cases in between” (p.8). The following figure shows hedges according to Lakoff:

|                                  |                                                 |
|----------------------------------|-------------------------------------------------|
| Sort of                          | In a manner of speaking So to say               |
| Kind of                          | A true                                          |
| Loosely speaking                 | A regular A                                     |
| More or less                     | veritable                                       |
| On the side... (tall, fat, etc.) | All but technically                             |
| Roughly                          | Practically                                     |
| Pretty much                      | All but a Anything but a                        |
| Relatively                       | A self-styled Nominally                         |
| Somewhat                         | He calls himself a in name                      |
| Rather Mostly                    | only Actually                                   |
| Technically                      | Really                                          |
| Strictly speaking                | He as much as                                   |
| Essentially                      | -like                                           |
| In essence                       | -ish                                            |
| Basically                        | Can be looked upon as Can be                    |
| Principally                      | viewed as Pseudo-                               |
| Particularly Par                 | Crypto-                                         |
| excellence Largely               | (he's) another (Caruso/Lincoln',...)            |
| For the most part                |                                                 |
| Very                             |                                                 |
| Especially                       |                                                 |
| Exceptionally                    |                                                 |
| Quintessential(ly)               | is the _ of _ (e.g. America is the Roman Empire |
| Literally                        | of the modern world. Chomsky is the DeGaulle of |
| Often                            | linguistics, etc.)                              |
|                                  | Details aside Mutatis mutandis                  |
| More of a _ than anything else   |                                                 |
| Almost                           |                                                 |
| Typically/typical As it          |                                                 |
| were                             |                                                 |
| In a sense In                    |                                                 |
| one sense                        |                                                 |
| In a real sense                  |                                                 |
| In an important sense            |                                                 |
| In a way                         |                                                 |

Figure 3. Hedges and Related Phenomena (Lakoff, 1973, p.472)

In sum, the description of the concept of hedge cherished by Lakoff in his landmark article (1972), as a linguistically oriented term, was the first to be introduced in the field of linguistics. Undeniably, Lakoff's (1973) treatment does offer intrinsic theoretical constructs of the conceptualization of the term "hedge" which paved the way to later studies where the phenomenon has eventually sparked to cover other areas.

### 2.2.1.2. Hedged Performatives

One way of widening the concept was the notion of *hedged performatives*, introduced by Fraser (1975). Fraser analysed the effects of modals and semi-modals on the performance of the illocutionary act expressed by a performative verb in sentences like “I *have to admit* you have a point”. He named such combinations ‘hedged performatives’, without naming the modals hedges. As a matter of fact, Lakoff (1972) claimed that some of *hedged performatives* combinations are used to reduce the illocutionary act of the entire speech act as in the following example:

(2) *I suppose that* he is leaving on the next train. (as cited in Varttala, 2001, p.8)

The introductory clause “*I suppose that*” not only tones down the force of the assertion of the action of leaving but also implicates that the validity of the proposition may not be true. Similarly, other researchers (cited in Markkanen and Schroder, 1997) as House and Kasper (1981), Blum-Kulka and Ohlstein (1984) have treated hedges as modifying certain types of speech acts namely requests and apologies.

### 2.2.1.3. Hedges as Approximators and Shields

Prince, Frader, and Bosk’s (1982) discussion on hedging in physician-physician discourse offered another direction of widening the scope of hedges. They consider hedges as “items making things fuzzier” (p.84) and have further divided them into *approximators* and *shields*. The former holds the semantic fuzziness basis within the propositional content itself as they express “non-prototypicalness with respect to class membership” (Prince et al., p.86). Approximators are divided into two main types: *adaptors* which place an object to match a non-prototypical situation (e.g. sort of) and *rounders* which express imprecision when

describing a concept (e.g. about). The latter, shields, on the other hand, express fuzziness within pragmatics; they indicate the relationship between propositional content and speaker commitment. Within this category, two sub-types have been identified; *plausibility shields* which reflect the speaker's degree of certainty about the veracity of his message (e.g. I think); while *attribute shields* distinguish the degree of uncertainty to someone different from the speaker (e.g. according to her estimates). Though Crompton (1997) claimed that such a functional analysis is basically relevant to the nature of the corpus of their study, it is believed that such an analysis offers a clear classification of hedges which has contributed a great deal in analyses of hedges devices expressing epistemic modality. Yet, this classification has been criticized by scholars as Skelton (1988) who pinpointed that such a categorisation can be only sustainable in abstract situations. He posited that items such as *suspect* considered as approximators can function as shields as well (p.38). Sharing the same idea, Markkanen and Schröder (1997) have further questioned the practical utility of such a division. In the same vein, Varttala (2001) states that the functions as introduced by Prince et al. as either to modify group membership or truth value hold a pragmatic basis than a semantic one. Accordingly, the division is problematic as the interpretation of either function will consider context and users' personal functions.

#### **2.2.1.4. Hedges and Understatements**

Another orientation of hedges is found in Hübler's work (1983) in which he claimed that there are some implicit strategies a speaker can use in order to gain more chance of getting his idea or information ratified by the hearer. He suggests, then, a two-way distinction of *understatements* and *hedges* and both of them express mainly indetermination. Indetermination signals the negotiability of a sentence which is of two types: "phrastic" and

“neustic”. Phrastic indetermination concerns the relationship between the propositional content and reality. Understatements are of this type as they affect the propositional correspondence to reality like it is *a bit* cold here and other items included in Lakoff (1972) list. On the other hand, hedges are associated with neustic indetermination referring to the speaker’s attitude to the hearer regarding the validity of his proposition like “I *suspect* his answer”. Actually, Hübler’s categorisation resembles that of Prince et al. (1982) in which “approximators” correspond to Hübler’s “understatements” and “shields” to “hedges”. Likewise, the criticism levelled at Prince et al. (1982) division was levelled at Hübler’s (1983) conceptualisation of hedges. The division is not clear-cut as the two types might have the same function: reducing the risk of negation. Within the same line, Varttala (2001) stated that the distinction between understatements and hedges is so problematic in longer stretches of language and that the difference between neustic and phrastic may theoretically be straightforward, but, in fact, in practical terms it is not.

The notion of hedge has developed expansively, the various semantic distinctions reviewed in the previous sections witness on this expansion. From 1980’s onwards, hedging research was extensively broadened with the growing influence of pragmatics and discourse analysis. Worth noting, Lakoff (1972) was primarily interested in “hedge” as a lexical and semantic property (not in hedging) and with the growing body of pragmatics and discourse analysis into the concept, the term hedging appears to accompany hedge.

### 2.2.2. Hedging as a Pragmatic Phenomenon

The notion of hedge has been further developed in pragmatics and discourse analysis where it has been approached as <sup>4</sup>pragmatic, rather than a purely semantic, phenomenon. Hedging, then, is seen as an interactional and a vulnerable element in the communicative scene whereby its function is weakening the speaker/writer attitude or responsibility to the information and, hence, avoiding the risk of opposition.

Varttala (2001) pointed out that “the studies into the pragmatic aspect of hedging are “often rather circumspect *ad hoc* notions for the purpose of a particular research project rather than thorough deliberations of the phenomenon” (p.14). For instance, Holmes (1984) in a study on hedging in spoken context asserted that “identifying and describing the linguistic devices which may be used to modify illocutionary force constitutes a rich research field for those interested in pragmatics” (p.364). Not only hedges offer a fertile topic of investigating the linguistic manifestations of hedges as a pragmatic entity, but also “[...] there is the challenge of investigating the different use made of such pragmatic resources by different categories of speakers, to different addressees, in different social contexts” (Holmes, 1984, p.364). In their study on philosophical texts, Markkanen and Schröder (1997) considered hedging as an interactional phenomenon. For them, hedges “offer a possibility for textual manipulation in the sense that the reader is left in the dark as to who is responsible for the truth value of what is being expressed” (p.6). The most thorough analysis of the pragmatic or

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<sup>4</sup>The Pragmatic meaning is differentiated from the semantic meaning. While the semantic meaning refers to “sentence meaning and word meaning” without considering context, the pragmatic meaning is “utterance meaning bearing in mind context” (Griffiths, 2006, p. 6).

interpersonal aspect of hedges, however, is Brown and Levinson 'politeness theory' (1987) in spoken discourse.

### **2.2.2.1. Hedging as a Politeness Strategy**

Brown and Levinson (1987) , relying on a myriad of fields like sociolinguistics, pragmatics, applied linguistics, conversational analysis, and anthropology attempt to establish a theoretical framework to account for the whole interactional situation of language use. They highlight three basic notions: *face*, *face threatening acts*, and *politeness strategies*.

In relation to the seminal work of Goffman in 1960's, *face*<sup>5</sup> is defined as "the positive social value a person effectively claims for himself by the line others assume he has taken during a particular contact. Face is "an image of self-delineated in terms of approved social attributes" (Goffman, 1967, p. 5). In short, face is the "public self-image", divided into positive and negative face. The positive face refers to "the positive consistent self-image or personality (crucially including the desire that this self-image be appreciated and approved of claimed by interactants" (Goffman, 1967, p. 321). Negative face, on the other hand, refers to one's "basic claim to territories, personal preservers, rights to non-distraction, i.e., to freedom of action and from imposition" (Goffman, 1967, p.321). In fact, both speakers and hearers are aware of these desires or "face wants", thus, it is in favour for both of them to cooperate and maintain each other face, particularly in situations which contain face threatening acts (FTA) like disapproval, criticism, insults and other forms of negative attitude towards the speakers'/writer' work, ideas, or opinions. Therefore, participants need to employ politeness strategies to redress the face

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<sup>5</sup>The term face derives from the English idiom "to lose face" (Brown & Levinson, 1987, p.61).

threatening acts. To mitigate an (FTA), the speaker will use either positive politeness strategies, showing that his wants are similar to the addressee's wants, or negative politeness strategies, showing that speaker and Hearer are co-operators sharing common ground, and expressing that S (the speaker) does not mean or intend to impede H (hearer).

Hedging, Brown and Levinson claim (1987), falls under the category of negative politeness as it distances the speaker from the content by making the relation fuzzier and, so, restoring the addressee's negative face. Using Brown and Levinson words (1987), hedging is "a primary and fundamental method of disarming routine interactional threats" (p.146). Consider this example:

(3) I *wonder* if you could help me with lifting this box.

The italicised verb (*wonder*) hedges the illocutionary force of the action by showing that the speaker does not want to impose an undesirable request to the addressee. Hedges can also be used as a positive politeness strategy, Brown and Levinson explain.

(4) *In a way*, the painting is beautiful. (Cited in Varttala, 2001, p.20)

Using *in a way* the speaker renders his opinion vague avoiding a precise attitude towards the painting for the sake of reducing the threat to the positive face of the addressee.

The theory has been criticised for certain aspects. For example, the cut-line between negative and positive politeness strategies is not clear because the same utterance may express both functions, and, thus, they are not mutually exclusive as Brown and Levinson indicated. Though, the theory as a whole has not been challenged and still is one of the most influential theories for politeness in human interaction.

From the discussion above, it may be observed that the concept of hedges, as many other concepts in linguistics, is not static. Markkanen and Schröder wrote(1997):

The concept [of hedges] has lost some of its clarity and sometimes seems to have reached a state of definitional chaos, as it overlaps with several other concepts. This problem concerns many other linguistic concepts and their definitions, beginning with the concept of ‘language’ itself (p.15).

Rather, it is a dynamic one which has evolved from a purely linguistic meaning to a pragmatic one, embracing “communicative, interactional, and discoursal connotations” (Yu, 2009, p.32). As summed up by Yu (2009), the development of the concept has gone through three stages:

- The first stage is mainly linguistic, working on a local level, modifying words or phrases with a proposition, with the focus on content.
- The second stage is mainly linguistic and pragmatic, modifying the truth value of the whole proposition and the speaker’s (or writer’s) commitment or attitude to the propositional content, with its focus on the speaker- content relationship.
- The third stage is mainly pragmatic and social modifying relationships between interlocutors or social relationships in a wider context, with its focus on the interpersonal and social relationship (p.32).

### **2.3. Taxonomies of Hedges**

Complete descriptions of hedges manifestation is lacking in literature and little agreement among linguists about what linguistic devices should and should not be regarded as hedges is notably apparent (Martin, 2008). This is explained by the fact that the interpretation of hedges is dependent on the whole context or situation and not on individual

lexical elements (Clemen, 1997). Therefore, it is somehow problematic to categorise hedges. However, and despite such a difficulty in dividing hedges into clear-cut lists, researchers have attempted to establish comprehensive lists of linguistic realisations of hedges.

### **2.3.1. Salager-Meyer's Taxonomy**

Salager-Meyer's interest was to investigate hedges as prototypical linguistic forms and search functional hedging nuances. Salager-Meyer (1994) claims that

I believe that in spite of their undeniable contribution to the field, most studies which have been carried out so far on the topic of hedges have not made enough emphasis upon the fact that hedges are first and foremost the product of mental attitude which looks for prototypical linguistic forms (such as modals, epistemic verbs, approximators, etc.) for its realization, but these linguistic forms do not always carry a hedging nuance. Such an ambiguity –one linguistic form may serve many functions and the same function may be expressed using different forms—leads to the difficulty in identifying which of these linguistic forms are hedges and which are not (p.152).

The underlying idea behind the classification of hedges according to her is the fact that hedges are the product of mental attitude. Therefore, the decision made to which a word is a hedge or not is problematic. To solve the problem, Salager-Meyer highlights “context” as a determining factor in the identification of a hedge. Using her own words, she contends that “nevertheless, it is my contention that the gap which necessarily exists between the writer's mental processes (i.e., his/her intentions) and the linguistic realizations employed can be solved to a great extent by carrying out a rigorous contextual analysis” (p.5).

To this end, Salager-Meyer's taxonomy is grounded on an attempt to bine the grammatical forms of hedges with their functional categories. Commenting on this, Crompton

(1997) stated that her taxonomy “attempted to consider both formal and functional criteria” (p.277). The following table summarises her taxonomy:

| Types of Hedges                            | Categories                                                                | Example                                                                                              |
|--------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>1. Shields</b>                          | Modal Auxiliaries Modal Lexical Verbs Probability Adjectives Nouns Adverb | <i>May, could, To seem, to appear, possible, probable, suggestion, assumption probably, possibly</i> |
| <b>2. Approximators</b>                    | Rounders of quantity, degree, and frequency                               | <i>somewhat, about</i>                                                                               |
| <b>3. Personal Expressions</b>             | Expressions of author’s doubt and direct involvement                      | <i>I believe, to our knowledge</i>                                                                   |
| <b>4. Emotionally charged intensifiers</b> | Comment words used to project author’s reaction                           | <i>particularly encouraging extremely interesting</i>                                                |
| <b>5. Compound Hedges</b>                  | double hedges treble hedges quadruple hedges                              | <i>It may suggest that It would seem likely that It may appear somewhat speculative that</i>         |

**Table 5. Taxonomy of Hedging Devices Adapted from Salager-Meyer (1994)**

### **2.3.2. Classification of Hedges Based on Their Forms, Functions and Strategies**

In order to capture all the characteristics of hedges, researchers (Namsaraev 1997; Vass 2004; Poveda Cabanes 2007; Martin, 2008) attempted to classify the phenomenon into separate aspects of form, function, and strategy. For example, Vass (2004) suggested a linguistic model which is a composite of three parameters to account for hedging in legal discourse. The first parameter signals the linguistic realisations of hedging, including verbal

and non-verbal items. The second parameter consists of strategies namely indetermination, subjectivisation, and depersonalization (identified by Namsaraev 1997) along with a strategy related to Vass corpus:

1. **Strategy of indetermination**, by giving a proposition a colouring of lesser semantic, qualitative and quantitative explicitness as well as of uncertainty, vagueness, and fuzziness.

Such a strategy may be realised by:

- 1.1. **Epistemic modality**, which may comprise:

- Modal auxiliary verbs expressing possibility, such as *may, might, can*
- Semi auxiliaries such as *to seem, to appear*
- Epistemic lexical verbs such as *to suggest, speculate, assume*
- Verbs of cognition such as *to believe, to think*
- Modal adverbs (*perhaps, possibly, probably*)
- Modal nouns (*possibility, assumption, suggestion*)
- Modal adjectives (*possible, probable...*)

- 1.2. **Approximators** of quantity, frequency, degree and time such as generally, most, approximately

2. **Strategy of subjectivisation** which highlights the writer's personal opinion and signals his voice, and simultaneously invites the readers to involve in the discussion, realized via:

- The use of **first personal pronouns** (I/we) followed by **verbs of cognition** (think, believe) or **performative verbs** (suppose, suggest).
- The author's personal doubt and direct involvement such as *to our knowledge, in our view*

**2.1. Quality-emphasising adjectives and adverbs** like *extremely interesting, particularly important...etc.* Their function is to strengthen the writer's voice in order to convince the readers of the truth value or significance of his propositions

**3. Strategy of Depersonalisation** which diminishes the writer's involvement or presence in the discussion for the sake of avoiding opposition. The strategy is mainly lexicalized by impersonal, agentless and passive constructions:

**3.1. Agentless passive and impersonal constructions** such as *an attempt was made to see ..../it seems that .....*

**3.2. Impersonal active constructions** in which the personal subject is replaced by some non-human entity such as *findings, results, data.*

**4. Limitation:** To remove vagueness or fuzziness from a part of a text by limiting category membership. The third parameter comprised four functions highlighting the use of hedging at ideational and interpersonal levels:

- a. To respond to the macro-level expectations of the discourse community concerning the nature and uncertainty of knowledge.
- b. To prevent or temper possible conflict and negative reaction
- c. To soften the illocutionary force of an utterance.
- d. To create a particular impression on the addressee.

Likewise, in her contrastive analysis of hedging in English and Spanish architecture project descriptions, Poveda Cabanes (2007) maintained that hedging is a multi-faceted phenomenon which requires combining the semantic, social, and pragmatic factors. In her view, it is realized by certain lexical items which uphold specific discourse strategies in order to fulfil several rhetorical functions depending on the communicative situation. According to

her catalogue for classifying hedges, the lexico-grammatical items which signal hedging can be divided into:

- (1) Verbal items including modal verbs, lexical verbs, passive voice.
- (2) Non-verbal items including nouns, adjective, and adverbs expressing mostly tentativeness and vagueness.

These lexical items perform several strategies like depersonalisation, detachment, modesty, humility, deference, solidarity, provisionality, tentativeness, justification, indetermination and accuracy level:

- **Depersonalisation and detachment:** serve to eliminate the author's presence and is mainly achieved by the use of the passive voice.
- **Modesty, humility and difference** towards the reader: "good" features of architecture genre whereby the author should show respect and deference towards colleagues and peers.
- **Solidarity:** reflects that the discourse community members have some shared knowledge and common desires and objectives.
- **Provisionality and tentativeness:** serve to protect the author against possible negative reactions or threats towards his claims.
- **Justification:** aims to justify that the chosen approach or solution is a possible response to the relevant situation and conditions of research.
- **Indetermination and accuracy level:** serve to reduce the semantic weight of an utterance through the use of indeterminate or vague expressions when quantifying or qualifying the knowledge.

In turn, these strategies express three main communicative functions: (1) show politeness and difference to the reader, (2) indicate the author's need to protect him/herself against potential consequences of being proved wrong, and (3) signal the writer's consideration of the degree of precision deemed necessary in his text.

### **2.3.3. Hyland's Taxonomy**

Hyland (1996 a) studies hedging in cell and molecular biology and attempts to provide a framework which reflects the "polypragmatic" nature of hedges devices in research articles. As far as linguistic realisations of hedges are concerned, Hyland refers to two categories: lexical and strategic hedges.

| Hedges                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lexical                                                                                                                                                                                                                                                                                                                                                                                      | Strategic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>1) Modal Auxiliaries</b><br><i>(would, could)</i><br><b>2) Epistemic judgmental verbs</b><br><i>(indicate, speculate,..)</i><br><b>3) Epistemic evidential verbs</b><br><i>(report, seem)</i><br><b>4) Epistemic Adjectives</b><br><i>(somehow, possible)</i><br><b>5) Epistemic Adverbs</b><br><i>(presumably, probably)</i><br><b>6) Epistemic nouns</b><br><i>(tendency, evidence)</i> | <b>1) Reference to Limited Knowledge</b><br><i>( nothing is known about, it is not known whether, we have no knowledge whatsoever)</i><br><b>E.g.</b> it is not known whether such a weak temperature response .....<br><b>2) Reference to limitations of model, theory or method</b><br><b>2.1. Limitations of model</b><br><b>E.g.:</b> <i>We are aware of the concerns expressed in the literature concerning the application of ...</i><br><b>2.2 Limitations of theory</b><br><b>E.g.:</b> <i>Viewed in this way the concept of lateral heterogeneity becomes obsolete ....</i><br><b>2.3. Limitations of method</b><br><b>E.g.:</b> <i>In spite of its shortcomings, the method has been widely employed to evidence this type....</i><br><b>2.4. Reference to experimental limitations</b><br><b>E.g.:</b> <i>We did not succeed in obtaining the complete ...</i> |

**Table 6. Hyland's Taxonomy Adapted from (Hyland, 1998 a, pp.103-148)**

Besides the previous mentioned taxonomies, there are also other proposed frameworks for classifying hedges in literature. For example, Crompton (1997), who critically stated that “without such a [function-based] definition, the term designates a rag-bag category of features

–understood by different people in different ways” (p.281), suggested the following taxonomy:

1. Copulas than be e.g. *appear, seem*
2. Epistemic modals e.g. *might, may,*
3. Sentences with clauses relating to the probability of the subsequent proposition being true e.g. *it is likely that ...*
4. Sentences containing sentence adverbials which related to the probability of the proposition being true e.g. *probably, possibly,*
5. Sentences containing reported propositions with non-use of factive reporting verbs such as demonstrate , show:
  - a. Where authors are responsible for the proposition being reported e.g. *I suggest that ...*
  - b. Where the authors use an impersonal subject, but the agent is intended to be themselves e.g. *It is being suggested that ...*
6. Sentences containing a reported proposition that a hypothesized entity x exists and the author can be the responsible for the hypothesis e.g. *these findings suggest that ...*

In a recent study, Yu (2009) suggested a categorization which combines together the grammatical, semantic, and pragmatic properties of hedges devices. Stating that certain areas are more likely to be considered as hedges than others, Yu offered four broad categories (1) modal hedges (including modal verbs, modal adjectives, modal adverbs, modal nouns), (2) performative mental hedges (lexical verbs with epistemic meaning like *suppose, think*), (3) quantificational hedges (devices expressing quantity, degree and frequency like *some, almost*) and (4) pragmatic markers (expressions like *in my opinion, I think*). In turn, these mentioned categories denote three pragmatic strategies namely approximators (expressing local fuzziness of the proposition at word/phrase level), shields (signal the speaker commitment to the truth

value of the proposition) and implicit hedges (monitor the interaction and the communicative process).

To sum up, this discussion on taxonomies of hedges devices is insightful for certain points. Clearly the diversity of taxonomies presented reveals a lack of unified criteria for the classification of hedges and, thus, a lack of a universal taxonomy to account for all the characteristics of hedges. Thus, researchers have tried to offer some satisfactory frameworks relying on hedges semantic, grammatical, and pragmatic properties resulting in various classifications. For example, Salager-Meyer's taxonomy<sup>6</sup> is based on her attempt to match the grammatical forms with their functional categories. Vass (2004) and Poveda Cabanes (2007) based their classifications on looking at hedges in terms of forms they realise, strategies they perform, and functions they fulfil. Hyland's model (1996 a) is based on a consideration of social, pragmatic and discoursal aspects of hedges.

Worthy to say, the absence of a unified taxonomy of hedges is also attributed to the complex and multi-functional nature of hedges. Clemen (1997) claims that "there is no limit to the linguistic expressions that can be considered as hedges ...no linguistic items are inherently hedgy, but can acquire this quality on the communicative context or co-text" (p.6). Brown and Levinson (1987) have also discussed this issue and argue that hedge is "a productive linguistic device...[which] can be achieved in an indefinite number of surface forms" (p.146).

However, as far as linguistic realisations of hedging are concerned, it can be noticed that a basic concept floating around that of hedging is the concept of modality. Markkanen and

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<sup>6</sup>According to Vass (2004), Salager-Meyer, Hyland and Crompton "refer to their classifications of hedging as taxonomies, but none adhere to a rigorous application of them" (p.112).

Schröder (1997) suggest a reciprocal relationship of the two concepts as they claim that “it seems possible to see the relationship between modality and hedges in two ways: either modality is the wider concept and includes hedges or the other way round; hedging is the umbrella term and modality a part of it” (p.4).

## **2.4. Hedging: Adjacent Concepts**

Doing research on hedges and hedging can be undoubtedly described as complex as it overlaps with several fields like pragmatics, linguistics, semantics, logic and philosophy. Due to this complexity nature of the concept, hedging is related with other concepts. These connected concepts are presented in the following section.

### **2.4.1. Hedging and Grice’s Maxims**

An important concept which comes across hedging is speech act and the interpretive maxims of Grice theory. Grice’s cooperative principle (1975) or Leech’s (1983) interpersonal rhetoric have basically characterised spoken discourse, yet their interpretive maxims are significant for efficient and successful communication in general terms. Thus, these principles can be applied to the research of written discourse as “principles introduce communicative value, such as truthfulness into the study of language” (Leech, 1983, p.9).

Communication highly requires interaction and cooperation. According to Grice Cooperative principles (1975), to make the communication efficient and comprehensive the user of the language should bear in mind certain maxims and a pattern to follow in order to convey the required message. He classifies these interpretive principles into four pragmatic classes as follow:

**1. The maxim of quantity:**

- a. Make your contribution as informative as required.
- b. Do not make your contribution more informative than required.

**2. The maxim of quality:**

- a. Do not say what you believe to be false.
- b. Do not say that for which you lack adequate evidence.

**3. The maxim of relation:**

- a. Make your contribution relevant

**4. The maxim of manner:**

- a. Avoid obscurity
- b. Avoid ambiguity
- c. Be brief
- d. Be orderly

Hyland (1998 a) illustrates how the use of hedges expressions could explain an adherence to the cooperative principles, providing these extracts from his research:

5) The area of the phase *is almost 50%* smaller after 30 minutes.

6) ...decrease in the overall intensity by *about 35%*

7) ...contains *most* of the central domain of the molecule (cited in Hyland, 1998 a, p. 41)

In these extracts, Hyland assumes that the use of these hedges can be associated with the Maxim of Quantity: make your contribution as informative as is required (Grice, 1975, p. 45). Writers can manipulate the degree of informativity to direct readers' focus to what is important (Dubois, 1987; Channell, 1990). The writer here still preserves a commitment to

truthfulness by hedging the reliability of his assertions, which is part of the process of interpreting his knowledge claims.

Additionally, the Maxim of quality (do not say what you believe false and do not say that for which you lack evidence) could justify the use of some hedges expression to express honesty and truth.

8) ....together *these data suggest* .....

9) ...nevertheless; it *cannot be excluded that*....

10) ...such *a possibility* requires further study.

(Cited in Hyland, 1998 a, p. 42)

In these extracts, the writer restricts his claims to what he knows and what might be known in the near future. To this end, he shields himself from the responsibility towards the presented knowledge and attributes it to some extra factors, showing that the validity of what he is discussing is relative to some conditional framework (Perkins, 1983). Zuck and Zuck (1986) define this strategy as “the process whereby the writer reduces the strength of what he is writing” (p.172). Crismore and Vande Kopple (1988) also consider hedges as items that “signal a tentative or cautious assessment of the truth of referential’ which lessen the writer’s responsibility towards the information presented” (p.185). For Nash (1990) “it is a way of taking out insurance on the statements one makes, limiting the damage that might result from bald propositions” (p.23).

## **2.4.2. Hedging and Metadiscourse**

According to Schiffrin (1994), there are six different theoretical frameworks and analytic approaches towards discourse analysis which are speech act theory, interactional sociolinguistics, ethnography of communication, pragmatics, conversation analysis and variation analysis. These different orientations tackle and approach language in different fashions, yet they all cherish language as a means of interaction and communication. Among the resources which reflect the interactive nature of language are metadiscourse markers.

It was Zellig Harris who introduced the concept of “metadiscourse” in 1959 as an aspect of interaction by language usages. Then, the concept has been expanded by Meyer (1975) who paves the way to many and various definitions and classifications of metadiscourse markers afterwards (Schiffrin, 1980; Williams, 1981; Kopple, 1985; Crismore et al., 1993; & Hyland, 2005). However, little research has been conducted on metadiscourse and writing until 1990s. Metadiscourse is generally perceived as “discourse about discourse” or “communication about communication” (Vande Kopple, 1985, p. 83). It is “a central pragmatic construct which allows us to see how writers seek to influence readers’ understandings of both the text and their attitude toward its content and the audience” (Hyland, 1998 a, p. 437). Metadiscourse markers have a significant role in the construction of knowledge and writer-reader relationships. Therefore, the use of these features boosts the acknowledgment of knowledge claims and also ensures the authorial competency as a community member. Used as an umbrella term, metadiscourse encompasses a composite of devices with two main functions: textual and interpersonal. While the textual elements allow the writer to organise the text, the interpersonal devices provide information about the writer’s

attitude about the content and, thereby, help him involve and engage in interaction with the reader (Hyland, 2000). Over the past several decades, researchers have suggested different metadiscourse taxonomies so as to account metatextual elements according to their form and function (Crismore, 1984;VandeKopple, 1985, 1997;Hyland, 2005). On the basis that “metadiscourse is a self-reflective linguistic material referring to the evolving text and to the writer and imagined reader of that text” (Hyland &Tse, 2004, p.156), Hyland proposes a recent taxononmy of metadiscourse which is considered highly preferred in modern metadiscourse studies for being recent, , clear and comprehensive (Abdi, 2011). The following table presents Hyland model of metadiscourse.

| Category                                                            | Function                                              | Examples                                  |
|---------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------|
| <b>Interactive resources: Help to guide reader through the text</b> |                                                       |                                           |
| Transitions                                                         | Express semantic relation between main clauses        | In addition/ but/ thus/ and               |
| Frame markers                                                       | Refer to discourse acts, sequence, or text stages     | Finally/to conclude/my purpose here is to |
| Endophoric markers                                                  | Refer to information in other parts of the text       | Noted above/ see Fig/ in section 2        |
| Evidentials                                                         | Refer to source of information from other texts       | According to x/ (Y, 1990)/ Z states       |
| Code glosses                                                        | Help readers grasp functions of ideational material   | Namely/ e.g./ such as/ in other words     |
| <b>Interactional resources: Involve the reader in the argument</b>  |                                                       |                                           |
| Hedges                                                              | Withhold writer's full commitment to proposition      | Might/ perhaps/ possible/ about           |
| Boosters                                                            | Emphasize force or writer's certainty in proposition  | In fact/ definitely/ it is clear that     |
| Attitude markers                                                    | Express writer's attitude to proposition              | Unfortunately/ I agree/ surprisingly      |
| Engagement markers                                                  | Explicitly refer to or build relationship with reader | Consider/ note that/ you can see that     |
| Self-mentions                                                       | Explicit reference to author(s)                       | I/ we/ my/ our                            |

**Table 7. Hyland's Interpersonal Model of Metadiscourse (2005 a, p.49)**

As the model shows, Hyland (2005 a) classifies metadiscourse into two types: these are **interactive** and **interactional categories**. Interactive are features “used to organize propositional information in ways that the target reader should find coherent and convincing” (Hyland, 2005 a, p. 50). Interactional devices are these features that “draw the reader into the discourse and give them an opportunity to contribute to it and respond to it by alerting them to the writer’s perspective on propositional information and orientation and intention with respect to that reader” (Hyland, 2005a, p. 52).

In other words, interactional devices help the writer engage in an interaction with the reader to express his propositions. According to Vasquez and Giner (2009), “propositional meaning can be formulated with different degrees of strength, ranging from very weak to very strong statements through the use of different devices such as modality, first person pronouns, hedges and booster” (p.220). Hedges, which are our focus in this study, are among interactional devices that are used by writers to modify their claims, to construe and attain persuasion (Hyland, 2000; Vazquez & Giner, 2009). Thus, hedges can be considered a form of metadiscourse as they direct the reader to how to evaluate, react and respond to the writer’s propositional content.

### **2.4.3. Hedging and Modality**

An important concept that comes across hedging is modality; the latter has lately been the focus of interest of myriad disciplines and approaches. The earliest investigation on modality was primarily conducted in the areas of logic, traditional grammar, with an emphasis on its semantic meaning. Research into modality within linguistic has remarkably witnessed a gradual shift from monolithic, static conception to a more dynamic comprehension of the

concept with regard to the linguistic, extra linguistic and contextual aspects in the production and interpretation of modality expressions in discourse (Bybee & Fleischman, 1995). Modality has attracted so much attention that as Perkins (1983) describes “doing research on modality is very similar to trying to move in an overcrowded room without treading on any one’s else’s feet” (p.4). This interest towards modality is also explained by Stubbs (1996) who states that

whenever speakers or writers say anything, they encode their point of view towards it: whether they think it is a reasonable thing to say or might be found to be questionable, tentative, provisional, controversial, irrelevant, impolite or whatever. The expression of such speakers’ attitudes is pervasive in all uses of language. All utterances encode such a point of view, and the description of the markers of such points of view and their meanings are central topics in linguistics (p.202).

The ample body of literature that has been written on modality and the numerous studies that have been conducted have been made in order to define the concept of modality (Palmer, 1979). Yet, characterizations vary and several approaches springing from various perspectives have attempted to define the concept of modality. The differences and variations are in fact, as Perkins (1983) explains, “to some extent a matter of different ways of slicing the same cake” (p.10). Halliday (1994) defines modality as “the area of meaning that lies between yes and no”, taking in “either yes or no” and “both yes and no” (p.356). Simpson (1990) refers to modality as “a speakers’ attitude towards or opinion about the truth of a proposition expressed by a sentence and toward the situation or event described by a sentence” (p.66). Lyons (1977) shares the same idea and argues that “these notions of speaker’s opinion and attitude capture the basic nature of modality” (p.452). Lyons (1977, 1983) expanded this notion of attitude to subjectivity to refer to subject/ speaker’s involvement. He (1983) clearly states that

Subjectivity is a matter of speaker's, or more generally, of the locutionary agent's involvement of himself in the utterance. In the case of epistemic modality what is involved is his knowledge (or beliefs). In the case of deontic modality it is his will and authority that is involved. But in both cases it is the locutionary agent who is the source of the modality (p.111).

Modality is the expression of the speakers' involvement towards the propositional content of what he is saying. Lyons speaks about two classes or categories of modality: deontic and epistemic modality. Deontic modality, derived from the Greek "deon" which stands for duty, expresses the speaker's observation about the necessity or obligation to perform particular acts. This type of modality means more specifically that the speaker "intervenes in the speech event by laying obligations or giving permission" (Downing & Locke, 1992, p.332). The deontic aspect of modality has essentially a performative sense since it entails the performance of the action. On the other hand, epistemic modality, derived from the Greek episteme for knowledge, indicates the speaker's opinion and belief of what is said. It is not only "concerned with the speaker's assumptions or assessment of propositions, but also indicates the speaker's confidence (or lack of confidence) in the truth of the proposition expressed" (Coates, 1983, p. 18). This view of modality comes very close to the pragmatic definition of "a hedge". Hedging is one aspect of epistemic modality as it expresses personal judgment based on lack of knowledge (Hyland, 1998a). As far as the relationship between hedging and modality is concerned, Makkanen and Schroder (1997) claim that the two concepts overlap, it is either way to see that hedging is the umbrella term including modality or modality is the cover term encompassing hedging. More specifically, Hyland (1998a) strongly claims that "the writer's or speaker's judgments about statements and their possible effects on interlocutors is the essence of hedging and this clearly places epistemic modality at the center of our interest" (p.2).

There is a tendency to emphasise on modal auxiliaries<sup>7</sup> as basic elements to express epistemic modality (Coates, 1983; Palmer, 1990). Modal auxiliaries can convey a range of meanings which can be associated with hedging. Coates (1983) illustrates the use of *may* in the following examples:

11) I *may* be a few minutes late.

12) I am afraid this is the bank's final word. I tell you this so that you *may* make arrangement elsewhere if you are able to (p.123).

In the first example, the modal *may* is used to express the speakers' lack of confidence and tentativeness towards his proposition: epistemic possibility. The modal *may* here is considered a hedge. In the second example, On the other hand, the modal *may* is used in its non-epistemic sense which is not associated with hedging. The modal *may* here expresses willingness or intention.

Thus, it has to be stated that not all modality is associated with hedges or vice versa. Only forms which have an epistemic meaning can be considered as hedges. While expressing epistemic modality is often associated with the use of modal auxiliaries, as we have previously stated, they are not by far the sole markers to express the epistemic function. Hyland (1998 a) explains that “despite the tendency of linguists to focus on modal verbs as exponents of epistemic modality (Coates, 1983; Palmer, 1990), the modals are part of a much wider system” (p.45). Indeed, different parts of speech including epistemic lexical verbs, tentative adjective, adverbs, and nouns can also fall within the semantic area of epistemic

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<sup>7</sup>However, the emphasis on modal auxiliaries is reductionist and misleading (Declerk, 2011, p. 22).

modality and the linguistic devices which express the writers' attitude towards the propositional content.

## **2.5. Empirical Studies on Hedging**

Hedging has received most attention in the context of oral and spoken discourse despite its significant role in academic discourse (Coates 1987; Hosman 1989; Nittono 2003). There have not been many cross-linguistic and cross-disciplinary studies on hedging in research articles. The studies which have been conducted have shown that there are some variations for the use of hedges across languages across disciplines, and across genres.

### **2.5.1. Hedging across Languages**

Several studies have treated the variation of the use of hedges across various languages and cultures. Bloor and Bloor (1991) stated that there are "clearly identifiable differences in degree of directness and concessions permitted or encouraged in academic writing in different languages" (p.1). Clyne (1991) conducted a study which sought to highlight the discourse patterns in academic texts written by German and English scholars. Specifically, he worked on three types of texts, namely, English written by English speaking authors and German and English texts written by German. His findings indicated that the greatest use of hedging in academic texts was by German authors regardless of the language they use. Added to this, the results show that modal auxiliaries are the prominent devices used in both languages.

Vassileva (1997) compared the use of hedges in English, Bulgarian, and Bulgarian English. Her interest was to examine whether writing will be affected by the cultural

perceptions when using hedges with a focus on socio pragmatic failure than linguistic ones. It is worth mentioning that some Bulgarians have a good level in English. Vassileva considers her taxonomy similar to that of Salager- Meyer (1994), but as “somewhat loose” (p.209). For example, modal verbs and semi-auxiliaries like *to seem*, *to appear* are treated as shields; adjectives and adverbs are treated as approximators; phrases containing *suggest*, *assume* ...considered as compound hedges, and expressions as *I believe*, *to our knowledge* as expressions of personal doubt. The results indicated that English writing was more tentative when confirming or disconfirming others claims than the Bulgarian and Bulgarian English. Bulgarian English use considerably few hedges and Bulgarian texts came in between. Vassileva explained the use of Bulgarian English as follow. The writers were not entirely acquainted with the expressions of hedging in English, or they were unaware of the need to use them, reflecting a socio pragmatic ineptitude. Perhaps, the other possible explanation was their desire to preserve their cultural identity which was reflected in the organization of the whole discourse. Besides, Introduction and Discussion are the most hedged sections.

Luukka and Markkanen (1997) study was about the use of impersonalisation (viewed as a sub category of hedges) in academic writing in English, Finnish, and Finnish English. They attempted to examine the importance of being inconspicuous in the academic discourse and whether the avoidance of explicit personal reference is a face saving strategy. The data comprised of spoken and written academic texts written by a native speaker of English, and a native speaker of Finnish who wrote two papers, one in English and one in Finnish. They also sought to compare the occurrence and frequency of impersonalisation in written and spoken discourse, therefore both writers delivered the spoken text version, after the written formats were prepared for publication. The results indicated that the spoken texts are explicitly more

personal than the written texts. And, the English texts are more personal than the Finnish versions. More interesting, the Finnish writer's spoken and written texts in English resemble those of the English writer, and not the Finnish spoken and written versions.

On their behalf, Tatis and Rawland (2006) compared Greek and English mathematical discourse. Their analysis showed that both languages use vague discourse to preserve their readers face, but Greek writers may rather prefer to strengthen their own faces and, so, maintain their positions.

Likewise, Robberecht and Van Peteghem (1982) reported on the difficulties faced by French in using and interpreting epistemic modality in English. Their results showed that non-native students do not use English modal verbs as frequently as native speakers do.

In a recent study, Yang (2013) compared the use of hedges and their frequency in research articles by English and Chinese writers in material science discipline. The results showed that there are similarities as well as differences concerning the use and frequency of hedges by English and Chinese scientists. Research articles written by Chinese tend to be direct and more authoritative than their English counterparts due to the higher frequency of approximators compared with shields. Furthermore, the introduction, result and discussion are the mostly hedged sections in the English research articles while the result and discussion sections are the ones in Chinese articles. In conclusion, Yang (2013) stated that Chinese writers should develop their hedging competence and, thus, some necessary training steps and practices are strongly required.

The above mentioned studies reveal that the rhetorical conventions concerning the use of hedges may vary from one language to another; while some languages may rather use an

assertive discourse, others will prefer a less tentative tone when expressing their claims. Interestingly enough, these studies suggest that non- native scientists or students may have a difficulty in using hedges. Commenting on this idea, Hyland (1995) pointed out that expressing detachment and commitment to propositions is problematic for foreign students to the extent that hedging failure is a feature of L2 writing. The main reason behind such failure is related to the features of academic writing as they are culture-specific. That is to say, non-native students with the influence of their L1 writing habits may constitute false perceptions of the pragmatic rules (formality, directness, difference...) required in the discourse community setting. Hyland, therefore, pinpointed that hedging is “a major “rhetorical gap” that L2 students have to cross before they can gain membership of a discourse community and pursue their chosen careers” (Hyland, 1995, p. 39).

### **2.5.2. Hedging across Disciplines**

The conventions of a discipline are another variable which may affect the use of hedging. The conducted studies revealed that the nature and functions of the discipline may constitute reasons for differences in the type and frequency for the use of hedges.

For example, Butler’s study (1990) was to investigate the use of modal verbs in Physics, botany, and animal physiology and their distribution along the sections of the research article genre. The texts were taken from academic journals and extracts from textbooks for university students. The results show that physics writing was more hedged than the other disciplines. Butler further mentioned that physics discourse used much more modals as *can*, *could*, *would* and *should*; while biology made greater use of *may*, *might*,...etc. Added to this, the introduction and discussion are much more frequently hedged than other sections.

Hyland (1996a, b) studied hedging in cell and molecular biology. He analysed a corpus containing 75000 words from six leading journals. He found that hedging represented more than one word in every 50, or about one hedge every two or three sentences. Therefore, he stated that hedging is principally a lexical phenomenon mainly realised by main verbs, modals, adjectives, and nouns. Added to this linguistic analysis, Hyland proposed a pragmatic perspective where he considered hedging a polypragmatic phenomenon, a full understanding of which requires considering the cultural practices of scientists and the specific genre within which it has significance.

Vazquez and Ginger (2008) undertook a cross disciplinary study where they compared the use of hedging (epistemic modality markers) across Marketing, biology, and mechanical engineering research articles. Based their investigation on a corpus study of twelve articles from each of these disciplines and using Hyland taxonomy, Vazquez and Giner analysis (2008) showed that the use of hedging in Marketing is more than doubles the quantity found in biology and more than the triples in mechanical engineering. The differences are not just remarkable but also reflective. These differences depend on the nature, the objective, and the sociological features of each discipline, elements which shape the occurrence of hedges in the studied disciplines, Vasquez and Giner (2008) argue. Marketing is a discipline which relies on observing people behaviours and attitudes towards the information conveyed; the data is imprecise and affected by contextual factors. Thus Hedges are used mainly to express willingness for negotiation, cautiousness, humility and politeness as well. On the other hand, the data in biology and mechanical engineering is rather more precise and accurate, which explains the low use of hedges compared to Marketing.

On the whole, concerning the variation of hedging in disciplines, there might be differences in the frequency and type of hedges used in various disciplines derived from the nature and objective of each discipline. This is made clear by Varttala (2001) who states that “different disciplines may not be altogether uniform when it comes to frequency, forms, and variety of hedges” (p.248). However, Markkanen and Schroder (1997), for instance, claim that “the differences in the use of hedges in different fields are not so great as has often been assumed” (p.10). McCloskey (1994) is of a similar opinion arguing that the differences are not significant. One could just conclude and say that the topic of the differences in the use of hedges across disciplines is a fertile area of investigation which needs further research.

### **2.5.3. Hedging across Genre**

Besides the variation of the use and frequency of hedging across languages and disciplines, there might be also some peculiarity concerning hedging across different genres. For example, Salager-Meyer and Sales (1991) undertook a rather genre-based study of hedging in written medical discourse in (1980-1990 )medical literature. Their focus was to portray how tentativeness was expressed via the use of hedges in medical discourse and to what extent hedging use varies in accordance with textual communicative purposes. The text types under investigation were research papers (RP), case reports (CR), reviews (RV), and editorials (ED). They adopt Prince et.al (1992) classification, plus three additional categories, passive voice, expressions of the authors’ doubt and direct involvement and emotionally charged intensifiers. They concluded that the overall discourse structure and the communicative purpose of the text type may affect the use of hedges. Editorials and reviews are more hedged than research papers and case reports. They noticed that shields characterise

most editorials and reviews, while research papers and case studies are signalled by the use of the passive voice.

Hyland (1994) examined hedging in EAP (English for Academic Purposes) and ESP (English for Specific Purposes) in a corpus of twenty two textbooks, constituting a range of writing materials addressed to L2 students. His analysis showed that EAP writing materials dealt more with modality than ESP writing materials did. More importantly, the general interest of modality is not widely reflected in the pedagogic studied materials despite the significance of hedging in literature. The absence of such an important pragmatic phenomenon in textbooks, which reflects the lack of empirical data on hedges, consequently provides students with misleading information. In conclusion to his survey, Hyland (1996a) insisted “the need for a revision for ESP pedagogy which should be based on authentic materials” (p.253).

Vass (2004) claimed that hedging is a genre –specific and a multi-functional phenomenon. She studied hedging across two different legal genres, namely U.S Supreme Court opinions and American law review articles from socio-cognitive and intra-disciplinary perspectives. Vass (2004) linguistic analysis indicated that both genres come from the same parent discourse community: judges. Yet, the context as well as the communicative purpose of each genre is different. Supreme Court belongs to the juridical context to employ operative, interpersonal and educational purposes. On the other hand, American law review articles belong to the pedagogical and academic contexts and serves only interpersonal and educational purposes. Besides these differences, there is a higher incidence of hedging in American law review articles than in U.S Supreme Court. In her conclusion, Vass insisted on

the feature of hedging as genre specific and calls for further studies to determine if this is true in other fields.

In a study on hedging in newspaper discourse, Buitkiene (2008) claimed that newspaper genre can be regarded as “the most remarkable genre since it is undeniably one of the most popular public media which has a wide range of audience” (Noorian & Biria, 2010, p. 67). Specifically, relying on Hyland’s polypramatic model in scientific discourse, Buitkiene examined the frequency of occurrence and the variety of hedges in editorials and news stories genres. The analysis showed that editorials are more heavily hedged than news stories and both genres use different types of hedges devices. This is explained by the fact that each genre pursues different interests and certain objectives and thus different ways and reasons when using hedges.

In a cross cultural corpus study, Abdollahzadeh (2011) analysed hedging in post graduate student theses genre. He was mainly interested in the way Iranian and British postgraduate students of applied linguistics hedge their propositions in the discussion section of their dissertations. The analysis showed that the differences between Iranians and British are remarkable. While epistemic verbs *can*, *would*, *may* were the ones most frequently used in both groups, Iranian students used *can* more frequently than the British students. The latter (the British), on the other hand, used *would* more frequently instead. Concerning probability adverbs, Iranians never use adverbials like *potentially*, *possibly*, nor they use tentative verbs like *supposes*, *estimate* compared with British students. Linking all the results together, the researcher concluded that Iranian students lack a complete lexical repertoire of hedges leading to less formal and direct expressions. Such a socio-pragmatic failure might be linked to their unawareness of how hedges should be used, the different ways of thinking and the different

argumentation patterning of Iranian and British students. Consequently, Abdollahzadeh (2011) concluded his discussions by emphasizing that it is “pedagogically justifiable to address hedging as an important linguistic element and raise awareness of the principles and mechanics of its use” (p.586).

## **Conclusion**

Providing the theoretical constructs on the concept of hedges is undeniably tempting and significant for the present study. The semantic and pragmatic aspects reviewed in this chapter witnessed the development of hedges. Hedge as a linguistic entity can be described as a dynamic notion evolving from a purely semantic concept to a pragmatic one, embracing interactional and discoursal connotations. Thus, the concept is a multi-faceted phenomenon that has been approached in various fashions. This latter can be regarded as a reason for the absence of a straightforward definition and a unified taxonomy for the concept. Yet, the definitions, despite their range, seem to convey a shared view: hedges are devices used by both speakers and writers to express a degree of commitment towards some assertions. Likewise, the suggested taxonomies, despite their differences, seem to agree that epistemic modality devices are the basic elements used for hedging. Besides these theoretical standpoints for the concept, the chapter has also provided a literature review for the variation of the use of hedges across languages, disciplines, and genres. What should be said here is that further research is necessarily warranted and some aspects await more detailed analyses. This is our aim for the present research: how hedges are used in the scientific research article genre which we will figure out in the next chapter.

## Chapter Three

### Hedging in Scientific Research Articles

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## **Chapter Three**

### **Hedging in Scientific Research Articles**

#### **Introduction**

The previous discussion on the concept of hedging has brought into focus what the notion is, the various perspectives towards the analysis of hedging in literature and the conducted studies on the concept across languages, disciplines and genres. Specifically, in this chapter we will highlight the phenomenon of hedging in the scientific research article genre, a little studied area of pragmatic competence in research writing as described by Hyland (1998 a). Thus, the purpose of the first part of the chapter is to examine scientific hedging, how we can explain the use of hedges in scientific articles, what the assumptions behind the use of hedges devices in scientific discourse are, which is well characterised by exactness and objectivity. Thus, the aim is to create a context for the use of hedging in scientific articles. Hyland (1998 a) asserts that an understanding of hedging “requires some understanding of the cultural practices of scientists and their epistemological assumptions and values, together with the specific genre within which the feature is situated and has significance” (p.13). Therefore, this part also tackles the research article as a specific genre and how it is rhetorically constructed to meet the scientific community expectations. The second part of the chapter discusses the implications of the analysis of hedges devices and how it can be of great significance. This part also sheds light on the various functions of hedging in scientific articles and the main approaches towards the function of hedges which will provide analytic descriptions for the practical analysis of the current research.

### 3.1. The Social Nature of Scientific Knowledge

Scientific discourse has traditionally and commonly been described as an ideal endeavour being accurate, neutral, and objective and this idea dies hard. According to Mulkay (1979), science is

[...] that intellectual enterprise concerned with providing an accurate account of the objects, processes and relationships occurring in the world of natural phenomena. To the extent that scientific knowledge is valid, it reveals and encapsulates in its systematic statements the true character of this world. (pp. 19-20).

The doing of science is then a neutral descriptive report of factual statements which derive from nature, with almost no possible human intrusion. That is to say, facts speak of themselves and the scientist is “the messenger relaying the truth from nature” (Gilbert, 1976, p.285). Bazerman (1984) has identified the criteria of such an ideal institution of scientific practices as traditionally presumed:

- 1) The scientist must remove himself from reports of his own work and thus avoid all use of the first person;
- 2) Scientific writing should be objective and precise, with mathematics as its model;
- 3) Scientific writing should shun metaphor and other flights of rhetorical fancy to seek a univocal relationship between word and object; and
- 4) the scientific article should support its claims with empirical evidence from nature, preferably experimental [...] (pp.163-4).

Clearly, such features shape how scientific knowledge has been strictly defined by the assumption that scientific truth is generated from reality on the basis of purely experimental methods beyond the interference of personal and contextual factors. However, such a tradition of science inquiry has been challenged by the sociology of science or “the social

constructionist approach” in recent studies (Kuhn, 1970; Latour & Wolgar, 1979; Latour, 1987).

The focus of the social constructionist view is the nature of science writing and the construction of the scientific knowledge and discourse in research settings. The advocates of this approach refute the ideal mathematical view of science as discussed in the traditional or standard approach of scientific knowledge. For them, science is rather a form of social action whose aim is the generation of facts or “black boxes”, as Latour and Wolgar (1979) called them. Facts are regarded as black boxes in the sense that they are decontextualised: they are true all the time without being linked to a given context. And, they are desubjectivised: without being linked to a given researcher. Air consists of two parts of hydrogen and one part oxygen. Nothing is *priori* a fact, the accreditation of which is rather a process based on collective agreement. Petraglia (1991) suggests the following premises of the social constructionist approach:

- (1) Real entities (reality) include knowledge, beliefs, truths, and selves.
- (2) All reality is arrived at by consensus.
- (3) Consensus, and thus knowledge, is discovered solely through discourse (rhetoric).
- (4) Reality changes as consensus/knowledge changes (p.39).

Principally, these premises reveal the nature of scientific knowledge as socially manufactured; knowledge as a composite of facts, beliefs, and values is socially constructed in a quest for consensus of the scientific truth. Thus, research is less a search for truth than for agreement. Consensus and scientific practices are all shaped through language.

### 3.2. Knowledge Claims in the Construction of Science

In his seminal work *the Structure of Scientific Revolutions*, from which the social constructionist approach originated, Kuhn (1970) also discussed the quest for consensus when he brought up the notion of “communities of scientists” as an intrinsic feature of the scientific enterprise. Kuhn pointed out that science is a social practice whereby the scientific knowledge and the authority of truth are community-generated and maintained processes. This is also echoed by Bruffee (1986) who states that

Social construction assumes that the matrix of thought is not the individual self but some community of knowledgeable peers and the vernacular knowledge of that community. That is social construction understands knowledge and the authority of knowledge as community generated, community symbolic artefacts (p.777).

The community is an institution, a repertoire or a reference encompassing pre-conceived conceptual, theoretical and methodological resources for the scientist doing science. The scientist role, then, is not to produce theories and establish facts but “to perpetuate particular research traditions, which Kuhn referred to as “the community paradigms” (Slougui, 2009, p 112.). Paradigms are defined by Kuhn (1970) as “...universally recognised scientific achievements that for a time provide problems and solutions to a community of practitioners” (p. x). Therefore, the scientific community paradigms direct the scientific process and define the matrix of the scientific knowledge, providing scientists with a universal model of shared criteria. Not only constitute linguistic, rhetorical and methodological resources for knowledge generation, but also constraints for knowledge evaluation and judgment of the credibility of the claim.

Myers' studies (1985, 1988, and 1990) are illustrative investigations on how the process of judgment of the claim is socially situated within the community maxims and expectations. In a case study of two biologists' attempts to fund and publish their research, Myers reported the modifications of their papers brought by the referees system at the conceptual and macro-structure levels. Comparing the final published papers and the scientists drafts, Myers observed that the process of revision was mostly concerned with "positioning the level of claim within the community structure" (Myers, 1985, p. 593); claims turn to become more cautious (an increase in the use of hedges) and speculations and proposals more restricted. To illustrate more, Myers cites the following changes:

courtship behaviour ...is dependent on androgens

courtship behaviour might depend on androgens

the implication of this observation have not been appreciated

the implication of this observation have not been fully appreciated

we propose that ...

one interpretation would be that ...

As it can be seen, the examples show that the revision process is not directly related with the evaluation of the claim itself, but rather concerned with "understatement, toning down- not one's claims for one's research, but one's language" (Myers, 1990, p.48). Thus, the linguistic and stylistic features are significant as they help the scientist place appropriately his claims or the whole research within the evidential context of the scientific literature. In so doing, the scientist is aiming at, hopefully, transforming his claims into facts which inevitably requires reader acceptance and linguistic and rhetorical means of persuasion. Bazerman (1984) elucidates how persuasion as part of the scientific knowledge is also codified by the discourse community maxims and constraints:

The individual writer in making decisions concerning persuasion must write within a form that takes into account the audience's current expectations of what appropriate writing in the field is. These expectations provide resources as well as constraints, for they provide a guide as to how an argument should be formulated, and may suggest ways of presenting material [...] (p.165).

Persuasion and argumentation are basic practices of the scientific knowledge. This is because "the construction of science, as a knowledge-producing activity, requires essentially argumentation before an audience" (Overington, 1977, p.p.143-44). This reveals the interactive nature of the scientific knowledge and how it is influenced by the basic elements of the communication process: writer, audience, language, and reality. All these aspects create a rhetorical context for the producing of knowledge and the shaping of research articles as well.

### **3.3. The Construction of the Scientific Research Article**

In a study of scientific discourse from a sociologist tradition, Knorr-Cetina (1981) observed the laboratory activities of a group of biochemists and documented their research articles writing afterwards. She analysed the scientists' articles from the first draft to the final resulting research paper. Knorr-Cetina pointed out that there are three major strategies of text modification: (a) the deletion of particular statements made in earlier versions, either obvious arguments which highly express a point of view or assertions regarded as "weak" or "dangerous", (b) the reshuffling of original statements, leading to a new paragraph structure, and (C) changes in the modality of assertions, from the necessary to the possible and from the strongly asserted to weakly assured. Knorr-Cetina (1981) claims that:

The scientific paper hides more than it tells on its tame and civilized surface. For one thing, it deliberately forgets much of what happened in the laboratory, although it purports to present a report of that research. Second, the written products of research employ a good deal of literary strategy largely unnoticed by the readers (p.94).

Indeed, the published paper does not reflect what actually occurs in a laboratory, (omitting false starts and failed procedures); therefore, it is rather a constructive report. This idea is also shared and cherished by Swales who strongly claims for the social constructivist view of the research article genre. Swales' suggested framework was foremost designated to assist non-native learners in university to acquire the macro structures and micro stylistic and linguistic levels which shape the texts of their disciplines. He (1990) defines the scientific research article as a "written text (although containing non-verbal elements), usually limited to a few thousands of words, that reports on some investigation carried out by its author or authors" (p.39). In addition, the RA will usually relate the findings with those of others, and may also examine issues of theory/or methodology. It is to appear or has appeared in a research journal or, less typically, in an edited book-length collection of papers.

According to Swales, the research article should follow a conventionalized pattern "the IMRAD format" which represents "the standard product of the knowledge manufacturing industry" (Swales, 1987, p.42). The IMRAD format includes the Introduction, Method, Result and Discussion sections, each of which is a genre that requires a conventional rhetorical pattern.

### **3.3.1. The Introduction Section**

The introduction section is one of the most significant rhetorical sections in the research article genre. It is in this section that scientists show the centrality and relevance of their present study. The most cogent attempt to analyse the introduction section is Swales (1990) "Create a Research Space" framework. Through this model, the introduction is divided in terms of moves and steps which are essentially motivated by the writer's:

Need to establish in the eye of the discourse community the significance of research itself; the need to situate the actual research in terms of that significance; and the need to show how that niche in the wider ecosystem will be occupied and defended (p.142)

The purpose of the first move “**establishing a territory**” ( See Chapter One, Figure 1) is to situate the research within the discourse community paradigm through reflecting the relevance of the topic. This move can be achieved by one or more of these three steps. The first one is to prove that the present study is worth investigating, which generally occurs at the outset of the introduction. The linguistic forms which are generally used to fulfil this function are:

Recently, there has been a spate of interest in how to .....  
In recent years, applied researchers have become recently interested in.....  
Recently, there has been wide interest in .....  
The explication of the relationship between .is a classic problem of .....  
Knowledge of .has a great importance for.....  
The study of .has become an important aspect of .....  
The effect of .has been studied extensively in recent years.....  
Many investigators have recently turned to..... (Swales, 1990, p.144)

The second step is to provide general statements about the field which enables the reader to construct general ideas about the topic. This step can be achieved by these linguistic realizations:

The aetiology and pathology of ... is well known.  
There is now much evidence to support the hypothesis that.....  
The properties of ... are still not completely understood.  
A standard procedure for assessing has been ...  
Education core courses are often criticized for... (p.146)

After providing generalisations about the topic, the third step is to review items of previous research. The purpose is to provide the reader with citations relevant to the present

study. The portrayal of previous studies enables the reader to have background knowledge and to see the relevance of the present study with the body of literature.

The main purpose of “**establishing a niche**” is to offer a space for the present research. This space or niche is created by indicating a gap in the research field or showing disagreement with or limitations of the previous studies.

| Category name                              | Forms                                 |
|--------------------------------------------|---------------------------------------|
| 1. Negative and Quasi-negative quantifiers | no<br>few/very few<br>Neither/nor     |
| 2. Lexical negation: verbs                 | fail, lack, overlook                  |
| Adjectives                                 | inconclusive, misleading, limited     |
| Nouns                                      | failure, limitation                   |
| Other                                      | without regard for                    |
| 3- Negation in the Verb phrase             | not/rarely                            |
| 4- Questions                               | direct<br>Indirect                    |
| 5- Expressed needs<br>Desires/interests    | there is a need/desire/an interest to |
| 6- Logical conclusions                     | must /seem/appear                     |
| 7- Contrastive comment                     | rather than.                          |
| 8- Problem raising                         | the key problem is                    |

After indicating a space or a gap, the writer needs to occupy that niche, which is the third move. Occupying the niche justifies the purpose of the present research and its whole outline or structure. Examples of the linguistic exponents are:

This paper reports on the results obtained.....

The aim of the present paper is to give.....

The present study extends.....

We now report the interaction .....(p.160)

Doubtless, the CARS model offers useful guidelines for non-native scientists to acquire the basic and necessary linguistic and rhetorical patterns of the Introduction section, which is a very important and difficult section to write. The difficulty of the Introduction derives from the pressure puts on the scientist to clearly establish and situate his claims in a significant, relevant, and persuasive area of scientific endeavour from the very beginning.

### **3.3.2. Materials and Methods Section**

The communicative purpose of materials and methods section is to report the procedures and materials used in the laboratory in order to permit replication. The scientist, therefore, should present all the necessary information of his experiment through a formulaic report of the employed procedures. The section has to provide in detail the experimental design, the materials, technical equipment and methods used by the scientist. The material and methods section is not written as a lab manual process, but as a descriptive procedure, without including failed procedures and unnecessary anecdotes.

The materials and methods section is characterised by the use of symbols, excessive nominalization, restricted use of lexis and a lack of cohesive connectors. That is why; the materials and methods section requires a great deal of domain knowledge from the reader (Hyland, 1998 a).

This section has received little attention in comparison with the other rhetorical sections. And, it becomes rather de-emphasised as readers refer to editors and reviewers comments to check the validity of the methods employed in the research (Berkenkotter & Huckin, 1995). But, still the presentation of the methods and procedures of a research is significant as it enables the reader to judge the scientists' claims after all. This is due to the

fact that Methods and materials are means of the persuasive tools a scientist should describe to achieve readers' acceptance. Prelli (1989) asserts that:

Typically, procedures scientists choose and describe in research reports are those the authors think will meet the audience's approval. Procedures reported are likely to be standardised of getting at the facts or of calculating data. If the audience understands or endorses the procedures, they are more likely to judge the authors and their claims favourably (p.156).

### **3.3.3. Results, Discussion and Conclusion Sections**

The result and discussion sections are the most persuasive rhetorical parts in the research article. It is here whereby scientists present, evaluate and interpret data. The interpretation of data starts in the results section and continues in the discussion section. Some research articles have three separate sections Results, discussion, and conclusion; while others omit the Conclusion and have only two sections: Result and Discussion sections. And, some have just one section Result/Discussion.

The communicative purpose of the Result section is to present the new scientific findings by examining the final outcomes of the scientists' experimental procedures. Hyland (1998a) reports that the interpretation of the new results is often hedged in order "to bring the reader into agreement with the author on what the experimental results mean" (Thompson, 1993, p.118). This need to persuade the reader is also reinforced by the use of evaluative comments to check the accuracy of data. The rhetorical effectiveness of evaluating material is highly based on explicit argumentation. Thus, the interpretation of results is not solely expository but also argumentative.

The communicative purpose of the Discussion section is to interpret data and relate the results with other works. Principally, the aim of the scientist is to situate the results and findings and the whole research within a wider setting by examining the validity of the research claims and, hence, revealing the contribution of the present study to the field.

As far as the rhetorical structure of the Discussion section is concerned, there have been some attempts to highlight the generic components of the discussion section. Belanger's (1982) study is one of the early works on the Discussion section. For him, after analysing 10 research articles in neuroscience, the Discussion section framework depends on the questions asked in the Introduction section. Belanger (1982) concludes that the Discussion is divided in terms of cyclic moves, including summarising results, what research suggests in relation with previous work, and further questions. Another attempt to study the Discussion section is the research of Dudley-Evan and Hopkins (1988) who extend Swales CARS model to the analysis of the Discussion section and ends up with a cyclic pattern of eleven moves:

Background knowledge → Statement of results → Unexpected outcome → Reference to previous research → Explanation of unsatisfactory result → Exemplification → Deduction → Hypothesis → Reference to previous research → Recommendation

Dudley-Evans (1994) analysis suggests that the Discussion section is mainly a composite of three parts: Introduction-Evaluation-Conclusion. The introduction paves the way to the whole discussion about the obtained results, Evaluation which is the heart of the discussion section "provides detailed comment on the key results and the writer's main claims", and conclusion "summarizes the main results and the writer's main claims" (1994, p.225).

Interestingly, what is shared by most of the suggested frameworks is the statement of results which is followed by a comment in order to evaluate the results and weigh evidence to check the credibility of the scientist' claims. Swales (1990) notices that the first statement of result upholds the strongest claim accompanied by weaker claims in later cycles. Despite these efforts to describe the rhetorical features and linguistic exponents of the Discussion section, there is an urgent call for further research into this important area of study.

### **3.4. Towards a Context of Scientific Hedging**

The significance of research papers as a critical means of knowledge communication in academia cannot be over minded. A research paper not only reports facts and phenomena, but also establishes the scientists' personal reputation. In Swales (1990) words, "publication is the major route to tenure, promotion, research grants and so on" (p.95). It is in research papers that scientists disseminate their knowledge and exhibit the relevance and novelty of their work to the community. Such an arduous process dictates on scientists employ some linguistic and rhetorical means of persuasion to convince the readers and, hence, achieve academic credibility. Thus, seeking for persuasion, recognition and consensus, scientists are incumbent to engage with readers when ratifying their claims trying to secure that their work is presented in a form that will meet the criteria of judgement imposed by the readers.

The major feature of a research article is the "novelty or news value of its knowledge claims" (Bazerman 1988; Hunston 1993; Berkenkotter & Huckin 1995). Hyland (1998b) contends that readers may refute a statement if it fails to correspond to adequacy or acceptability conditions. Adequacy conditions necessitate on the scientist to present his claims in a plausible and convincing manner in relation to reality so that it can be adequately accepted. The latter upholds the awareness of the process of claims' negotiation where the

scientist should adopt a professional acceptable persona. The two factors or conditions, Hyland explains, conceptualize that knowledge claims should:

- Respond to an existing and finite set of exigencies recognized by the community.
- Maintain and or expand the community's understanding of natural phenomena.
- Represent empirical adequacy and accuracy in terms of prescribed methods.
- Correspond to existing assumptions, theories and bodies of knowledge believed to accurately describe nature.
- Adopt the most certain and general position readers are likely to accept.
- Demonstrate a scientific ethos to the discourse community which involves
  - ii. recognizing previous work and acknowledging priority.
  - iii. concealing a rhetorical identity behind a prose of objectivity.
  - iv. presenting a modest and collegial persona, demonstrating deference to and willing

In essence, such sets of characteristics shape how scientists should present their claims in accordance with the scientific community guidelines and expectations. Particularly, one can notice that they highlight how knowledge claims should be highly related with reality knowledge (shared knowledge), audience, and language. These elements create a context for the use of hedging in scientific research articles.

### **3.5. Hedging in Scientific Research Articles**

Regarding the importance of hedging in academic discourse, several studies have been conducted by researchers. The studies attempt to uncover the significance of hedging in text-books (Myers, 1992), economic forecasting (Pindi & Bloor, 1986), science digests (Fahnestock, 1986), abstracts (Rounds, 1982), medical discourse (Salager-Meyer, 1994), and molecular genetics articles (Myers, 1989). Other studies were interested in the use of particular linguistic features like the use of modal verbs (Hanania & Akhtar, 1985; Butler, 1990), imprecise numeric expressions (Dubois, 1987; channell, 1990), and “commentative”

items (Adams-Smith, 1984; Skelton, 1988). However, Hyland (1996 a) claims that “little is known about the way hedging is typically expressed in particular domains nor the particular functions it serves in different genres” (p.252).

How hedging is used in research articles is a fertile area of investigation. Hyland (1998 a) reports how the study on hedging has important implications for a number of areas. Essentially, a better understanding of hedging in (RAs) provides valuable insights into how scientists carry out their work and establish their knowledge claims. The negotiation of the scientist claim and the accreditation of knowledge, as previously discussed (Sections 3.1-3.2), are socially situated within the scientific community conventions to guide the scientist having an acceptable persona. Scientific research articles are thus regarded as “socially constructed artefacts” (Hyland, 1998 a, p.16). Because of the social nature of research articles, scientists “do not only produce texts that plausibly represent reality. They use language to acknowledge, construct and negotiate social relations” (Hyland, 1998a, p.196). These practices whereby scientists interact with other researchers aim to persuade the reader to accept the scientists’ claims. This quest for consensus is the reason behind the use of hedging in scientific research articles. Therefore, “hedging is the mark of a professional scientist, one who acknowledges the caution with which he or she does science and writes on science” (Crismore & Fransworth, 1990, p.135).

Hyland (1998a) also discusses how research into the use of hedging in scientific research articles can also provide information about the practices of argumentation and reasoning, which are the core elements of scientific discourse. In presenting claims, there are some ideas which have a factive character: these are claims that belong to the knowledge belief of the field (shared knowledge) and they have been previously confirmed by the discourse community. Other statements are non-factive or hedged statement: these are

propositions a scientist assumes to be true as far as he claims so and convinces the reader to be so. Hence, the scientists' new claims have a negotiability character. Research into the use of hedges uncovers this negotiated process whereby the scientist attempts to transform research results and finding into convincing, "well established" knowledge claims. Hedges are among the devices which help scientists express a perspective on their statements and a degree of commitment towards some assertion.

Additionally, Hyland (1998 a) reports how investigation into the use of hedging has practical implications for research writing in L1 and L2 settings. In those contexts, students are generally informed to avoid tentative expressions and devices (Strunk & White, 1959; Winkler & McCuen, 1989, p. 97). This conception is mostly presented in style guides and ESP writing textbooks where hedges and tentativeness are regarded as unnecessary words and padded expressions which diminish the worthiness of a research paper. According to Hyland (1998a), hedging is a problematic aspect for L2 learners and is a major rhetorical gap in many of their writings. This can be related to what Thomas (1983) calls as "cross-cultural pragmatic failure" resulted from inadequate linguistic knowledge or culturally different perceptions as they write differently in their L1. That is why; research into the use of hedging will help both students and teachers by providing them with theoretical and analytic guidelines to write appropriately and effectively. Hyland (1998 a) asserts that "clearly the more we understand these features of academic writing, the more we can assist NNS to participate fully and successfully in the research field" (p.8).

### **3.6. Functions of Hedges**

Researchers in different fields have assigned various function of hedging. In general terms, hedging helps scientists present their claims with caution and humility, features which

are much more favoured by the scientific community than “argumental arrogance.” For Crompton (1997), the basic function of hedging is “to explicitly qualify the author’s lack of knowledge to the truth of the proposition he utters” (p.273). However, this is not the case for Crystal (1987) who claims that using hedges does not always reflect the authors’ lack of knowledge, but it may reflect the facts that:

- People intentionally do not like to be precise all the time.
- Sometimes, specifically in scientific writing, the writer understands that the audience needs “half-truth”.
- Using hedge words can act as safe guards, impeding further questions.

On his behalf, Powell (1985) maintained that hedging has an “evaluative function” as it reflects the speaker/writer judgement and assessment of the credibility of what they say or write. From his standpoint, Rounds (1981) claimed that despite the basic association of hedging with the function of making things fuzzy, hedging makes scientific claims more precise. Sharing the same idea, Skelton (1988) pointed out that hedging is not merely a cover up tactic but also a resource to express doubt and uncertainty for the sake of describing the state of affair with more precision and accuracy. Salager-Meyer (1994) partly agrees with these views which assign the use of hedging with (purposive) fuzziness. She (1994) states that hedging may reflect the true state or attitude of the writers’ understanding: “hedging ...may represent the strongest claim a careful researcher can make” (p.151). Salager-Meyer also discusses the function of hedging be it a negative politeness strategy, an idea which has been cherished by Myers (1989). According to him, hedging is *par excellence* a part of a politeness system whose function is to reduce the threat of the scientists’ claims to the face of other researchers. It is, thus, a protective strategy a scientist uses to soften his position in order to avoid harsh criticism and opposition. Likewise, Swales (1990) is of a similar opinion. He argued that hedging is a strategy used for “projecting humility, modesty, and proper caution in self-reports and for diplomatically creating space in areas heavily populated by

other researchers” (p.151). According to Hyland (1998 a), hedging is a linguistic and rhetorical resource by which academics construct knowledge as members of a particular community. For him, there are three basic functions of hedging which are mainly concerned with functions towards the propositional content, the reader, and the writer. First, hedges help scientists present their propositions with greater accuracy and precision. The use of hedges modifies the truth value of a proposition; it is true, accurate and precise as far it is expressed. Second, hedges help scientists protect themselves from the result of categorical commitment towards their statements. Using hedging, scientists will avoid their personal responsibility and rather refer back to limited samples, absence of adequate methodological procedures ...etc. The third function of hedging is concerned with the relationship of the reader and the writer. Writers, as members of the scientific community, should express a perspective on their statements and make efforts to persuade readers and gain acceptance of their work. They are, therefore, an intrinsic element in the process of negotiation whereby scientists should consider the reader role in the ratification of knowledge and the need to conform to the community expectations. In recent studies, Isabel (2001) also claims that hedging fulfils two basic functions. The functions reflect the attitude of the scientist towards the claim and the audience.

Noticeably, the functions associated with hedges devices vary from one researcher to another. Yet, what these descriptions have in common is the fact that hedging enables the scientist to express their lack of commitment towards some assertions taking into account the reader’s role in the ratification of their proposition. In the following section, the two main approaches to the study of hedging will be discussed.

### **3.6.1. Hedging as a Politeness Strategy**

Myers (1989) extends Brown and Levinson theory of politeness in spoken discourse to scientific research articles on the basis that “scientific discourse consists of interactions among scientists in which the maintenance of face is crucial” (p.5). According to him, interaction between the reader and writer is the primary function of writing. Swales (1992) also speaks about how it is essential for the scientist to “shield himself against criticism in spaces populated by other researchers like the research article genre” (p.175).

Research articles are rarely simple narratives of investigations. Instead they are completely distanced reconstructions of research activities, at least part of this reconstructive process derived from the need to anticipate and discountenance negative reactions to knowledge claims being advanced (Swales, 1990, p.175)

Writers’ and readers’ confrontation in the process of claims negotiation and the peculiarity of scientific discourse necessitate the use of hedges in order to protect the writer’s self-image and mitigate the impositions of negative reactions. Thus, hedging is a politeness marker used to redress the threat research claims contain to the “face” of the scientist and other researchers’ “faces” as well. Myers (1989) provides the following example:

**Example:** The findings *suggest* a common origin of some nuclear and mitochondrial introns and common elements in the mechanisms of their splicing. (p.14)

According to Myers (1989), the italicized verb is a hedge which acts as a politeness marker. Using the epistemic verb *suggest* indicates that the writer is cautious about his findings and the results are rather tentative. The writer wants to be in a safe position where he could protect himself (his face) from any threatening act that lurks behind any assertion. Therefore, Myers (1985) insists that scientists should make careful decisions about the level of the knowledge claim they want to express. Assertive claims are more likely to expose to criticism and opposition because they seem to challenge existing assumptions. And, as

expressed in Blisset (1972) words, “if a scientist is articulate, persuasive, if he goes to the heart of the matter, he is open to attack” (p.141). Simultaneously, however, lower level claims are not that welcomed because they may not be considered as reliable and authoritative. Swales (1990) ensured that “high-level claims are likely to be important but risky, whilst low-level claims are likely to be trivial but safe” (p.117). Clearly such a situation reveals the pressure puts on the writer in an attempt to negotiate his claims. Myers (1985) comments on such a situation by stating that “there is a tension inherent in the publication of any scientific article that makes the negotiating between the writer and a potential audience essential” (p.593).

Thus, the writer or researcher needs to be so careful when stating his claims which should be significant enough to be accepted and published. Myers (1989) regards hedging as an important tool a researcher should use to modify the strength of the claim without changing its significance. He (1989) contends that hedging can make “a claim, or any other statement, as being provisional, pending acceptance in the literature, acceptance by the community\_, in other words, acceptance by the readers” (p.12). Within the same line, Salager-Meyer (1994) claims that one of the main functions of hedging is to express modesty and humility and thus protecting the writer against negative reactions readers may impose. On his behalf, Crompton (1997) regards hedging as a politeness strategy in scientific context so interesting as it reflects the interactive nature of the scientific setting being as any social activity within which elements like speaker/writer, hearer/reader should be highlighted. However, Banks (1994) claims that associating hedging with expressing politeness in research articles should not obscure other important functions of the phenomenon. Hyland (1996 b) has also claimed that despite the explanatory power of Myers’ suggestive framework and the fact that it is central to any discussion on hedging, but it cannot be the sole adequate explanation

for the use of hedging in research articles. Myers' politeness system, grounded on Brown and Levinson conversational analysis, to account for hedging in scientific discourse can be only regarded as a partial view, Hyland (1998a) argued. In other words, looking at hedging as a politeness strategy neglects the multi-functional nature of hedging and also underplays the significance of authority and community in scientific discourse, elements which undeniably contextualise the use of hedging. In conclusion, Hyland (1998 a) puts it clearly that "we have to reject the politeness model as an adequate explanation for the use of hedging in science and conclude that discourse community norms are likely to play a larger part than credited by the Myers/Brown and Levinson model" (p.69).

### **3.6.2. Hedging as a Polypragmatic Phenomenon**

Hyland (1998 a) developed a functional framework of the use of hedges in research articles trying to account for the linguistic, sociological and discourse perspectives of the concept. For him, the classification of hedges should indicate how knowledge is linguistically expressed and how readers, or the discourse community, affect the ratification of such knowledge.

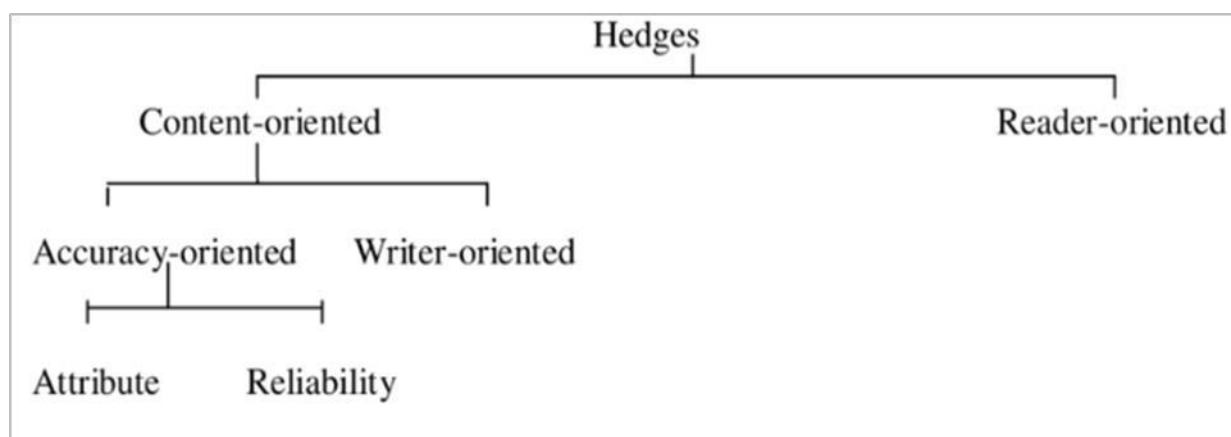
To begin with, Hyland (1996b) claimed that matching specific meanings or functions of hedging devices to particular forms is not always possible because of the polypragmatic nature of hedges as they "do not fit into a neat scheme of discrete categories which allows one meaning to be clearly distinguished" (p.437). To this end, a problem of indeterminacy is introduced because choosing a given hedging device does not always suggest "a single unequivocal pragmatic interpretation" (Hyland, 1996b, p.437).

Because indeterminacy appears to be an inherent feature of the epistemic use of language, an adequate account of hedging in scientific discourse must look beyond a mono-meaning model. In other words, hedges seem to require a more-or less rather than an all-or-nothing account. (Hyland, 1998 a, p. 157)

Consequently, Hyland developed a fuzzy category model trying to reflect the multi-functional nature of hedges. Hyland model is fuzzy as he applied the theory of fuzzy sets with graded membership by Zadeh (1972). The theory is based on the idea that most classes that categorize the real world are fuzzy. A “fuzzy-set is a class with unsharp boundaries, that is, a class in which the transition from membership to non-membership is gradual than rather abrupt” (Zadeh, 1972, p. 4).

Therefore, the prominent feature of the fuzzy category is its flexibility of membership transition in which “at the core an expression will most closely approximate to the meaning of the category while examples at the periphery will exhibit less precise meanings” (Hyland, 1998, p.161). Applying this to his framework, Hyland explained that at the core of writer-oriented hedges, examples will denote self-protection and moving towards the periphery examples which denote propositional accuracy will rather appear. Added to the theory of fuzzy sets, Hyland has also applied the prototype modern theory to his analysis of hedging in scientific research articles. The underlying tenet of the theory of prototypicality is the idea that categories are not homogeneous sets of sharp boundaries of membership relationships, but they rather have a prototype model with fuzzy borders, which can be related by family resemblance (Hyland, 1998a). Looking at hedging in terms of the prototype theory, Hyland (1998a) states that “hedging might be seen as a basic-level category offering the largest number of correlated attributes such as *weakens the force of statements, contains modal*

*expressions, expresses difference, signals uncertainty, and so on*” (p.160). In a schematic form, he offers the following diagram:



**Figure 4. Hyland’s Model of Scientific Hedging (Hyland, 1998a, p.156)**

### **3.6.2.1. Content-oriented Hedges**

Content-oriented hedges “mitigate the relationship between the propositional content and a non-linguistic mental representation of reality; they hedge the correspondence between what the writer says about the world and what the world is thought to be like” (Hyland, 1998, p.162). In other words, content-oriented hedges refer to the correspondence of writer’s propositional content and reality. And, they are motivated by either the writer’s desire to present uncertain scientific claims with appropriate caution (accuracy-oriented hedges), or seek self-protection from poor judgement (writer-oriented hedges).

#### **3.6.2.1.1. Accuracy-Oriented Hedges**

Accuracy-oriented hedges concern the writer’s desire to express propositions with greater precision. They denote the degree of writers’ specification of the accuracy of the proposition and, thus, making the state of affair precise. In Hyland’s words (1996 b), they

represent the “institutionalised” language of science as they help convey the state of knowledge” (p.440). Consequently, readers are expected to understand the proposition is true as far as it can be determined. In turn, accuracy hedges are also divided into attribute and reliability hedges.

#### **3.6.2.1.1.1 Attribute Hedges**

Attribute hedges specify attributes of phenomena more precisely describing how far their results approximate the idealised conception. The use of attribute hedges help writers clearly define entities in order to be accurately described via putting “limits on certainty by restricting the time, quality or generalizability of the proposition” ( Hyland, 1998a, p. 187). Among the central devices act as attribute hedges are adverbs expressing precision in terms of degree or frequency (e.g., *approximately*, *generally*).

#### **3.6.2.1.1.2. Reliability Hedges**

Reliability hedges express the writer’s uncertain knowledge and his reservation on the validity of the claim in order to present the content as truthfully as possible. The main motivation for reliability hedges, Hyland (1998a) explained, “is a desire to clarify the state of knowledge, a hedge against complete accuracy, rather than a wish to seek protection against overstatement” (p.167). Among the central manifestations of reliability hedges are modal verbs, full verbs, adjectives and nouns.

#### **3.6.2.1.2. Writer-oriented Hedges**

While accuracy-oriented hedges concern the propositional precision, writer-oriented hedges “*diminish* the author’s presence in the text rather than increase the precision of claims”

(Hyland, 1996b, p. 443). By so doing, the use of writer-oriented hedges aim to protect the author from possible opposition and discountenance negative reactions or threats by restricting the writer's personal commitment to the truth value of a proposition. Hyland stated that such an association of hedging with fuzziness resembles Lakoff's (1972) portrayal of hedges devices. Yet, "what is made fuzzy is the relationship between the writer and the proposition, rather the claim itself" (Hyland, 1996b, p. 443). The absence of writer agentivity is the defining feature of writer-oriented hedges, mainly realised by the use of:

Judgemental epistemic verbs, particularly speculative (assume, propose, predict) and evidential verbs (appear, seem).

Or passive constructions:

(22) The BS fraction *is assumed to* originate from the center of the.....

Or clausal subjects:

(23) *It might be speculated that* the lack of crDNA in methylation in cv. Platenese could .....

Or the construction of "abstract rhetors" which nominalise a personal projection:

(24) *These date indicate* that A processes the intrinsic

.....Or by attribution to literature:

(25) This hypothesis seems plausible because UV-B absorbing flavonoids accumulate in leaf epidermal cells, where they may protect the inner cell layers from UV-B damage (Caldwell, et al, 1983; Beggs et all 1986).

Or reference to methods, models employed or conditions of the study:

(26) *Despite the limitations of this method,* the results suggest that the protein mentioned .....

### 3.6.2.2. Reader-oriented Hedges

The other category of hedges in scientific research articles is reader-oriented hedges. The motivation for the use of such a kind of hedges is two-fold. First, categorical assertions leave no space for negotiation, and they rather ignore the reader's involvement in the ratification of knowledge. Second, hedged statements help scientists project a professional *persona* which cherishes the readers' role in the ratification of knowledge. Thus, the use of reader-oriented hedges reflects the interactional nature of statements where the author invites the reader to engage in a dialogue and judge the truth value of the proposition. Added to the interpersonal function of reader-oriented hedges, there is also a normative aspect. Not only should the scientist adhere to norms of the scientific setting, but he should also show "conformity to research community expectations concerning deference to colleagues in presenting information" (Hyland, 1998a, p.178). All these rules, behaviours, and norms help the scientist make his voice heard by other peers and colleagues. Conforming to these maxims and practices is necessary for the accreditation of knowledge which is a social process after all.

Core examples of reader-oriented hedges are clear in managing disagreement and avoiding conflict: For example,

(27) *We do not know the reasons for the discrepancy between our results and those of Ngernprairitisiri et al, but it might reflect genetic differences in the cultivars employed.*

Personal attribution is another example of reader-oriented hedges where the writer gives his personal opinion and leaves some room for judgement to the reader.

(28) *We infer* that the rate become limited by the rate of regeneration of RuBP-saturated Rubisconetics, ....

Difference to the reader may also be achieved by using the indefinite article or hypothetical conditionals:

(29) *A model* implying most lateral heterogeneity in the thylakoid membrane.....

(30) *If we assume* that the apparent molecular weight obtained by SDS PAGE is correct, *this suggests* that *a few* amino acids are missing from the N-terminal end.....

Questions can also act as reader-oriented as they “involve more closely the reader in the research and convey the communality of the scientific quest” (Hyland, 1998a, p. 138).

(31) But which functional form is more nearly correct, particularly at longer or shorter lives?

Worth to say, Hyland claimed that despite his proposed framework, ‘indeterminacy’ is still a feature of the use of hedges in research articles because some cases assigned with a category can be included in another. He, therefore, suggests the following generalisations in determining the core cases:

- 1) Where the principal role of the hedging device is to specify the extent to which a term accurately describes the reported phenomena, it is likely to be acting as an *attribute hedge*.
- 2) Where the principal role of the hedging device is to convey the writer's assessment of the certainty of the truth of a proposition, then it is likely to be performing a *reliability function*.
- 3) Where the device occurs in a context which conceals the writer's viewpoint and avoids personal responsibility for propositional truth, then it is probably acting as a *writer-oriented hedge*.

- 4) Where the writer acknowledges personal responsibility for the validity of propositional content or invites reader involvement, then the device is likely to be acting as a *reader-oriented hedge* (Hyland, 1996 b, p.439).

## Conclusion

In chapter three, the aim was to create a context for the use of hedging in the scientific research article genre, which is the concern of the current study. Scientific knowledge is socially manufactured and constructed in a quest for consensus. A scientist is a member of a large community which dictates the shaping of knowledge as well as scientific practices as persuasion and argumentation, which are the central features of scientific discourse. Thus, seeking for persuasion and consensus, scientists engage with readers attempting to present their knowledge claims in a convincing and acceptable manner. Consequently, the linguistic choices made by the scientist when expressing his claims are so crucial. Hedges are among the devices which help the scientist convey their attitude to the truth value of their statements by presenting unproven claims with caution and softening categorical assertions. This is a function of hedges among other functions which vary from one researcher to another. However, the two main approaches towards the analysis of the functions of hedging are the politeness model and the polypragmatic model. The politeness model treats hedges as politeness markers scientists use to modify the strength of the claim without changing its significance, thus protecting the scientist from negative reactions readers may impose. On the other hand, Hyland provides a polypragmatic model which takes into account the multi-functional nature of hedges. The model provided by Hyland (1998a) will be adopted in this study.

## Chapter Four

### Methodology: The Studied Corpus

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## **Chapter Four**

### **Methodology: A Consideration of 31 Articles**

#### **Introduction**

This chapter offers a description of the methodological framework and tools used in this research to analyse hedging in Algerian biology articles. The chapter presents the steps and stages followed for the analysis and the procedure used to identify the frequency of hedges devices and to determine the pragmatic function of the identified hedges. This study also sought to determine the distribution of hedging forms across the rhetorical sections of the research article genre (IMRAD). To this end, this study makes use of quantitative and qualitative analyses of hedging in the studied corpus. The quantitative analysis demonstrates the way of classifying the types of hedges' surface realisations and provides statistical counts of them. The qualitative descriptive method is employed to describe the function of the use of hedges in the research articles.

The chapter starts with reviewing some theoretical concepts which are important and necessary namely the corpus linguistic approach. The latter is used in this study as a methodological tool to analyse the use of hedges. The key concept in corpus linguistics 'the corpus' is defined and the principal issues in collecting a corpus are examined. After providing these theoretical considerations, how the corpus of biology articles has been compiled is presented and discussed. Then, the chapter moves to offer a detailed description of the research methodology, the quantitative and pragmatic analyses.

## 4.1. Overview of Corpus Linguistics

As stated in chapter one, the scope of analysis of discourse has been widened with the emergence of corpus linguistics. Corpus linguistics is a branch of applied linguistics which investigates language on the basis of corpora (Johansson, 1995). According to Kennedy (1998), “the use of corpora does not in itself constitute a new or separate branch of linguistics. Rather, corpus linguistics is essentially descriptive linguistics aided by new technology” (p.268). Within the same vein, Teubert (1996) claims that corpus linguistics is “the modern face of empirical linguistics” (p.vi). Looking at corpus linguistics as descriptive or empirical is explained by the fact that Corpus linguistics (CL) is used as a methodological tool to explain and get thoroughly in the construction of discourses as it basically offers and provides the discourse analyst with software and statistical analytical tools which enable him analyse naturally occurring data, this latter is called a corpus.

However, the nature of corpus linguistics is a topic of debate: is CL a theory or a method? Stubbs (1993) refuted the definition of corpus linguistics as a methodology, and, claims that “... a corpus is not merely a tool of linguistic analysis but an important concept in linguistic theory” (pp.23-4). Teubert (2005) is of the same vision and he stresses the theoretical conceptualisation and describes corpus linguistics as “a theoretical approach to the study of language” (p.2). In a similar vein, Meyer (2002) also strongly affirms that

It is wrong to assume that the analysis of corpora has nothing to contribute to linguistic theory: corpora can be invaluable resources for testing out hypotheses based on more functionally based theories of grammar, i.e. theories of language more interested in exploring language as a tool of communication (p.2).

However, according to Granger (2002),

Corpus linguistics can best be defined as a linguistic methodology which is founded on the use of electronic collections of naturally occurring texts, viz. corpora. It is neither a new branch of linguistics nor a new theory of language, but the very nature of the evidence it uses makes it a particularly powerful methodology, one which has the potential to change perspectives on language (p.4).

For Granger and other corpus linguists (for example, Biber et al., 1998 and Kennedy, 1998) corpus linguistics is a powerful linguistic methodology and not a theory or a branch of linguistics because it is all about doing linguistics via the use of corpora. Gries also (2006) favours the methodological paradigm of corpus linguistics and he writes that “over the past few decades, corpus linguistics has become a major methodological paradigm in applied and theoretical linguistics” (p.191). Thompson and Hunston (2006) claim that corpus linguistics can be basically considered as a methodology which could be applied to any theoretical approach to language. According to McEnery, Xiao and Tono (2006), “corpus linguistics is a whole system of methods and principles of how to apply corpora in language studies and teaching/learning, it certainly has a theoretical status. Yet theoretical status is not theory in itself” (pp.7-8). Therefore, they put it clearly that corpus linguistics is a methodology rather than a theory. Being a theory or a method, corpus linguistics’ nature is still a question of discussion. Other scholars (Aarts, 2002; Teubert, 2005), among others, consider corpus linguistics neither a theory nor methodology, but a discipline. Leech (1992) regards corpus linguistics a paradigm. He explains that “computer corpus linguistics defines not just a newly emerging methodology for studying language, but a new research enterprise, and in fact a new philosophical approach to the subject” (p.106). For Taylor (2008), corpus linguistics is a paradigm, a discipline or a combination of all these.

Noteworthy to say, the approach that will be taken in this study is that of corpus linguistics as a research methodology. Corpus linguistics is used here as a methodological tool to investigate the use of hedges devices.

## **4.2. Corpus-based Methodology**

Corpus-based methodology has approached the study of language in a different manner as to what has been traditionally dealt with. Sinclair (1991) puts it clearly that

Thirty years ago when this research started it was considered impossible to process texts of several million words in length. Twenty years ago it was considered marginally possible but lunatic. Ten years ago it was considered quite possible but still lunatic (p.1).

Accordingly, analyses of long texts are possible thanks to corpus methodology which has not been possible many years ago. The benefits of corpus-based approaches are well-known. Among the advantages of corpus-based methodology, corpora make it possible to uncover patterns and regularities of use by providing information about the frequency and co-occurrence of a linguistic entity (Kaltenböck et al., 2010). Corpus linguistics does not emerge with “the development of computers but there is no doubt that computers have given corpus linguistics a huge boost by reducing much drudgery or text-based linguistics and vastly increasing the size of the databases used for analysis” (Kennedy, 1998, p.2). Corpus linguistics has an immense challenge in the discovery of new facts which “have led to far-reaching new hypotheses about language, for example about the co-selection of lexis and syntax” (Stubbs, 1996, p. 232). According to Leech (1992), the use of computers “gives us the ability to comprehend and to account for, the content of ....corpora in a way which was not dreamed of... in the pre-computational era of corpus linguistics (p.106). Likewise, Hardt-Mautner (1995) investigates the ability of the computer to uncover patterns and regularities of

discourses and he comes to a conclusion that the quantitative approach is as important as the qualitative and they have to be combined for better understanding. In essence, gathering the quantitative and the qualitative techniques makes the qualitative analysis more precise and the quantitative data more reliable to the point to be generalizable (McEnery & Wilson (1996).

Examining various approaches to analysis of lexico-grammatical level of particular disciplinary discourses, Hunston (2002) maintains that

The techniques of corpus investigation are ideally suited to examining specific, fairly homogenous discourses. Specialised corpora can be compiled relatively easily and connections can be made between the phraseology of a discourse and the ideology of the discourse community. The results are clearly applicable to the needs of those seeking to be socialised into that community (p.204).

Thus, using the corpus-based methodology to the analysis of discourse is helpful in uncovering the repeated patterns and specific forms of a given discourse. To this end, socializing into a discourse community could be possible because “repeated patterns show that evaluative meanings are not merely personal and idiosyncratic, but widely shared in a discourse community” (Stubbs, 2001, p.215).

The corpus approach (Biber, Conrad, and Reppen, 1998, p.4) is a composite of the following features:

1. It is empirical, analysing the actual patterns of language use in natural texts.
2. It utilizes a large and principled collection of natural texts, known as a “corpus”, as the basis for analysis.

3. It makes extensive use of computers for analysis, using both automatic and interactive techniques.

4. It depends on both quantitative and qualitative analytical techniques.

### **4.3. Principal Issues in Designing a Research Corpus**

The basic element in corpus linguistics is the notion of “corpus, pl. corpora or corpuses, developed from the Latin word corpus, -oris, meaning a body, mass, collection, set etc. For Sinclair (2005), a corpus, in a general term, could refer to “a collection of pieces of language text in electronic form, selected according to external criteria to represent, as far as possible, a language or language variety as a source of data for linguistic research” (p.16). The selected corpus is a sample which represents a language variety as a source of information. Hunston (2002) defines corpus as “... a collection of naturally occurring examples of language, consisting of anything from a few sentences to a set of written texts or tape recordings, which have been collected for a linguistic study” (p.2). In this definition, the corpus size is varied from few sentences to large blocks of texts whether written or spoken, being compiled for a linguistic purpose. For Bowker and Pearson (2002), “a corpus can be described as a large collection of authentic texts that have been gathered in electronic form according to a specific set of criteria” (p.9). The features or criteria upon which a corpus is collected are different to some extent from one researcher to another, but the common criteria that most researchers agree upon will be highlighted.

**“Representativeness, balance and sampling”** are among the commonly accepted features in collecting an adequate corpus for the investigation. According to Biber (1993),

representativeness “refers to the extent to which a sample includes the full range of variability in a population” (p.243). In other words, the chosen corpus should reflect as far as possible the whole population under investigation in terms of characteristics of the variety of the genre and balance. The representative corpus is “one sampled in such a way that it contains all the types of text, in the correct proportions, that are needed to make the contents of the corpus an accurate reflection of the whole of the language or variety that it samples.” (McEnery & Hardie, 2012, p.250). A corpus is representative in condition it successfully captures the variability of a language. Researchers also discuss that the size of the corpus does not guarantee representation of the corpus; that is to say, a large corpus does not necessarily mean a representative corpus. Interestingly, Biber (1993) and Sinclair (2005) suggest certain stages or steps to achieve the feature of representative of the corpus:

- a. decide on the structural criteria that you will use to build the corpus, and apply them to create a framework for the principal corpus components;
- b. for each component draw up a comprehensive inventory of text types that are found there, using external criteria only;
- c. put the text types in a priority order, taking into account all the factors that you think might increase or decrease the importance of a text type — the kind of factors discussed above;
- d. estimate a target size for each text type, relating together (i) the overall target size for the component (ii) the number of text types (iii) the importance of each (iv) the practicality of gathering quantities of it;
- e. as the corpus takes shape, maintain comparison between the actual dimensions of the material and the original plan;
- f. (most important of all) document these steps so that users can have a reference point if they get unexpected results, and that improvements can be made on the basis of experience.

(Sinclair, 2005, p. 8)

Another important feature of a corpus is “**the size of the corpus**”. The size of the corpus is basically related with the methodology of the research itself. The size can refer to the number of words only or numbers, symbols and markers...etc. Bowker and Pearson (2002) explain that “there are no hard and fast rules about how large a corpus needs to be [...] though large means a greater number of texts than you would be able to easily collect and read in printed form” (p.11). According to Sinclair (1991), the corpus should encompass millions of words to adequately and hopefully represent the language. To quote his words (1991),

In modern computational linguistics, a corpus typically contains many millions of words: this is because it is recognized that the creativity of natural language leads to such immense variety of expression that it is difficult to isolate the recurrent patterns that are the clues to the lexical structure of the language (p.171).

According to him, large size corpus reflects the wide range of choices and expressions of language structure. Yet, Bowker and Pearson (2002) have another view and they rather associate the size of the corpus with the purpose of the study; “but exactly how large depends on the purpose of your study” (p.11). Biber (1990) (cited in Flowerdew, 2012) has the same vision and he refutes this rule “bigger is better” concerning the size of the corpus and also speaks about the objective of the researcher as a determinant factor. Flowerdew (2012) claims that small size corpus could be used to investigate very specific features of language like grammatical elements with the help of qualitative data, the analysis of which can be very useful indeed. To quote her words,

Smallish samples of a few thousand words can yield useful insights into the linguistic realization of strategic competence for maintaining interpersonal relations. There is thus a case to be made for using more qualitative data for examining very specific sub- purposes concerning socio- pragmatic behaviour, which could easily be overlooked in larger-scale quantitative analysis (p.5).

Likewise, according to Biber (1993), to investigate features such as the number of present and past tense verbs in English, for example, a sample of 1000 words may seem sufficient. Worthy to say, however, the corpus size is an issue of ongoing debate in corpus construction. It can be said that the size of the corpus is mostly determined by the questions raised by the researcher, the purpose of the study and other practical considerations.

**“Machine-readability”** is an important feature of modern corpora. Machine-readable means that the corpus is held in plain ASCII or Unicode text files that can be inserted, operated, and treated electronically. Thanks to the development of technology and the use of computers, we can process machine-readable data consistently and accurately. To this end, with the use of computers we can avoid human bias in an analysis and, consequently, making the results more reliable. Thus, this automatic processing is much faster and less error-prone than any other methods (McEnery & Wilson, 1996).

#### **4.4. Collecting the Corpus**

A corpus can be defined as “a collection of machine-readable authentic texts (including transcripts of spoken data) that is sampled to be representative of a particular natural language or language variety” (McEnery et al., 2006, p. 5). In this research, our concern is research articles written by Algerian scientists in the field of biology. Before discussing the corpus of investigation, we will first shed some light on the state of publication in Algeria.

#### 4.4.1. The State of Publication in Algeria: Difficulties and Challenges

Publication in Algeria and its scientific output have witnessed stages evolving through the years whether at the local or international levels. At the beginning of 2009, signs of progress appeared after the government implemented a special strategy to improve the quality of scientific research. The number of research labs in universities increases from 600 in 2008 to 1400 in 2016. Additionally, the number of researchers in all disciplines grows — from 1200 to 30,000 professors in universities. There are now 60,000 doctorate students in the country. In addition, there are 30 research centers, outside the university campus, at the national level where 2500 permanent researchers work. Importantly, the number of scientific publications remarkably expands from 12,000 research papers published in high-profile scientific journals in 2008 to 45,000 in 2015. Undeniably, there is a quantitative development concerning the publication of Algerian scientists, but there is a lack of qualitative improvement in the Algerian community and institutions (Aissaoui, 2017), which is so clear in the rank of Algerian universities:

| Country | World Rank | University Name                                                |
|---------|------------|----------------------------------------------------------------|
| Rank    |            |                                                                |
| 1       | 2099       | Université des Sciences et de la Technologie Houari Boumediene |
| 2       | 2213       | Université Abou Bekr Belkaid Tlemcen                           |
| 3       | 2675       | Université Djillali Liabes                                     |
| 4       | 2691       | Université Mohamed Khider Biskra                               |
| 5       | 2716       | Université de Béjaia                                           |
| 6       | 2894       | Université' Alger 1                                            |
| 7       | 3068       | Ecole Nationale Polytechnique d'Alger                          |
| 8       | 3088       | Université Constantine 1                                       |
| 9       | 3107       | Université de Batna                                            |
| 10      | 3139       | Université Kasdi Merbah Ouargla                                |

**Table 8. The Rank of Algerian Universities among the World (2016)**

According to Aissaoui (2017) this problem or “crisis” as he calls it is due to the state of publication in Algeria. He writes (2017) that

Publications have a profound impact on the international rank of universities, and the above classification of the best Algerian universities compared with international universities is clear and regrettable evidence that significant percentage of Algerian lecturers, researchers and research students do not publish neither in simple nor in high-impact journals (p.306).

In her research on publication, Slougui (2009) has claimed that the state of publication in Algeria might be mostly affected by “its being both a non-English speaking and a third world country” (p. 16). In a world whereby English is the lingua franca of scientific communication, Slougui (2009) speaks about the language barrier which impedes Algerian scientists as readers and writers.

In order to solve the problem of publication, Algeria has implemented new mechanisms and strategies like “open access journals”. Directory of Open Access Journals (DOAJ) is an online directory that indexes and provides access to quality open access, peer-reviewed journals. Open access is a new movement in Algeria. It is recently that Algerian scientists and publishers recognize the significance of open access journals. Out of 359 Algerian scientific journals listed by the DGRSDT (National Council of Scientific Research and Technology of Algeria), only a few are indexed in the DOAJ. The Ministry of Higher Education and Scientific Research has already decided that PhD students can defend their theses by publishing their papers in Algerian OA journals indexed in Scopus, Web of Science, DOAJ, etc. This positive step will surely boost the number of Algerian OA journals.

#### 4.4.2. The Corpus

The material for the present thesis consists of a selection of scientific research articles written by Algerian scientists writing in Algerian locally published journals in the field of biology written in English. The criteria for selecting an article into the corpus construct the basis of this study. This procedure has been followed. As a first stage, target journals have been selected from Algerian published journals. Algerian journals of biology have been searched from ASJP <sup>8</sup> website, which offers a number of journals published in the chosen domain. We have also contacted some Algerian biologists and asked them to provide us with names of Algerian locally published in the field of biology. Most of them mentioned “the Algerian journal of natural products”.

*The Algerian Journal of Natural Products* is an open access journal, free of charges, published three times a year by the Laboratory of Organic Materials (LOM), Faculty of Technology, University of Bejaia, Algeria. The journal is dedicated to research of all aspects of Plant and Natural Products.

*PhytoChem & BioSub Journal (PCBS Journal* is a peer-reviewed Open Access research journal published by Phyto chemistry & Organic Synthesis Laboratory. The PCBS Journal publishes innovative research papers, reviews, mini-reviews, short communications and technical notes that contribute significantly to the scientific knowledge related to the field of Phytochemistry & Bioactives Substances (Medicinal Plants, Ethnopharmacology, Pharmacognosy, Phytochemistry, Natural products, Analytical Chemistry, Organic Synthesis,

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<sup>8</sup>[www.aspj.cerist.dz](http://www.aspj.cerist.dz)

Medicinal Chemistry, Pharmaceutical Chemistry, Biochemistry, Computational Chemistry, Molecular Drug Design, Pharmaceutical Analysis, Pharmacy Practice, Quality Assurance, Microbiology, Bioactivity and Biotechnology of Pharmaceutical Interest ).

*La revue Sciences & Technologie. C, Biotechnologies* is a biannual journal. It publishes scientific articles in three languages : French, English and Arabic in the following disciplines: Biotechnology, Vegetal Physiology Biochemistry, Microbiology, animal Physiology, Immunology, food Industries , agronomical Sciences, veterinary Sciences, Medical and pharmaceutical.

*Genetics and Biodiversity journal* is devoted to tackle the variety of genetic characteristics involved in the genetic structure of a species; it is the diversity within the species which acts as the major reason for the distinguishing characteristic expressed by each individual. All forms of life on earth, whether microbes, plants, animals, or human beings, contain genes. Genetic diversity is the sum of genetic information contained in the genes of individual plants, animals, and micro-organisms.

*AGROBIOLOGIA* created in 2010 and edited by the Laboratory of Research in Biotechnology of vegetal productions, University Saad Dahlab, Faculty of Sciences of Nature and Life, Department of Agronomy. It is a biannual journal, specialised in agronomical and biological sciences.

All these journals are peer-reviewed. Peer-reviewed journals ensure a high level of quality of the published articles. All the mentioned journals from which the corpus was compiled are indexed in DOAJ. Only articles by Algerian scientists written in English were concerned. Biology as a discipline has sub-areas like: microbiology, biochemistry,

physiology, plant biology, animal biology, genetics, anatomy, and immunology. That is why; it is related to other disciplines and fields like chemistry and medicine. Because most of these journals cover other disciplines and not only biology, I asked the help of some biologists to make sure that the articles of the corpus are about biology, though the interference of other disciplines within biology is inevitable.

As a second stage, the articles should have the conventional IMRAD (Introduction, Method, Results, and Discussion) sections in the RAs. Noteworthy, most of the articles respect the format. When it came to the date of publication, articles published between 2014–2019 have been examined. Consequently, we finished up with a corpus which consists of 31 articles consisting of 69672 token words. The size of the corpus, hopefully, would help us dig thoroughly into the use of hedging.

| <b>Journal Title</b>                                | <b>Number</b>    | <b>Year of Publication</b> |
|-----------------------------------------------------|------------------|----------------------------|
| Phyto Chem & BioSub                                 | <b>14</b>        | 2016-2019                  |
| La revue « Sciences & Technologie Biotechnologies » | <b>7</b>         | 2014-2016                  |
| Genetics and Biodiversity Journal                   | <b>2</b>         | 2019                       |
| AGROBIOLOGIA                                        | <b>2</b>         | 2019                       |
| Algerian Journal of Natural Product                 | <b>6</b>         | 2015-2019                  |
| <b>Total</b>                                        | <b>31 (100%)</b> | <b>2014-2019</b>           |

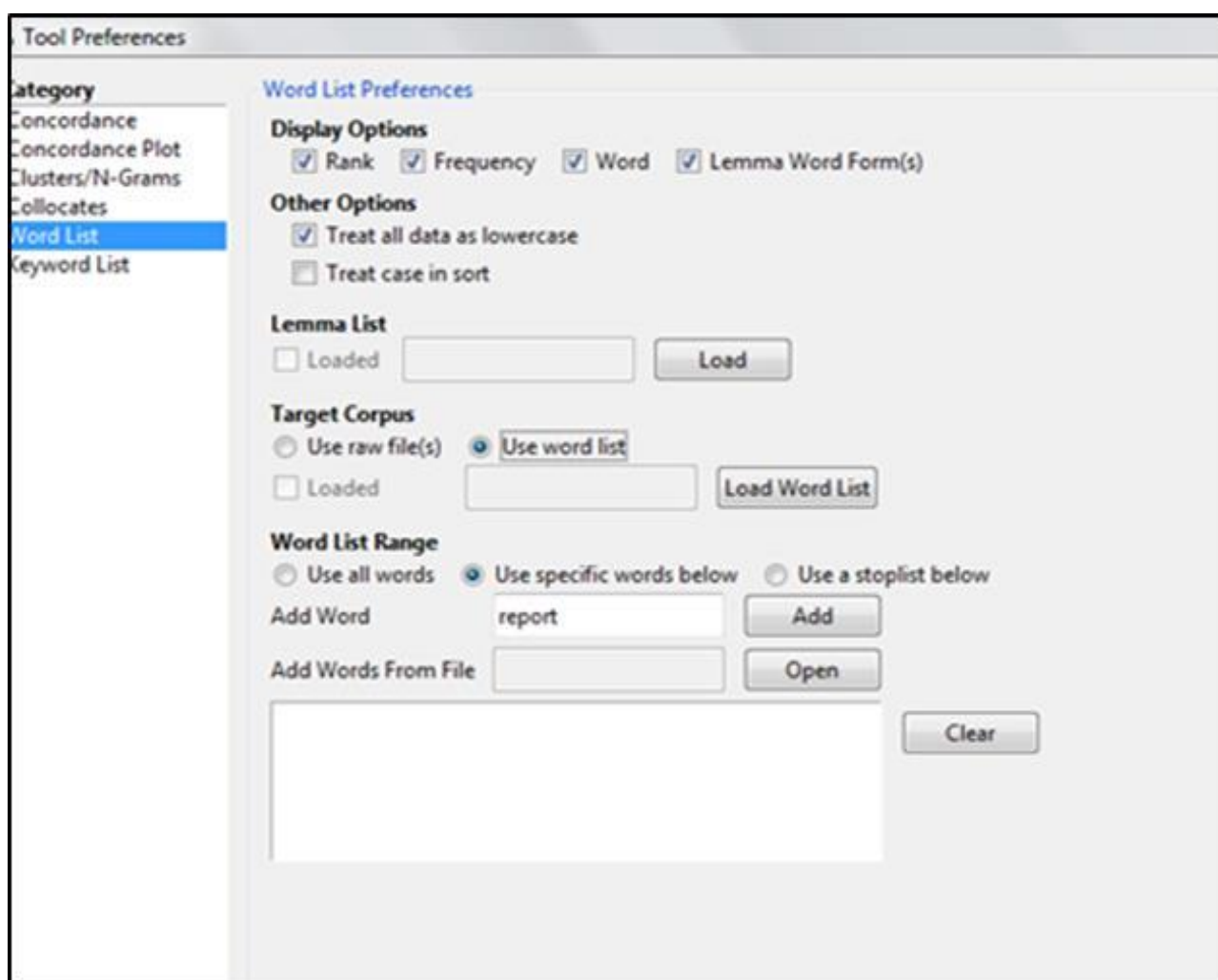
**Table 9: Number and Title of Journal Articles in the Corpus**

Once the research articles in English have been selected, they have been analysed in terms of the hedging forms and functions. The methods and procedures used for analysing the data are discussed in the next section of this chapter.

## **4.5. Research Methodology**

As far as the methodological framework is concerned, it was fairly difficult to construct an adequate method for the purposes of the present study given the nature of hedges (chapter two). The “subjectivity factor” is an inevitable element in judging various hedging expressions (e.g. Grabe& Kaplan 1997). Accordingly, some factors and considerations have been taken into account in designing the quantitative and qualitative analyses.

First, the sample articles were analysed using Laurence Anthony Antconc program, which is a software having seven tools Concordance Plot Tool, File View Tool, Clusters/N-Grams, Collocates, Word List and Keyword List. The Word list function has been used which counts the number of occurrences of specific items. For the purpose of electronic analysis, a list of possible hedging devices has been devised and compiled based on Varttala’s (2001) research. The Algerian articles are available online as PDF files , and for the purpose analysis, they were converted into Plain Text format (UT-F8) using Antconc converted files, in order to be processed in the software tools. The following figure represents the Word List function of Antconc:



**Figure 5. Word List Function of AntConc 2019**

Then, because of the highly contextual nature of hedges, the electronic search was followed by a meticulous manual search to examine the identified hedges. The lack of context is raised by Hunston (2002), who considers this issue to be one of the main drawbacks of using corpus-based approach in linguistics research (p.23). Another difficulty is the fact that hedges may appear in single items, phrases, clauses, sentences, or even paragraphs; which could not be calculated with the software. The program could only work with lexical properties. A decision has also to be made between epistemic and root modality.

Second, after identifying and categorizing hedging devices according to the taxonomy proposed by Varttala (2001), a quantitative analysis was conducted to determine the frequency of hedging forms and their percentages. The frequency of hedging forms in this study is calculated per "word" since the majority of the studies conducted in this area have applied "word" as the unit of showing the distribution of hedging devices in a corpus (Butler, 1990; Coates, 1983; Hyland, 1998a; Varttala, 2001; Yang, 2003). The 1000 -word approach is the one adopted by many researchers. The procedure for calculating the relative frequency per 1000 words is as follows: first the raw number (count) of the device in RA(s) was determined. The raw number was multiplied by 1,000 and the result was divided by the total number of words of the research articles or the examined section. In addition to the relative frequency per 1000, the relative percentage of a particular hedging device was counted as well. After identifying the hedging forms in the studied corpus, the researcher provided possible contextual interpretations of the hedging devices to identify their functions.

#### **4.6. Procedure of Analysis**

There are different taxonomies of hedges as far as the linguistic or formal categories are concerned (see chapter two). Brown and Levinson (1987) put it clearly that "it should be born in mind that the semantic operation of hedging can be achieved in indefinite numbers of surface forms" (p. 146). Likewise, Clemen (1997) states that "there is no limit to the linguistic expressions that can be considered hedges... The difficulty with these functional definitions is that almost any linguistic item or expression can be interpreted as a hedge" (p.6). Hyland (1998) claims that hedges "not only do they often have different semantic interpretations, for example between root and epistemic domains, but they may also convey a

range of meanings for particular users in particular contexts” (p.156). Thus, the use of hedges is both polysemeous and polypragmatic. The nature of hedges, consequently, makes the study into the use of these devices difficult.

To be able to analyse hedges which appear in the examined scientific research articles, it is necessary to settle upon a suitable classification. The classification of hedges appearing in the corpus will be two-fold. Hedges will be categorized according to the form in which they appear (i.e. verb, adverb, noun...etc.) and also to the function they exhibit in the analysed articles (writer-oriented, reader-oriented, and content-oriented). The analysis is not only linguistic, but also pragmatic. It is to identify and classify the linguistic items which act as hedges and to distinguish the functions of the identified surface features:

|                                                                        |  |
|------------------------------------------------------------------------|--|
| <b>Quantitative Surface-level Analysis</b>                             |  |
| (To characterise the extent of hedging and its major forms in a sample |  |
| <b>Pragmatic analysis</b>                                              |  |
| (To identify the purposes served by items in particular cases)         |  |

**Figure 6. Theoretical Framework for Hedging Analysis (Hyland, 1998a, p.99)**

#### **4.6.1. Quantitative Surface-level Analysis**

The analytical framework used in the present study was Varttala’s (2001) typology. Varttala’s categorisation of hedges is a revised version of Hyland’s (1998a) taxonomy of hedges. Varttala’s taxonomy was used previously by several researchers (e.g., Atai & Sadr,

2008; Tahririan & Shahzamani, 2009), a fact that shows its relative credibility for the purpose analyzing forms of hedging, which is presented in the following figure<sup>9</sup>

- 1. Modal auxiliary Verbs**
- 2. Full verbs**
  - 2.1. Non-factive reporting verbs
  - 2.2. Tentative cognition verbs
  - 2.3. Tentative linking verbs
- 3. Adverbs**
  - 3.1. Probability adverbs
  - 3.2. Adverbs of indefinite frequency
  - 3.3. Adverbs of indefinite degree
  - 3.4. Approximative adverbs
- 4. Adjectives**
  - 4.1. Probability adjectives
  - 4.2. Adjectives of indefinite frequency
  - 4.3. Adjectives of indefinite degree
  - 4.4. Approximative adjectives
- 5. Nouns**
  - 5.1. Non-factive assertive nouns
  - 5.2. Tentative cognition nouns
  - 5.3. Nouns of tentative likelihood
6. Clausal elements.
7. Questions.
8. Other

**Figure 7. Classification of Hedging Forms (Varttala, 2001, p. 289)**

Worthy to say, the differences in the classification by Hyland (1998) and Varttala (2001), as far as the lexical manifestations of hedges are concerned, are not related with the main categories, but with the sub-categorisations of these main types. All these studies claim that there are four core categories of lexical hedges. These are verbs, adjectives, adverbs and nouns.

#### **4.6.1.1 Modal Auxiliaries**

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<sup>9</sup>The Types of hedges with examples from the corpus are in Appendix B.

According to Butler (1990), “modals are used in rather complex ways in scientific texts, in the making of claims from evidence, and more particularly in making generalizations about what is possible in the behavior of the universe, on the basis of observation of what actually happens” (p.139). Modal auxiliaries or verbs expressing epistemic modality are considered the most frequent category or means of hedging. There are nine central modals: *can*, *could*, *may*, *might*, *will*, *would*, *shall*, *should*, and *must* (Biber et al., 1999, p.485). The following table demonstrates the epistemic meaning of modals based on Coates (1983):

| <b>Modal</b>  | <b>Epistemic Meaning</b>                         | <b>Paraphrase</b>                                                |
|---------------|--------------------------------------------------|------------------------------------------------------------------|
| <b>Can</b>    | None                                             | None                                                             |
| <b>Could</b>  | Tentative possibility                            | I believe/perhaps                                                |
| <b>May</b>    | Epistemic possibility                            | I believe/perhaps                                                |
| <b>Might</b>  | Epistemic possibility                            | I believe/perhaps                                                |
| <b>Will</b>   | Prediction about present based on repeated exper | I confidently expect                                             |
| <b>Would</b>  | Past prediction/ hypothetical prediction         | I confidently expected/<br>I expect given unlikely<br>conditions |
| <b>Shall</b>  | Prediction about present based on repeated exper | I confidently expect                                             |
| <b>Should</b> | tentative assumption based on inference          | I assume /probably                                               |
| <b>Must</b>   | confident inference based on deduction           | I am sure                                                        |

**Table 10. Epistemic Meanings of Modal Verbs (Coates, 1983)**

## **May/Might**

Both epistemic *may* and *might* express possibility but *might* is said to be more tentative. According to Coates (1983), *may* and *might* are the primary modals used for

epistemic possibility which can express the speaker's lack of confidence in the proposition expressed. Consider the examples<sup>10</sup>:

**Example 1:** However, other mechanisms such as inhibition of macromolecular synthesis that may operate during bacterial killing by these plants extracts.. (A6)

**Example 2:** Another explanation *might* be that phenolic compounds interfere with membrane function and interact with membrane proteins, causing deformation in structure and functionality. (A 6)

## Can/Could

Perkins (1983) claims that “can” and “may” have the same core meaning (p.37). However, it should be pointed out that the auxiliary *can* seems to be very problematic in terms of its pragmatic analysis. There is an agreement that *can* does not seem to allow epistemic reading in affirmative sentences. According to Hyland (1998a), Affirmative “can” expresses primarily a deontic/intrinsic meaning (permission, possibility, and ability)” (p.109).

**Example 3:** Modern day clinical trials have shown that aqueous extract of lavender *can* improve the memory and has shown promise in the treatment of Alzheimer disease. (A 6)

However, despite these claims, it has been argued that “can” can be successfully used as a hedge. It is used as such to weaken the strength of an assertion aiding the writers to avoid personal responsibility for their statements:

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<sup>10</sup>All the examples are extracted from the corpus, see Appendix A.

**Example 4:** Studies on species as *Citrus medica* L.cv. Diamante (cidra) demonstrated anticholinesterase activity, which can be explained by high amount of monoterpenes present in the skin of the fruit [13]. (A26)

Epistemic *could* is similar to *may* and *might* which are mainly used for expressing tentative possibility (Perkins, 1983). Consider these instances:

**Example 5:** The high PH values of soils *could* have accounted for a low transfer of metals from soil to plants. (A 27)

## **Will/Would**

The modal *will* in its non-epistemic meaning is generally used to denote willingness, intention, and insistence. The epistemic readings of *will* have to do with “predictability about the present” (I confidently predict that it is the case that p”) or prediction about the future (I predict that...).

**Example 6:** These results can only be conclusive *if* the study population *will* be larger. (A23)

In its deontic meaning, *would* expresses willingness, intention, and volition. On the other hand, the main epistemic function of *would* is showing tentativeness or (Coates, 1983). Consider the following example:

**Example 7:** This value *would* express the rate of mutations between the two DNA sequences leading to different, but similar or homologous 16S RNAs. (A20)

Hyland (1998 a) explains that writers do not intend to show all their commitment to the propositions and rather express tentativeness rather than hypothesis. Through using some "softening" modals like *would*, writers try to “avoid forcing the reader to accept a forthright insistence on the recognition of the claim” (p.113). Coates (1983) also speaks about another epistemic use of *would* as marking the past tense of *will* which is used to express “confident assertion or prediction about some action or state in the past (p.208). In this sense, it refers to the predictability of some actions based on repetition, or back shifting, which is so common in science.

### **Shall/Should**

Coates (1983) has mentioned just one epistemic meaning for *shall*, the “weak 'futurity' sense of prediction.” In this sense, it can be equivalent to “I predict that . . . / it is predictable that ...” Epistemic *should* is paraphrasable by “I assume” and expresses “tentative assumption based on reference” (Coates, 1983 as cited in Hyland, 1998 a, p. 106). The epistemic *should* can express “less confident assessment of probability based on facts known to the writers” when compared with epistemic *would* (Hyland, 1998 a, p. 104). For Hyland, the use of the modal *should* is associated with “subjectivity”; the writer’s attitude to proposition and what he exactly thinks is probable.

### **Must**

Epistemic *must* expresses a high level of probability. In this sense, epistemic *must* is used to “express confident inference based on deduction from the facts available” (Hyland, 1998a, p.106).

#### 4.6.1.2. Full Verbs

Full verbs with epistemic meaning are also regarded as basic means of hedging. They are classified into three groups: non-factive reporting, tentative cognition and linking verbs.

##### 4.6.1.2.1. Non-factive Tentative Reporting Verbs

This category of verbs includes verbs which are used to tentatively describe the work of other researchers or the own research of the writer himself. Examples of this sub-class are: *suggest, show, and notice*.

**Example 8:** In the present study, diabetic rats *showed* a significant decrease in total cholesterol, triglycerides, LDL-C, VLDL-C associated with significant decrease in HDL-C levels. (A1)

##### 4.6.1.2.2. Tentative Cognition Verbs

This category of verbs encompasses verbs which are attributed to mental status or mental processes allowing the writer to present the information based on cognition. Examples of this sub-class are *believe, assume* and *understand*.

**Example 9:** It is generally *understood* that roots act as a barrier to the movement of heavy metal through the soil-plant system [21]. (A27)

##### 4.6.1.2.3. Tentative Linking Verbs

This category consists of verbs which are used to express tentativeness when the writer is stating his ideas or others researchers' information. Examples of this sub-class are: *seem, appear* and *tend*.

**Example 10:** In the weeks that followed (4, 5, 6, 7 and 8), we observed that the poisoned plants *seem* more fragile than control plants...(A 27)

#### 4.6.1.3. Epistemic Adjectives

Epistemic adjectives encompass three types: probability adjectives, adjectives of indefinite degree, and adjectives of indefinite frequency.

##### 4.6.1.3.1. Probability Adjectives

According to Varttala (2001), these are adjectives which are “used to express different degrees of probability concerning the certainty or accuracy of what has been said” (p.135). They are often regarded as content-oriented hedges. Examples of this sub-class include: *possible*, *likely*, and *plausible*

**Example 11:** Suggesting that, the extract of the selected plants could be a *possible* source to obtain active molecule to treat infections ... (A 6)

##### 4.6.1.3.2. Adjectives of Indefinite Degree

These are the type of adjectives which “allow the authors to invest the propositions presented with justifiable degree of certainty or exactitude” (Varttala, 2001, p.137). They signal the extent to which the propositional content applies (Malášková, 2014). Examples of this sub-class include: *significant*, *partial* and *relative*.

**Example 12:** Moreover, the essential oil showed *significant* antimicrobial activity but the ethanol extract showed low antimicrobial activity. (A 16)

#### 4.6.1.3.3. Adjectives of Indefinite Frequency

For Varttala (2001), adjectives of indefinite frequency express “tentative qualifications where numerical exactitude is not necessary or possible, or as indications that what is said is based on the most characteristic features of a given phenomenon, and that it may not capture the full picture of the phenomenon or apply to each and every case” (p.137). Examples of this sub-class include: *frequent*, *rare* and *typical*.

**Example 13:** ...H. Scopariumis used to treat *numerous* human diseases especially the infectious one such as skin infections, urinary and genital infections. (A 11)

#### 4.6.1.4. Epistemic Adverbs

Hyland (1998 a), Varttala (2001) and Malášková (2014) have discussed the formal classification of this category. Yet, none of them offers straightforward answers to the best approach to this category. Hyland relies on classifying adverbs on the basis of their syntactic function (adjuncts, disjuncts), providing several sub-categories (downtoners in adjuncts, style and content disjuncts). Varttala and Malášková, on the other hand, have approached adverbs as hedges from the semantic angle. Basically, According to Vartalla (2001), “it appears that the hedging potential of adverbs is primarily a question of their basic meaning components rather than of whether they function syntactically as for instance adjuncts or disjuncts” (p.127). Varttala’s categorisation which is based on the meaning of the adverb, rather than its syntactic property has been followed. These are adverbs of indefinite degree, adverbs of indefinite frequency and adverbs of approximation.

#### 4.6.1.4.1. Probability Adverbs

Probability adverbs are used to denote degrees of probability in order to indicate that the presented information is inconclusive. Examples of this sub-class include: *possibly*, *probably*, and *tentatively*.

**Example14:** Moreover, rhamnetin resulted to be more active than quercetin and morin, *probably* because of the methoxy in the A-ring, which makes this molecule more hydrophobic. (A 27)

#### 4.6.1.4.2. Adverbs of Indefinite Degree

These are adverbs which express epistemic qualification of the information presented. They are “institutionalized” language of science using Salager-Meyer’s words (as cited in Varttala, 2001, p. 131). Example of this sub-class encompasses *quite*, *somewhat*, *rather* and *partly*.

**Example 15:** The group of diabetic rats showed *significantly* elevated total cholesterol and triglycerides in their liver, pancreas, and adipose tissue as compared to the control group. (A1).

#### 4.6.1.4.3. Adverbs of Indefinite Frequency

Adverbs of indefinite frequency are by nature indefinite which makes them perfect for hedging functions. Particularly, they permit the speakers not to commit to categorical assertion or to exact figures (Varttala, 2001, p.129). Examples of this sub-class include: *generally*, *often*, and *occasionally*.

**Example 16:** It is *generally* understood that roots act as a barrier to the movement of toxic heavy metal through the soil plant system. (A27)

#### **4.6.1.4.4. Approximative Adverbs**

Approximative adverbs are the kinds of adverbs which are used to express an approximation which can be associated with vagueness, imprecision and manipulating numerical data. Examples of this sub-class include: *almost*, *just*, and *about*.

**Example 17:** Crocus genus consists of *about* 85 species and many of them are considered as economically valuable (A 5).

#### **4.6.1.5. Nouns**

In fact, the category of nouns is mostly related with the previously mentioned classes in which many of them are derived from the mentioned verbs or adjectives and, thus, they share the hedging and tentative function as well. The noun category is also classified into the following subclasses:

##### **4.6.1.5.1. Non-factive Assertive Nouns**

Non-factive assertive nouns are “used to signal, that what is said may be an unfounded claim, not empirically validated fact, the issues dealt with are likely, but not absolutely certain to provide useful information, that the information is predictive by nature, or the analytical model suggested is only putative” (Varttala,2001, p.140). Examples of this sub-class include: *prediction*, *proposition*, and *indication*.

**Example 18:** Nowadays, the bioinformatics tool takes a considerable place in the analysis of the results and especially in the *prediction* of the structures and the gene functions. (A 20)

#### 4.6.1.5.2. Tentative Cognition Nouns

This type of nouns refers to these items which can express tentative and non-categorical information and are rather based upon the writer's subjective points of view or other sources. Varttala (2001) posits that “they hint that we are not dealing with unquestionable truth, but rather mental constructs of approximate characterizations of the matter” (p.141). Examples of this sub-class include: *assumption*, *belief* and *inference*.

**Example 19:** Thus, the *evaluation* of antimicrobial activity of flavonoids tested on six pathogens showed a slight inhibition on E.coli.S and aureus and P. fluorscens. (A 7)

#### 4.6.1.5.3. Tentative Likelihood Nouns

These nouns denote that “although what is said is likely to apply, this may not be invariably or necessarily so” (Varttala, 2001, p.142). Examples of this sub-class include: *probability*, *possibility* and *potential*.

**Example 20:** The hypersensitivity of the strain *Staphylococcus aureus*ATCC can be explained by the *probability* of the sensitivity of bacteria Gram (+) to external environmental changes, such as temperature, pH and the natural extracts due to the absence of the outer membrane [27]. (A 7)

#### 4.6.1.6. Clausal Elements

Clausal elements used to express hedging are mainly linked with if-clauses. According to (Hyland, 1998 a), if-clauses are considered “a common means of qualifying commitment to methodology, theory or model, by making one circumstance dependent on another and thereby hedging the certainty of the outcome” (p.145).

**Example 21:** The present study is aimed mainly to: (1) analyze the essential oil extracted from the aerial part and determine the phenolic compounds from the ethanol extract; (2) Investigate the antioxidant and antimicrobial activities for to determine *if* these essential oil and ethanol extract could be used as natural preservatives. (A 1)

#### 4.6.1.7. Questions

Interrogative constructions may be used to discuss a significant unresolved topic or hedge the writers’ commitment towards their propositional information by making it relative to the state of knowledge (Hyland, 1998 a). For Varttala (2001), questions may be used as “the means by which the authors wish to engage the readers and thus draw their attention to the uncertainties concerning their results” (p.147). Questions are not a very common hedging strategy, but they could be used as reader-oriented hedges.

#### 4.6.1.8. Other Hedges

Varttala (2001) has established this category to account for some items of hedges which do not fall in any of the above mentioned forms of hedges. Examples of this category include: *most*, *little* and *several*.

**Example 22:** *Several* anti-inflammatory drugs have shown dose-dependent ability to inhibit thermally-induced protein denaturation. (A 8)

#### 4.6.2. Pragmatic Analysis

In the current study, the purpose is not only a statistical linguistic analysis of hedges devices and their realisations, but there is also an interest in the functional framework of the use of hedges in scientific research articles. In chapter three, two main functional approaches of the use of hedges in scientific research articles have been discussed: hedging functions in the politeness model and hedging functions in a polypragmatic model. This latter is adopted in the present study. According to Hyland (1998 a), the functions of hedges are linked with the proposition, the writer and the reader. Hyland's approach has been thoroughly presented (chapter three) and the following table summarises his model:

| Category    | Content – Oriented Hedges                                                                                                                                |                                                                                                                                                                                                                                |                                                                                                                                                                                                                             | Reader–Oriented Hedges                                                                                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Accuracy –Oriented hedges                                                                                                                                |                                                                                                                                                                                                                                |                                                                                                                                                                                                                             |                                                                                                                                                                                                 |
|             | Attribute hedges                                                                                                                                         | Reliability hedges                                                                                                                                                                                                             | Writer -oriented hedges                                                                                                                                                                                                     |                                                                                                                                                                                                 |
| Description | specifying the extent to which a term accurately describes the reported phenomena                                                                        | conveying the writer's assessment of the certainty of the truth of a proposition                                                                                                                                               | occurring in a context which conceals the writer's viewpoint and avoiding personal responsibility for propositional truth                                                                                                   | acknowledging personal responsibility for the validity of the propositional content or inviting reader involvement                                                                              |
| Examples    | 1. degree of precision adverbs: partially, quite, barely<br><br>2. style disjuncts: generally, approximately<br><br>3. qualification: viewed in this way | 1. epistemic modal verbs, adjectives, nouns, adverbs: the possibility, may be, probably<br><br>2. content disjuncts: presumably, apparently<br><br>3. expressions indicating knowledge limitations: it is not known whether... | 1. passive constructions: is assumed to be<br><br>2. clausal subjects: it might be speculated<br><br>3. Abstract rhetors: these data indicate<br><br>4. judgmental epistemic verbs + impersonal phrasing: the model implies | 1. personal attribution (verbs of judgment and deduction): I believe, we infer<br><br>2. indefinite article: a model<br><br>3. hypothetical conditionals: if we assume that<br><br>4. questions |

**Table 11. Taxonomy of Hedges according to Function – Hyland (1998 a)**

Trying to put Hyland's theoretical approach into practice was problematic and complicated. One of the reasons is, in fact, stated by Hyland (1996 a) himself who puts it clearly that realisations of one category might have meanings of another category. The cut-line between the categories is not clear which makes the analysis very complicated. The distinction between, for example, writer-oriented hedges and reliability hedges is unclear; both are considered "content-oriented hedges".

Reliability hedges enable the writer to state his knowledge in a clarified manner. Writer-oriented hedges help the writer shield himself from possible falsification of their assertion (Hyland, 1998a). Seemingly, the two categories do not exhibit the same function. However, according to Hyland, writer-oriented and reliability hedges are realised by the same lexical form: epistemic modals and main verbs. The distinction between the two is based on the type of the claims. For Hyland (1998 a), "writer-oriented hedges are often associated with higher level claims than accuracy-oriented ones" (p.70). That is to say, if the writer is making major and principal claims of his findings, this type would be considered a writer-oriented hedge. Yet, when the writer makes minor claims of his findings and results, hedges of this type are "reliability hedges". Practically speaking, attempting to draw a distinction between major and lower level claims is a problematic issue. And what about the type of claims which mediates between the two extremes, they are neither major nor minor, like claims relating to methodology, previous work and other information in the research article (Varttala, 2001).

With regard to the problems found in applying Hyland's approach and to overcome the complexity of Hyland's model, I relied on Maláškova (2014) modified classification model as the basis for my analysis, which is presented in the following taxonomy:

| Content-oriented Hedges             |                                                     | Participant-oriented Hedges                                                        |                                                                            |                                                                                                                |
|-------------------------------------|-----------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
|                                     |                                                     |                                                                                    |                                                                            |                                                                                                                |
|                                     |                                                     | Writer-oriented Hedges                                                             | Reader-oriented Hedges                                                     |                                                                                                                |
| aim at greater accuracy (precision) | aim at the extent of applicability/generalizability | protect the writer by depersonalizing the information presented in the proposition | appeal to the reader by employing various strategies of reader involvement | attenuate assertiveness and appeal to the reader by personalizing the information presented in the proposition |

**Table 12. Taxonomy of Hedges (Malášková, 2014, p. 50)**

In fact, Malášková (2014) model of analysis is based on Hyland's taxonomy (1998a), but the writer-oriented hedge stands as a separate category. She also combines attribute and reliability hedges under one broader category. The main choice of this model is basically practical in order to be able to make the pragmatic analysis. To diminish erroneous decisions, I followed a series of tests, as proposed by Malášková (2014). The latter (Malášková, 2014) suggests that if a removal of a linguistic item results in any of the effects below, we are indeed dealing with a hedge:

- increase in the extent, scope or amount to which proposition is true for the phenomenon;
- or
- increase in the extent, scope or amount to which proposition corresponds to reality; (**content- oriented hedges**)
- increases the writer's commitment to p; (**writer- oriented hedges**)
- increases the assertiveness of the utterance. (**reader -oriented hedges**) (p.64).

The following sentence excerpted from my data serves as an example of this method:

**Example 23:** Inhibition in dry weight and length of root and shoot of *Rhapanus Sativus* has been observed; these effects of lead on growth and biomass accumulation are *possibly a consequence of effect of metabolic processes of plant* [20]. (A27)

If we remove the adverb *possibly*, the sentence would be: Inhibition in dry weight and length of root and shoot of *Rhapanus Sativus* has been observed; these effects of lead on growth and biomass accumulation are a consequence of effect of metabolic processes of plant [20]. In other words, the use of *possibly* here modifies the correspondence of the propositional information to the extent of truthiness. The adverb *possibly*, hence, acts as content-oriented hedge. Undeniably, we will also rely on Hyland's intrinsic and useful ideas to better comprehend the use of hedges.

#### **4.6.2.1. Content-oriented Hedges**

Content-oriented hedges are concerned with the proposition and its relation with reality. In writing research articles, scientists are seeking to state their informational content as accurately as possible (adhering to Grice's maxim of quality). Content-oriented hedges are described as being the "institutionalised" language of science, as they allow the writer to convey the state of knowledge (Hyland, 1996b, p. 440). In other words, content-oriented hedges denote the extent to which the proposition is true and, simultaneously, they signal the writer's stance about the possibility of the propositional information being or becoming true. Content-oriented hedges are mainly realized by, with regard to the taxonomy according to form in the present study, by all the categories of adverbs, all categories of adjectives, nouns, modal verbs, main verbs and "other hedges" categories.

#### 4.6.2.2. Writer-oriented Hedges

While content-oriented hedges seek to promote precision by expressing the exact state of knowledge, writer-oriented hedges are concerned with protecting the writer's scientific credibility. According to Hyland (1998 a), "claims carry a considerable risk and an element of self-protection may be necessary" (p.170). Therefore, Hedges of this type help the writer shield himself from possible and negative reactions readers may impose by limiting their personal commitment. Thus, the type of these hedges aims to remove the writer persona or diminish the link between it and the propositional information. Writer-oriented hedges are realised primarily by impersonal structures such as passive constructions (24), abstract rhetors (25), clausal subjects (26), attribution to literature (27) and impersonal reference to research /methods+ limits (28).

**Example 24:** This method *was taken* from the principles of titling the antibiotics (European pharmacopeia 2002) its application for the essential oil *was approved* by the microbiology CRD Saidal, it *was also used* by some authors [16-25]. (A 29)

**Example 25:** *The data obtained* revealed a significance decrease in the LPL activities of liver, pancreas and adipose tissue in rats of diabetic groups, as previously reported by...(A 1).

**Example26:** *It could be concluded that* methanol extract of *Crocus Sativus* L., constitute a potent source of polyphenols, an excellent ...(A 5)

**Example 27:** *According to [19],* Gram-positive bacteria are more sensitive to the action of flavonoids than Gram negative bacteria. (A 21)

**Example 28:** *However, the relatively small size of the cohorts used for these studies does not reveal the real effect of these polymorphisms on this pathology.* (A23)

#### 4.6.2.3. Reader-oriented Hedges

Reader-oriented hedges express the writer's audience awareness, regarded as one of the conventions of academic discourse in general (Hyland, 1998 a). By using this type of hedges, the writer draws the readers to the text to make a kind of a dialogue, allowing them to decide about the issues presented. Hedging is a strategy of persuasion "which ensures that the audience accepts and interprets presented propositions according to the writer's intentions and goal" (Raušová, 2016, p. 38). Reader -oriented hedging strategies are realised by means of personal attribution (29), questions and hypothetical Conditionals (30).

**Example 29:** *We also found that triglyceride levels of diabetic animals increased significantly in comparison with control rats ...*(A22)

**Example 30:**...(2) Investigate the antioxidant and antimicrobial activities for to determine *if these essential oil and ethanol extract could be used as natural preservatives.* (A16)

### 4.7. Research Questions

This research attempts to answer the following questions:

1. What are the difficulties encountered by Algerian biology scientists when they hedge in this corpus?
2. How frequent is the Algerian scientists' use of hedges in RA?

3. What are the most and least used forms of hedges in Algerian scientists' research articles?
4. How are hedging forms distributed across the rhetorical sections of the research article (IMRAD)?
5. What is the most hedged rhetorical section in the Algerian biology research articles?
6. What functions do hedges express in the examined corpus?

## **Conclusion**

This chapter has presented the framework used to conduct the analysis of hedges. The quantitative analysis is based on Varttala's typology (2001) in order to identify the realisations of hedges devices in the examined corpus. The pragmatic analysis is based on Malášková's (2014) model which allowed the researcher highlight the functions of hedging in the Algerian scientists of the biology corpus. Principally, the research aims 1) to characterise the extent of hedging and its major forms in the Algerian corpus and 2) to identify the pragmatic purposes served by the identified hedges.

## Chapter Five

### Corpus Analysis

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## Chapter Five

### Corpus Analysis

#### Introduction

The practical part of the present work introduces the results of the analysis carried out based on the principles described in the chapter of methodology. The aim of the analysis was to answer the raised questions. The analyses focus on the frequency of occurrence of the types of hedges suggested by Varttala (2001), the distribution of these forms through the research article structure as well as the pragmatic functions served by hedging in the Algerian corpus. But, prior to present the findings of the use of hedges in the examined corpus, it is worth making some observations about hedging analysis.

#### 5.1. Analysis of Hedging

There have been some points which have been taken into account when investigating the use of hedges in the corpus. First, Hedges can be described as polysemous and polypragmatic (Hyland, 1998a). They could express a number of related meanings simultaneously. Consequently, a problem of indeterminacy appears in an attempt to analyse the use of hedging. Therefore, the decision made to attribute a hedge function to a word cannot be seen in isolation, but it “must look beyond the mono-meaning model” (Hyland, 1998 a, p. 157). To explain more, consider the following example:

**Example 1:** *The data obtained revealed a significance decrease in the LPL activities of liver, pancreas and adipose tissue in rats of diabetic groups, as previously reported by...(A 1).*

The verb “reported” could be regarded as a content-oriented hedge which modifies the correspondence of the propositional content to reality. At the same time, when we consider the verb “reported” as part of the construction *The data obtained* revealed a significance decrease in the LPL activities of liver, pancreas and adipose tissue in rats of diabetic groups, then the whole construction would be considered an abstract rhetor, then functions as a writer-oriented hedging.

Second, another difficulty in coding data was the distinction between root and epistemic meaning of modal auxiliaries. There were some cases where the distinction was not straightforward. To differentiate between root and epistemic reading of a modal, a simple test is to be made according to Butler (1990). If the modal “could be paraphrased “it is possible that p”/it may be that, the particular instance is regarded as epistemic. However, if it could be paraphrased “it is possible for x to”, it is regarded as root” (p.146). Yet, there are cases where there is an overlap between enabling conditions that permit x to occur (root possibility) and the writer’s lack of confidence in the possibility that x (epistemic possibility). Consider the following example:

**Example 2:** Oxidative stress *might* be generated by maternal overnutrition, elevated circulating lipids, inflammation and insulin resistance [9]. (A 30)

= either a) it is possible that this explains the event. (Epistemic possibility)

Or b) it is possible for oxidative stress to be generated under the mentioned circumstances or conditions. (Root possibility)

As the example can reveal, both readings are possible. For Hyland (1998a), this

overlap between root and epistemic readings of a modal is not a conflict and is just possible to occur. However, worthy to mention, cases caused doubt were not considered as hedges in this study.

## 5.2. Quantitative Analysis

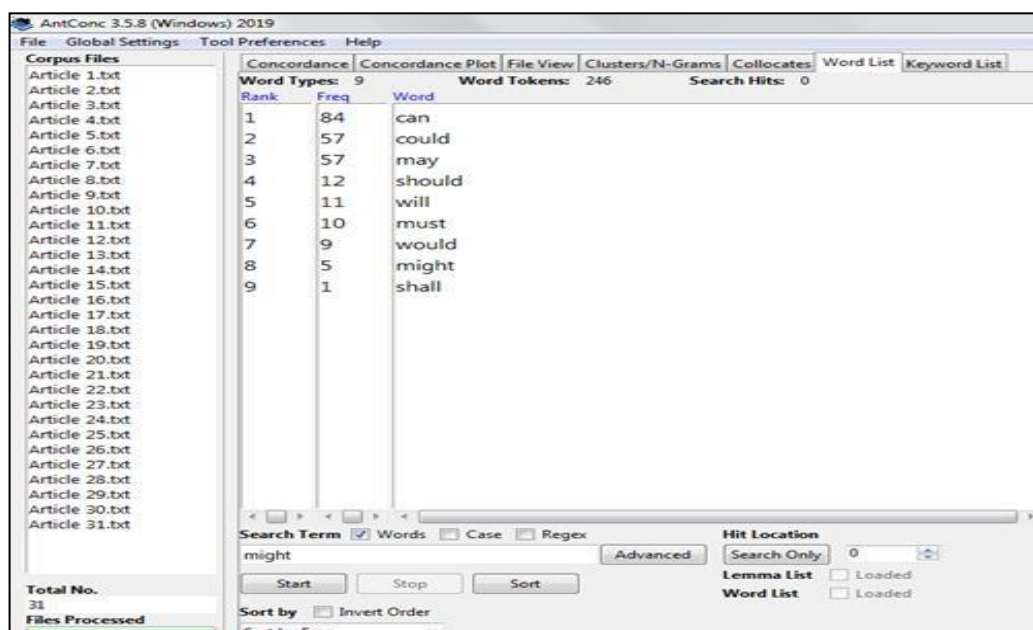
The initial step in the corpus analysis procedure was to quantitatively identify hedges in the examined corpus. Based on the work of Varttala (2001), seven major categories have been recognized: verbs (both main and modal), adverbs, nouns, adjectives, clausal elements, questions and other hedges. Worthy to state, the four major categories – verbs (both main and modal), adverbs, nouns and adjectives are typical items that can be found in various works on hedges.

### 5.2.1. Verbs

As it was mentioned in chapter four, verbs can be divided into **modal auxiliaries** and **main verbs** functioning as hedges. We will provide a detailed discussion of items in both categories.

#### 5.2.1.1. Modal Auxiliaries

The corpus contains 9 modal auxiliaries: could, may, might, shall, should, would, can, must and will. The following figure shows the results of the use of modals in the examined corpus.



**Figure 8. Modal Auxiliaries in the Corpus**

The figure indicates that the total number of hedges is 246 with a highest occurrence of the modal *can* in the corpus. However, not all these occurrences could be regarded as instances of hedges (see chapter two). Because of the polysemous nature of auxiliaries, the context of all these modals was verified and the results refined as table 13 shows:

| Modal        | Raw number<br>in the corpus | Epistemic function |             |            |
|--------------|-----------------------------|--------------------|-------------|------------|
|              |                             | Raw<br>number      | F           | Percentage |
| May          | 57                          | 53                 | 0.76        | 34.64      |
| Might        | 5                           | 5                  | 0.07        | 3.26       |
| Could        | 57                          | 56                 | 0.80        | 36.60      |
| Shall        | 1                           | 0                  | 00          | 0          |
| Should       | 12                          | 0                  | 00          | 0          |
| can          | 84                          | 28                 | 0.40        | 18.30      |
| will         | 11                          | 04                 | 0.06        | 2.61       |
| would        | 9                           | 6                  | 0.09        | 3.92       |
| must         | 10                          | 1                  | 0.01        | 0.65       |
| <b>Total</b> | 246                         | <b>153</b>         | <b>2.19</b> | 100%       |

**Table 13.**The Frequency and Percentage of Modal Auxiliaries in the Corpus

### **Might /May**

*Might* and *may* are regarded as basic modals to express epistemic possibility. *Might* is considered more tentative. The number of occurrences of the modal *might* in the corpus was only 5 instances. All the 5 instances had an epistemic reading. The corpus contains 57 instances of the modal *may*, 53 of them seem to have an epistemic function. The other four instances of *May* in our corpus do not express root meaning, but they are concerned with the month (May), or a name (May GrunaldGumesa). The following examples illustrate the use of the modal *might* and *may* as epistemic in the examined corpus:

**Example 3:** The experiments were intentionally conducted under axenic condition to avoid un-estimated effects of other environmental factors that *might* affect the metal uptake efficiency. (A 27)

**Example 4:** Another explanation *might* be that phenolic compounds interfere with membrane function and interact with membrane proteins, causing deformation in structure and functionality [23]. (A 6)

**Example 5:** The HPLC has revealed the presence of the catechin in all extracts of rosemary, which *may* explain the antibacterial activity of the extracts of this plant. (A 27)

**Example 6:** The antimicrobial activities were mainly explained by C10 and C 15 terpenes with aromatic and phenolic hydroxyl groups capable of forming hydrogen bonds with active sites of the target enzymes, although other active terpenes, as well as alcohols, Aldehydes and esters *may* contribute to the overall antimicrobial effect of essential oils [24, 31, 32]. (A 4)

**Example 7:** The results obtained in the present study indicate that the aqueous extract of *G. alpum* *may* be a potential source of natural anticancer substances. (A18).

As the examples show, the writer offers possibilities to justify and explain his results, avoiding categorical assertions with the help of the modals *might* and *may*. These latter are “used interchangeably to indicate a 50-50 assessment of possibilities” (Hyland, 1998a, p. 116).

## Should/Shall

The modal *shall* with only one occurrence in the whole corpus was used with first person plural pronoun in its root meaning as an alternative of *will*. Consider the following instance:

**Example 8:** We *shall* present the different species studied (figure i). (A 29)

As the example illustrates, the modal *shall* is not in its epistemic meaning as it does not express any hedging function of tentativeness. Rather, the modal *shall* here denotes a

sense of volition in providing the reader with information in the next sections of the article.

## **Should**

Deontic *should* is associated with obligation. Epistemic *should*, however, is paraphrasable by “I assume” and expresses “tentative assumption, an assessment of probability, based on facts known to the speaker” (Coates, 1983, p. 64). Additionally, Coates states that there are cases of “merger” between deontic and epistemic readings of the auxiliary *should* (pp.77-78).

In our corpus, the modal *should* occurred 12 times. None of these instances were in the epistemic use. They rather expressed deontic obligation.

## **Will/Would**

While the root meaning of *will* is generally associated with the sense of futurity and willingness, epistemic meaning of *will* is linked with a sense of predictability: it marks predicted “logical outcomes” (Hyland, 1998a, p. 115). The latter mentions that distinguishing between the sense of “futurity” and epistemic meaning of *will* is complicated since referring to the future inevitably involves uncertainty and doubt (p.116).

In this study, the modal *will* occurred 11 times. Occurrences of *will* deemed as hedges were rather infrequent. Only 4 (out 11 occurrences) could have been identified as epistemic.

**Example 10:** Their principle consists of hybridization with a DNA sequence which is complementary to them and if there is no complementary sequence, there *will* be no amplification and a polymorphism of presence and absence of bands will be detected. (A 17)

**Example 11:** Previous findings have documented that not only quantity, but also fat type used in the diets *will* affect the rate of weight gain. (A30)

The examples illustrate the use of *will* with a predictability sense: whenever X occurs,

it is predictable that Y happens. Example 11 shows how the use of *will* resembles the use of *may* or *might* as one can notice that the writer is offering possibilities to the phenomenon in order to avoid full commitment. Notwithstanding the difficulty in identifying the epistemic reading of “will”, Coates (1983) states that the “prediction sense of will particularly in scientific settings reduces the authorial commitment to the factuality of what is said” (p.184).

## Would

The deontic meaning of the modal *would* is rather infrequent. The latter is generally associated with volition, intention, and willingness. Consider the following instance:

**Example 12:** In the end, it *would* be interesting to perform further analysis on these compounds using other more efficient techniques...(A10).

The above example illustrates the use of *would* in non-epistemic use without a hedging function, the use of *would* in such a context is rather related with the recommendations or suggestions of the writer. Consider the following hits,

| Concordance Hits - 9 |                                                               |
|----------------------|---------------------------------------------------------------|
| Hit                  | KWIC                                                          |
| 1                    | of nucleic sequences. It would be better to use               |
| 2                    | the number of drugs would be higher. Therefore, the           |
| 3                    | . In the end, it would be interesting to perform              |
| 4                    | on this pathology. It would be interesting to identify        |
| 5                    | cases (bootstrap value); which would express the existence of |
| 6                    | 16S RNAs. This value would express the rate of                |
| 7                    | compounds of this plant would give a strong antioxidants      |
| 8                    | of the product that would inhibit their growing ,after        |
| 9                    | formation of these products would mask the real decrease      |

**Figure 9. Concordance Hits of the Modal Would**

The modal *would*, howsoever, is considered as the principal hypothetical modal with epistemic meaning. The whole corpus contained 9 instances of the modal *would*, 6 of them can be regarded as hedges, i.e., in an epistemic use.

**Example 13:** The bacteria were spreader all over the discs, the spreading of the tested product throughout the disc determined the degree of concentration, the micro-organisms grow all over the surface of the agar except where they encounter a sufficient concentration of the product that *would* inhibit their growing, after incubation ... (A29)

**Example 14:** The topology of the phylogenetic tree confirms the strong similarity between the 16S RNAs of *A. Calcoaceticus* and *S. Maltophilia*, because the clade made by these two bacteria returns in 99% of the cases (bootstrap value); which *would* express the existence of a homology between these two sequences. (A20)

The above examples illustrate the use of *would* in its epistemic use as “a general hypothetical marker” (Coates, 1983, p. 213). Example 13 is a good instance showing that the writer is making a series of hypotheses and he expresses certain circumstances and conditions to fulfill his hypotheses. Such cases of epistemic sense of the modal *would* are generally perceived as conditional predictability, although the conditional clause is not overtly expressed (Hyland, 1998a).

## Can/Could

*Can* is perhaps regarded as the most problematic modal as a hedge. According to Hyland (1998a), *can* appears with its epistemic use only in negative and interrogative cases.

**Example 15:** Male dominance *can't* be explained by a relationship between sex and illness since its transmission is autosomal recessive, it effects both sexes equally (Bedir and Miloud 2006). (A 23)

The above example is the only negative form of the modal *can* in the whole corpus and no interrogative cases have been detected. On the other hand, Varttala (2001) assumes that *can* could be perceived epistemically not only in negative and interrogative situations. To justify his opinion, Varttala (2001) provides examples from his corpus and explains how the modal *can* could be considered as a hedge. Likewise, in our corpus we came across cases of the modal *can* which might be perceived as instances of hedges. Consider the following examples:

**Example 16:** The levels reported by Ho and Tsai are very high compared with our results; this difference *can* probably explained by the difference of the standard used for the assay of flavonoids. (A 24)

**Example 17:** The differences found *can* be attributed to several reasons such as, methods of extraction ([8]; [23];[37], preparation of the extract, solvent used, the sensitivity of the bacteria [38] and finally the part of the plant used [31]. (A 24)

**Example 18:** Maternal nutrition is a major modifiable environmental factor, which *can* affect fetal growth and development with potential long-term consequences. (A 30)

As can be gleaned from the mentioned examples, the use of *can* in such contexts tends to be similar with the use of *may* and *might* in expressing epistemic possibility. In deciding the epistemic reading of the modal *can*, the co-occurrence of the adverb “probably” (example 16) and the use of the passive voice with the modal *can* reinforce the epistemic function, indeed.

## Could

The use of *could* as epistemic resembles the use of *may* and *might* in denoting tentative possibility (Perkins, 1983). According to Coates (1983), in its deontic use, *could* can

be used as a past or hypothetical form of *can* in expressions of deontic possibility (it was/would be possible for...), permission (it was/would be permissible for...), and ability (x was/would be able to...)” (p.107). Consider the following extract from the examined corpus:

**Example 19:** Essential oil exhibited very weak antioxidant abilities for reduce DPPH radicals when compared to BHT which remained below  $3.47 \pm 0.25$  % at concentration 1000 mg/L and the IC 50 *could* not be calculated due to their low inhibition activity. (A 16)

The example can illustrate the deontic use of the modal *could* as the writer was not able to calculate the concentration due to low inhibition activity. Hyland (1998a) discusses how enabling and disabling conditions are related with the occurrence of root meaning and the example reflects this situation of disabling or external constraints associated with root reading of a modal.

However, the sense of *could* as expressing epistemic possibility is highly associated with “the writer’s assessment of the likelihood of the truth of p” (Hyland, 1998a, p.110). In our corpus, the modal *could* appeared 57 times, out of them 56 instances can be regarded as hedges amounting for 0.80 per 1000 words, , making it the most frequent model in our corpus with a share of 35.89%. The following examples illustrate the use of *could* as a hedge in the examined corpus:

**Example 20:** Suggesting that, the extract of the selected plants *could* be a possible source to obtain active molecule to treat infections and also in the search for the novel antibacterial agents...(A 6).

**Example 21:** These free radicals are the main cause of metabolic abnormalities and degenerative complications of diabetes mellitus that *could* affect several organs and functions. (A 22)

**Example 22:** In addition, these microalgae, because of their antioxidant properties *could* also mitigate oxidative stress and prevent complications associated with diabetes. (A 1)

As the examples illustrate, the use of *could* mitigates the force of a statement by offering possible explanations. One can also notice that the use of *could* in such a context is similar with the use of *may* and *might* in toning down the information presented, so that it does not appear assertive. Interestingly, *can* and *could* often occur with passive voice (Biber et al., 1999, p. 499). In this case, *can* and *could* are used to avoid overt identification of the human agent of the main verb.

## **Must**

The deontic meaning of *must* is basically associated with obligation. Most of the instances of the modal *must* in the corpus (8 instances) expressed obligation. Consider these examples:

**Example 23:** Saffron flowers *must* be carefully cooked harvested for the production of 1 kg of spice. (A 18)

**Example 24:** DNA was extracted by a commercial extraction kit. Before extraction of the DNA, the working chamber and the scalpel *must* be cleaned and sterilized with 70° alcohol. (A 17)

As the examples illustrate *must* is used to express obligation as the writers are stating how the process and procedures of their experiments, for instance, *must* be done. However, the epistemic sense of *must* is associated with “confident inference” (Coates, 1983). That is to

say, using the modal *must* as a hedge means that the writer is offering information “that is likely-not absolutely-true in view of their knowledge and observations” (Varttala, 2001, p. 115). In the whole corpus, only 1 instance of *must* could be considered as a hedge.

**Example 25:** After aligning each of our 16S rRNA sequences with the BlastN tool, only the GenBank sequences having a similarity (with our sequence ) greater than or equal to 99% and a zero E-value were chosen because the molecular definition of the genus *Stipulates* that the homologies of the 16S rDNA sequences *must* be greater. (A 20)

#### 5.2.1.2. Main Verbs

Main verbs are classified into three types: non-factive tentative reporting, tentative cognition and tentative linking verbs. The following table provides the frequency of verbs’ categories identified in the research corpus. The raw figures were converted to normalised frequency (frequency per 1000 words) and to percentage of each category out of total.

##### 5.2.1.2.1. Non-factive Tentative Reporting Verbs

This category is named “non-factive reporting tentative reporting verbs as suggested by Varttala (2001). The results of this category are shown in the following table:

| Verb      | Raw number | F    | Percentage |
|-----------|------------|------|------------|
| suggest   | 27         | 0.39 | 5.92       |
| argue     | 00         | 00   | 00         |
| Propose   | 3          | 0.04 | 0.66       |
| Note      | 38         | 0.55 | 8.33       |
| Claim     | 00         | 00   | 00         |
| Outline   | 00         | 00   | 00         |
| State     | 4          | 0.06 | 0.88       |
| Indicate  | 39         | 0.56 | 8.55       |
| Imply     | 3          | 0.04 | 0.66       |
| Declare   | 1          | 0.01 | 0.22       |
| Say       | 10         | 0.14 | 2.19       |
| Refer to  | 00         | 00   | 00         |
| Posit     | 00         | 00   | 00         |
| Point out | 00         | 00   | 00         |
| Report    | 83         | 1.19 | 18.20      |
| Notice    | 10         | 0.14 | 2.19       |
| Show      | 171        | 2.45 | 37.50      |
| find      | 67         | 0.96 | 14.69      |
| Total     | 456        | 6.53 | 100%       |

**Table 14. The Frequency and Percentage of Tentative Reporting Verbs**

As the table shows, there are 11 verbs appearing in the corpus as “non-factive tentative reporting verbs”, with a total number of 456 verbs. The most used were *show*, *report*, *indicate* and *note*.

**Example 26:** The results *showed* that some populations like P2, P3 and P4 have identical bands. (A 17)

**Example 27:** These results were *found* to be highly consistent with those *reported* in the previous studies. (A 1)

**Example 28:** Other researchers have *suggested* that antimicrobial components of the plant extracts cross the cell membrane...(A 9)

**Example 29:** We *note* a high incidence of *Enterococcus* supp. compared to the rest of the bacteria. (A20)

**Example 30:** Thus, observed results *indicate* that *Nannochloropsis gaditana* possesses interesting antihyperlipidemic properties. (A 1)

These verbs, as the above examples illustrate, can be used to report the results and the outcomes of the scientist's investigation or to present other scientists' findings and propositions. They can be used with "abstract rhetors" (observed results, these results) which allow the writer to distance himself from his proposition, indicating that rhetorical acts could be realized without human interference and that facts speak about themselves (Hyland, 1998).

As the example 29 shows, this type of hedges could also be used with personal pronouns (we) in which the scientist presents a subjective justification of his attitude. As such, the writer makes the claims open to the reader judgment, therefore hedges of this type function as reader-oriented hedges.

#### **5.2.1.2.2. Tentative Cognition Verbs**

Tentative cognition verbs are the type of verbs which enable the scientist to present the information based on his subjective cognition and not empirical evidence (Varttala, 2001). The results of this category are shown in the following table:

| Verb        | Raw number | F    | Percentage |
|-------------|------------|------|------------|
| See         | 6          | 0.09 | 3.17       |
| Believe     | 1          | 0.01 | 0.53       |
| Feel        | 00         | 00   | 00         |
| Assume      | 1          | 0.01 | 0.53       |
| Expect      | 1          | 0.01 | 0.53       |
| Think       | 1          | 0.01 | 0.53       |
| predict     | 4          | 0.06 | 2.11       |
| infer       | 00         | 00   | 00         |
| Wish        | 00         | 00   | 00         |
| regard      | 00         | 00   | 00         |
| Consider    | 20         | 0.29 | 10.58      |
| Reveal      | 31         | 0.44 | 16.40      |
| Hope        | 01         | 0.01 | 0.53       |
| Deem        | 00         | 00   | 00         |
| Conclude    | 8          | 0.11 | 4.23       |
| Estimate    | 14         | 0.20 | 7.40       |
| Observe     | 56         | 0.80 | 29.63      |
| Perceive    | 00         | 00   | 00         |
| Adopt       | 00         | 00   | 00         |
| Evaluate    | 30         | 0.43 | 15.87      |
| Interpret   | 00         | 00   | 00         |
| Suppose     | 00         | 00   | 00         |
| View        | 1          | 0.01 | 0.53       |
| Hypothesize | 00         | 00   | 00         |
| Imagine     | 00         | 00   | 00         |
| Suspect     | 4          | 0.06 | 2.12       |
| Understand  | 5          | 0.07 | 2.64       |
| Intend      | 1          | 0.01 | 0.53       |
| Support     | 4          | 0.06 | 2.12       |
| Total       | 189        | 2.68 | 100%       |

**Table 15.**The Frequency and Percentage of Tentative Cognition Verbs

The results show 17 verbs (or 2.68 per 1000) that are regarded as tentative cognition verbs. The three most frequent ones were *observe*, *consider* and *reveal*.

**Example 31:** We *observed* that the poisoned plants seem more fragile than control plants. (A 27)

In this context of use, the writer uses the personal pronoun (we) to signal the writer's authorial presence. Combining personal attribution with the presented data is a distinguishing characteristic of this type of hedges in order to express the interpersonal dimension of academic communication (Hyland, 1998a). Such combinations are considered as “reader-oriented” hedges.

**Example 32:** It was also **revealed** that *Nannochloropsis gaditana* has the capacity to improve the lipid metabolism. (A 1)

As the above example demonstrates, tentative cognition verbs could also be used with passive constructions without the agent of the action. The use of impersonal expressions helps the writer seem more objective and distanced, therefore this combination functions as a writer-oriented hedge, as it acts as a protective strategy.

#### 5.2.1.2.2.3. Tentative Linking Verbs

Tentative linking verbs are also called “sensory evidential verbs” (Hyland, 1998a). The results of this category are shown in table 16 below

| <b>Verb</b>  | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|--------------|-------------------|-------------|-------------------|
| seem         | 10                | 0.14        | 37.03             |
| appear       | 15                | 0.22        | <b>55.56</b>      |
| tend         | 2                 | 0.03        | 7.40              |
| sound        | 0                 | 00          | 00                |
| <b>Total</b> | <b>27</b>         | <b>0.39</b> | <b>100%</b>       |

**Table 16. The Frequency and Percentage of Tentative Linking Verbs**

The corpus contains only 27 linking verbs. The most frequent verb was *appear* constituting a percentage of 55.56 % out of the total number of verbs of this category. On the other hand, the verb *tend* is the least used verb appearing only 0.03 per 1000 words.

**Example 33:** It *appears* legitimate to wonder about the biological and ecological impacts induced by these stressing environmental conditions...(Article 31)

**Example 34:** However, when microalgae *Nannochloropsis gaditana* was fed to diabetic rats, it *tended* to bring the above values to near normal (table 2). (A 1)

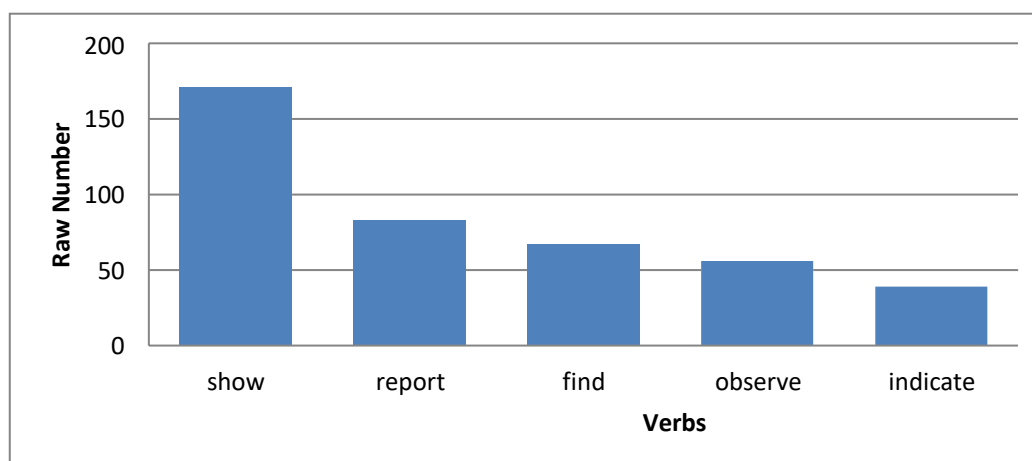
As the above examples illustrate, this type of hedges could occur with an empty it subject which allows the writer to protect himself from negative reaction and opposition by reducing his assertiveness towards the information presented. Therefore, such combinations are considered as writer-oriented hedges. The following table summarises the occurrence and frequency of lexical verb categories in the Algerian corpus.

| Category                              | Raw Number | F          | Percentage  |
|---------------------------------------|------------|------------|-------------|
| Non-factive tentative reporting verbs | 456        | 6.53       | 67.86       |
| Tentative Cognition verbs             | 189        | 2.68       | 28.12       |
| Tentative linking verbs               | 27         | 0.39       | 4.01        |
| <b>Total</b>                          | <b>672</b> | <b>9.6</b> | <b>100%</b> |

**Table 17: Overall Results of Main Verbs**

The corpus contains an overall of 672 instances of main verbs or 9.6 per 1000 words. As the table shows, the most used lexical type in the examined corpus was “non-factive tentative reporting verbs, with a number of occurrences of 456 out of 672 which constitutes a percentage of 67.86 %. However, tentative cognition verbs’ category contains only 189

devices in the examined corpus. The least used was tentative linking verbs with only 27 hits amounted for only 0.39 per 1000 words. Figure10 shows the prominent main verbs used in the biology research articles written by Algerian scientists in the whole corpus:



**Figure 10. Most Occurring Epistemic Verbs**

Clearly, the most used verb was the non-factive reporting verb *show* with a number of occurrences of 171. The second most occurring verb was *report*(N=83). The third most used verb was the verb *find* (N=67).

## 5.2.2. Epistemic Adjectives

The semantic classification of adjectives is based on Varttala (2001) in which three types of epistemic adjectives are identified. These are adjectives of indefinite degree, adjectives of indefinite frequency and probability adjectives.

### 5.2.2.1. Probability Adjectives

Adjectives of this category allow the writer to express degrees of probability regarding the accuracy and assertiveness of the information presented. They denote the author's

assessment of the certainty of the truth of a proposition (Hyland, 1998a). The results of this category are presented in the following table:

| Adjective    | Raw number | F           | Percentage  |
|--------------|------------|-------------|-------------|
| Likely       | 02         | 0.03        | 8           |
| Possible     | 15         | 0.22        | 60          |
| Unlikely     | 00         | 00          | 00          |
| Unclear      | 00         | 00          | 00          |
| Obvious      | 00         | 00          | 00          |
| Apparent     | 00         | 00          | 00          |
| Certain      | 2          | 0.03        | 8           |
| Plausible    | 00         | 00          | 00          |
| Potential    | 04         | 0.06        | 16          |
| Evident      | 1          | 0.01        | 4           |
| Suggestive   | 1          | 0.01        | 4           |
| Suggested    | 00         | 00          | 00          |
| Expected     | 0          | 00          | 0           |
| <b>Total</b> | <b>25</b>  | <b>0.36</b> | <b>100%</b> |

**Table 18. The Frequency and Percentage of Probability Adjectives**

As table 18 indicates, the biology corpus contained six adjectives with a total of occurrences of 25 instances with a density of 0.36 per 1000 words. The most frequent adjective being *possible*.

**Example 35:** Suggesting that, the extract of the selected plants could be *apossible* source to obtain active molecule to treat infections ... (A 6)

**Example 36:** It is not however **certain** whether the toxicity symptoms produced in the plant were solely due to the excessive levels of lead in the plant tissue or that the toxicity was

associated with ionic imbalance involving other essential trace metals. (A 27)

In the mentioned examples, the writer employs the adjective possible and certain to express a suggestion and a possibility, which can turn to be real if certain circumstances are present, rather than a categorical assertion. Probability adjectives function as content-oriented hedges.

#### 5.2.2.2. Adjectives of Indefinite Degree

These adjectives are used to “reduce the definiteness of what is said or to avoid commitment to precise figures” (Varttala, 2001, p.137). The results of this category are shown in table 19 below:

| <b>Adjective</b> | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|------------------|-------------------|-------------|-------------------|
| moderate         | 08                | 0.11        | 4.88              |
| considerable     | 05                | 0.07        | 3.05              |
| significant      | 81                | 1.16        | 49.39             |
| modest           | 00                | 00          | 00                |
| major            | 27                | 0.39        | 16.46             |
| relative         | 2                 | 0.03        | 1.22              |
| notable          | 00                | 00          | 00                |
| small            | 15                | 0.22        | 9.15              |
| partial          | 01                | 0.01        | 0.61              |
| limited          | 8                 | 0.11        | 4.88              |
| broader          | 00                | 00          | 00                |
| large            | 17                | 0.24        | 10.36             |
| <b>Total</b>     | <b>164</b>        | <b>2.34</b> | <b>100%</b>       |

**Table 19. The Frequency and Percentage of Adjectives of Indefinite Degree**

The category of indefinite degree adjectives is represented by 9 verbs in total of 164 instances. The most frequently occurring ones were significant , *major*, and *common*

**Example 37:** Moreover, the essential oil showed *significant* antimicrobial activity but the ethanol extract showed low antimicrobial activity. (A 16)

**Example 38:** Infections acquired in health care settings are among the *major* causes of death and increased morbidity among hospitalized patients. (A 11)

**Example 39:** A great variation of Lavender extract demonstrated in several investigations may be due to *considerable* variation in their method of extraction, constituents as well as bacterial strains used. (A 6)

### 5.2.2.3. Adjectives of Indefinite Frequency

Adjectives of indefinite frequency resemble the previous category in that they enable the writer to express their assumptions of prototypical phenomena demonstrating that in real life the findings might be different from the ideal. The results of this category are presented in the following table:

| <b>Adjective</b> | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|------------------|-------------------|-------------|-------------------|
| Common           | 20                | 0.29        | 55.56             |
| usual            | 1                 | 0.01        | 2.77              |
| frequent         | 1                 | 0.01        | 2.77              |
| rare             | 3                 | 0.04        | 1.829             |
| Typical          | 1                 | 0.01        | 2.77              |
| Numerous         | 6                 | 0.09        | 16.66             |
| Approximate      | 2                 | 0.03        | 5.55              |
| occasional       | 2                 | 0.03        | 5.55              |
| <b>Total</b>     | <b>36</b>         | <b>0.51</b> | <b>100%</b>       |

**Table 20. The Frequency and Percentage of Adjectives of Indefinite Frequency**

As table 20 can show, there are eight adjectives out of 36 occurrences considered as adjectives of indefinite frequency with a density of 0.51 per 1000 words. The most used one was the adjective *common*.

**Example 40:** Obesity is one of the most *common* health problems for pregnant women. (A 30)

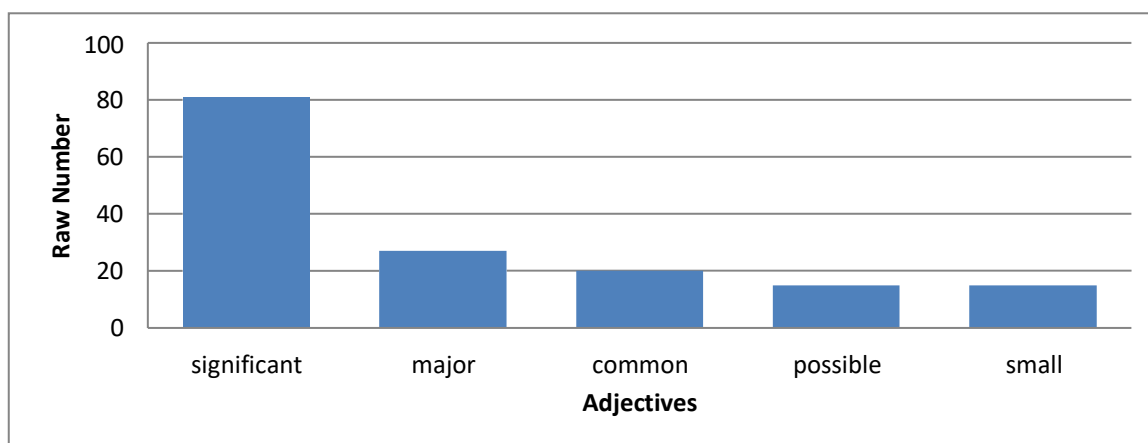
**Example 41:** ...H. Scopariumis used to treat *numerous* human diseases especially the infectious one such as skin infections, urinary and genital infections. (A 11)

The following table summarizes the results of the overall occurrences of epistemic adjectives in the examined corpus. The relative frequency is per 1000 words.

| Semantic Category                  | Raw number | F           | Percentage  |
|------------------------------------|------------|-------------|-------------|
| Probability adjectives             | 25         | 0.36        | 11.11       |
| Adjectives of indefinite degree    | 164        | 2.34        | 72.89       |
| Adjectives of indefinite frequency | 36         | 0.51        | 16          |
| <b>Total</b>                       | <b>225</b> | <b>3.21</b> | <b>100%</b> |

**Table 21. The Overall Results of Epistemic Adjectives**

Overall, table 21 indicates that the incidence of epistemic adjectives in the corpus is 3.21 per 1000 words (N=225). The most implied category was adjectives of indefinite degree comprising a percentage of 72.89 % out of the total number of adjectives. The two other categories adjectives of probability and adjectives of indefinite frequency are approximate N=25 and N=36 respectively. Yet, adjectives of indefinite frequency were quite higher. Figure 12 demonstrates the most commonly adjectives in the corpus:



**Figure 11. Most Commonly Occurring Adjectives in the Corpus**

Clearly, the most commonly occurring adjective was the adjective “significant” with a number of occurrences of 81 instances. This category also functions as content-oriented hedges as these adjectives serve to accurately describe the phenomenon in which the writer presents the propositional content while avoiding precise quantification.

### **5.2.3. Epistemic Adverbs**

Adverbs were classified according to their meaning and not syntactic aspects resulting in four categories: probability, indefinite degree, indefinite frequency, and approximative adverbs.

#### **5.2.3.1. Adverbs of Probability**

Examples of probability adverbs include adjectives such as probably, possibly and tentatively. They are used to express degrees of probability between the absolutes of true and false. The results of this category are shown in the following table 22:

| Adverb       | Raw number | F           | Percentage  |
|--------------|------------|-------------|-------------|
| possibly     | 1          | 0.01        | 20          |
| probably     | 2          | 0.03        | 40          |
| tentatively  | 00         | 0           | 00          |
| seemingly    | 00         | 0           | 00          |
| supposedly   | 0          | 0           | 00          |
| perhaps      | 0          | 00          | 00          |
| potentially  | 2          | 0.03        | 40          |
| Arguably     | 0          | 00          | 00          |
| <b>Total</b> | <b>05</b>  | <b>0.07</b> | <b>100%</b> |

**Table 22. The Frequency and Percentage of Adverbs of Probability**

As table 22 shows, only 3 adverbs with a total of 5 occurrences were identified in the examined corpus with a density of 0.07 per 1000 words. The most used one was the adverb probably and potentially.

**Example 42:** Moreover, rhamnetin resulted to be more active than quercetin and morin, *probably* because of the methoxy in the A-ring, which makes this molecule more hydrophobic [27]. (A 28)

The use of probability adverbs is similar to probability adjectives in which using them denotes a sense of likelihood. The writer qualifies the state of knowledge by expressing varying degrees of certainty towards the propositional content. The writer avoids offering categorical assertions and rather provides possible and probable explanations and suggestions to the information presented.

#### **5.2.3.2. Adverbs of Indefinite Frequency**

Under this sub-category, the adverbs *frequently*, *commonly* and *rarely* are regarded as adverbs of indefinite frequency. They are inherently indefinite. Table 23 shows the results

of this category:

| <b>Adverb</b> | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|---------------|-------------------|-------------|-------------------|
| frequently    | 6                 | 0.09        | 13.33             |
| generally     | 12                | 0.17        | 26.67             |
| commonly      | 5                 | 0.07        | 11.11             |
| occasionally  | 00                | 00          | 00                |
| often         | 8                 | 0.11        | 17.78             |
| seldom        | 00                | 00          | 00                |
| usually       | 4                 | 0.06        | 8.89              |
| typically     | 1                 | 0.01        | 2.22              |
| normally      | 4                 | 0.06        | 8.89              |
| sometimes     | 2                 | 0.03        | 4.44              |
| Rarely        | 3                 | 0.04        | 6.67              |
| <b>Total</b>  | <b>45</b>         | <b>0.64</b> | <b>100%</b>       |

**Table 23. The Frequency and Percentage of Adverbs of Indefinite Frequency**

Seemingly, the corpus contained 9 adverbs of indefinite degree with a total of 45 occurrences. The most used ones were *generally* and *often* with N=12 and N=8 respectively. Because these adverbs are indefinite by nature, they are good instances of the hedging function. To illustrate, the examples indicate how the use of such items help the writer state his knowledge in a very careful manner in which he does not commit himself to categorical assertions.

**Example 43:** It is *generally* understood that roots act as a barrier to the movement of toxic heavy metal through the soil plant system. (A 27)

**Example 44:** Oxidative stress is a major factor in health, aging and disease and is *often* defined by the redox balance established by free radicals and antioxidants system defense. (A 7)

### 5.2.3.3. Adverbs of Indefinite Degree

Indefinite degree adverbs allow the writer qualify the state of knowledge. Examples of this sub-class include largely, mostly and at least. The results of indefinite degree in the examined corpus are shown in table 24:

| <b>Indefinite Adverb</b> | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|--------------------------|-------------------|-------------|-------------------|
| Rather                   | 2                 | 0.03        | 1.98              |
| Quite                    | 5                 | 0.07        | 4.95              |
| slightly                 | 11                | 0.16        | 10.89             |
| significantly            | 34                | 0.49        | <b>33.66</b>      |
| considerably             | 6                 | 0.09        | 5.94              |
| Relatively               | 00                | 00          | 00                |
| mostly                   | 2                 | 0.03        | 1.98              |
| Largely                  | 03                | 0.04        | 2.97              |
| highly                   | 15                | 0.22        | 14.85             |
| Greatly                  | 1                 | 0.01        | 0.99              |
| shortly                  | 00                | 00          | 00                |
| Partly                   | 2                 | 0.03        | 1.98              |
| Fairly                   | 00                | 00          | 00                |
| Somewhat                 | 00                | 00          | 00                |
| Mainly                   | 11                | 0.16        | 10.89             |
| Partially                | 1                 | 0.01        | 0.99              |
| At least                 | 8                 | 0.11        | 7.92              |
| <b>Total</b>             | <b>101</b>        | <b>1.45</b> | <b>100%</b>       |

**Table 24. The Frequency and Percentage of Adverbs of Indefinite Degree**

Apparently, the corpus contains 13 adverbs of indefinite degree in total of 101 instances (or 1.45 per 1000 words). The most used ones were *significantly* N=34 and *highly* N=15. The following examples illustrate the use of such adverbs in the examined corpus:

**Example 45:** The group of diabetic rats showed *significantly* elevated total cholesterol and triglycerides in their liver, pancreas, and adipose tissue as compared to the control group. (A1)

**Example 46:** Thus, the analysis of variance (ANOVA) shows a *highly* significant effect of hydrous stress on germination ( $p \geq 0.05$ ). (A15)

**Example 47:** Those constitute the heterogeneous group of thalassemias, but this diversity explains only very *partially* heterogeneity of the clinical presentation. (A 23)

#### 5.2.3.4. Approximative Adverbs

This last category includes adverbs such as: approximately, almost and nearly. Table 25 shows the result of this sub-class:

| Adverb        | Raw number | F           | Percentage  |
|---------------|------------|-------------|-------------|
| almost        | 5          | 0.07        | 5.21        |
| about         | 25         | 0.36        | 26.04       |
| nearly        | 1          | 0.01        | 1.04        |
| approximately | 7          | 0.10        | 7.29        |
| around        | 12         | 0.17        | 12.5        |
| some          | 42         | 0.60        | 43.75       |
| roughly       | 00         | 00          | 0           |
| virtually     | 00         | 00          | 00          |
| Just          | 2          | 0.03        | 2.08        |
| Essentially   | 2          | 0.03        | 2.08        |
| <b>Total</b>  | <b>96</b>  | <b>1.37</b> | <b>100%</b> |

**Table 25. The Frequency and Percentage of Approximative Adverbs**

The analysis shows that there are 96 instances of approximative adverbs with a density of 1.37 per 1000 words. The mostly used adverbs were the adverb *some* N=42 and *about* N=25. The following examples illustrate the use of such adverbs:

**Example 48:** The comparison of the retention times (Table 3) of the standards with those recorded in the different chromatograms (table 4), allows a possible identification of *some* flavonoids in our extracts [19] (A 24).

**Example 49:** Crocus genus consists of *about* 85 species and many of them are considered as economically valuable. (A 5)

**Example 50:** Flavonoids are the most widely occurring polyphenol and are present in *almost* every form of human consumed vegetation. (A28)

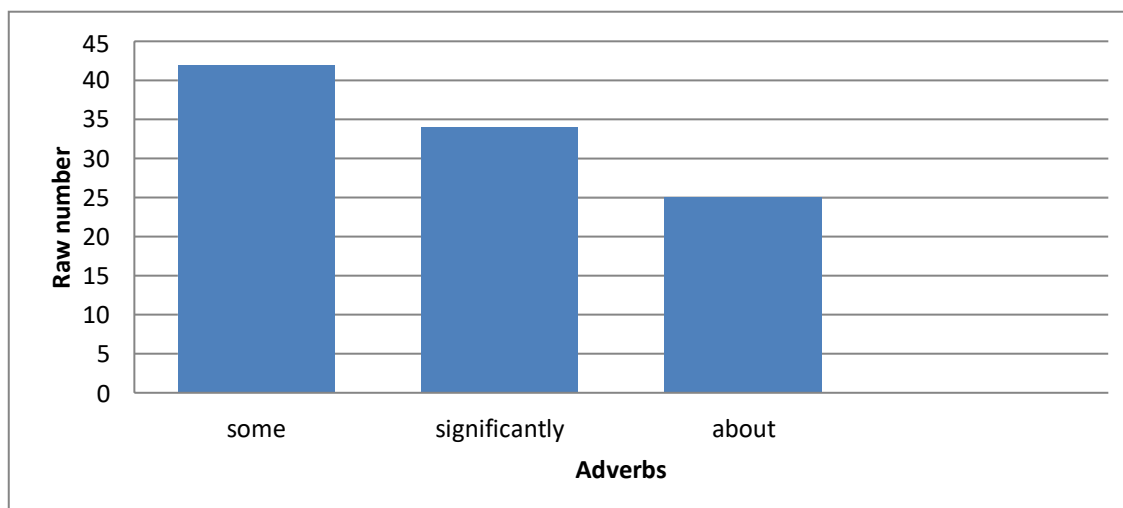
Based on the results of the sub-classes of epistemic adverbs, table 26 shows the overall use of epistemic adverbs in the examined corpus:

| Adverbs' sub-classes            | Raw number | F           | Percentage |
|---------------------------------|------------|-------------|------------|
| Probability                     | 05         | 0.07        | 2.02       |
| Adverbs of indefinite frequency | 45         | 0.64        | 18.22      |
| Adverbs of indefinite degree    | 101        | 1.45        | 40.89      |
| Approximative adverbs           | 96         | 1.37        | 38.87      |
| <b>Total</b>                    | <b>247</b> | <b>3.53</b> | 100%       |

**Table 26. Overall Results of Adverbs**

On the whole, the corpus contains 247 epistemic adverbs (or 3.53 per 1000 words). Besides, the table reveals varying degrees of the occurrences of the sub-classes of adverbs in the biology research papers. The highest sub-category being adverbs of indefinite degree (N=101) making 40.89 % out of the total number of adjectives. The second highest sub-class was approximative adverbs with a density of 1.37 per 1000 words. Probability adverbs come

the last frequently used sub-class of adjectives sharing only 2.02% out of the whole adjectives. Over 247 adverbs identified in the corpus, figure 13 presents the mostly occurring adverbs in the examined corpus:



**Figure 12. Most Commonly Occurring Adverbs in the Corpus**

The figures indicate that the most commonly occurring adverb in the examined corpus is the adverb *some* (N=42). The adverb *significantly* appearing 34 times is also frequent. This reminds us that the commonly occurring adjective is also *significant*. Another most frequently used adverb was the adverb *about* with a number of occurrences of 25.

#### 5.2.4. Nouns

According to Varttala (2001), nouns can be classified into three types. They are non-factive assertive nouns, tentative cognition, and tentative likelihood nouns.

##### 5.2.4.1. Non-factive Assertive Nouns

This category of nouns is, in fact, connected with the category of non-factive verbs which has been seen previously examined. The following table 27 shows the results:

| Noun         | Raw number | F           | Percentage  |
|--------------|------------|-------------|-------------|
| Evidence     | 1          | 0.01        | 33.33       |
| Argument     | 00         | 00          | 00          |
| Implication  | 00         | 00          | 00          |
| Suggestion   | 00         | 00          | 00          |
| Prediction   | 1          | 0.01        | 33.33       |
| Outline      | 00         | 00          | 00          |
| allegation   | 00         | 00          | 00          |
| indication   | 1          | 0.01        | 33.33       |
| Claim        | 0          | 00          | 00          |
| <b>Total</b> | <b>3</b>   | <b>0.03</b> | <b>100%</b> |

**Table 27. The Frequency and Percentage of Non-factive Assertive Nouns**

The data listed in the table show that only three nouns were identified in the corpus with three occurrences, which makes it a modest category. Instances of this category include nouns as prediction, indication, and evidence. These nouns are used to express that the informational content of the writer is based on a suggestion that is why it is predicative.

**Example 51:** Nowadays, the bioinformatics tool takes a considerable place in the analysis of the results and especially in the *prediction* of the structures and the gene functions.  
(A 20)

#### 5.2.4.2. Tentative Cognition Nouns

Examples of this category include nouns like: *assumption*, *view* and *opinion*. The results of this sub-class are shown in table 28:

| <b>Noun</b>   | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|---------------|-------------------|-------------|-------------------|
| Assumption    | 1                 | 0.01        | 5.55              |
| View          | 00                | 00          | 00                |
| inference     | 00                | 0           | 00                |
| Hypothesis    | 1                 | 0.01        | 5.55              |
| evaluation    | <b>16</b>         | <b>0.23</b> | 88.89             |
| approximation | 00                | 00          | 00                |
| Impression    | 00                | 00          | 00                |
| viewpoint     | 00                | 0           | 00                |
| Thinking      | 00                | 00          | 00                |
| supposition   | 00                | 0           | 00                |
| Deduction     | 00                | 0           | 00                |
| speculation   | 00                | 0           | 00                |
| opinion       | 00                | 0           | 00                |
| expectancy    | 00                | 0           | 00                |
| expectation   | 00                | 0           | 00                |
| <b>Total</b>  | <b>18</b>         | <b>0.25</b> | 100%              |

**Table 28. The Frequency and Percentage of Tentative Cognition Nouns**

Clearly, from the above results, this category is also modest but quite higher compared to non-factive assertive nouns. There appeared 3 nouns in 18 occurrences with a density of 0.24 per 1000 words. The most used tentative cognition noun in the corpus was *evaluation*.

**Example 52:** Thus, the *evaluation* of antimicrobial activity of flavonoids tested on six pathogens showed a slight inhibition on E.coli.S and aureus and P. fluorscens. (A 21)

Nouns of this type may function as content-oriented hedges when appearing as single sets like the above example. They can also function as writer-oriented hedges if occurred as a part of constructions.

### 5.2.4.3. Tentative Likelihood Nouns

This last category of nouns encompasses nouns of probability which have a likelihood sense. The results can be seen in table 29:

| Noun         | Raw number | F           | Percentage  |
|--------------|------------|-------------|-------------|
| Possibility  | 2          | 0.03        | 20          |
| probability  | 4          | 0.06        | 40          |
| potential    | 00         | 00          | 00          |
| Attempt      | 2          | 0.03        | 20          |
| tendency     | 00         | 0           | 00          |
| trend        | 00         | 00          | 00          |
| contribution | 2          | 0.03        | 20          |
| <b>Total</b> | <b>10</b>  | <b>0.15</b> | <b>100%</b> |

**Table 29. The Frequency and Percentage of Tentative Likelihood Nouns**

Apparently, there are 4 likelihood nouns occurring in 10 instances (or 0.15per 1000 words). The most used likelihood noun was the noun *probability* with 4 instances accounted for 40% out of the total number of nouns in this category.

**Example 53:** The hypersensitivity of the strain *Staphylococcus aureus*ATCC can be explained by the *probability* of the sensitivity of bacteria Gram (+) to external environmental changes, such as temperature, pH and the natural extracts due to the absence of the outer membrane [27]. (A 24)

The writer by using the noun “probability” is expressing likelihood. He/she attributes the outcome of “hypersensitivity” to some probabilities and possibilities like external environmental changes. He also uses the passive voice “can be explained” and the modal “can” which strengthen the probability of the results by diminishing his personal involvement.

The following table 30 shows the overall occurrence of the semantic category of nouns in the Algerian biology research articles.

| <b>Noun sub-classes</b> | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|-------------------------|-------------------|-------------|-------------------|
| Non-factive assertive   | 3                 | 0.03        | 9.68              |
| Tentative cognition     | <b>18</b>         | 0.25        | <b>58.06</b>      |
| Tentative likelihood    | 10                | 0.15        | 32.26             |
| <b>Total</b>            | <b>31</b>         | <b>0.43</b> | <b>100%</b>       |

**Table 30. Overall Results of Nouns**

On the whole, as the figures demonstrate, the semantic category of “nouns” were the least used semantic category in the examined corpus, compared with verbs, adjectives and adverbs, with only 31 occurrences amounted for 0.43 per 1000 words. The most commonly used nouns were tentative cognitions nouns comprised of 58.06% out of the total number of nouns in the corpus. The least used sub-class of nouns was non-factive assertive accounted for only 9.68%.

### 5.2.5. Other Hedges

According to Varttala (2001), this is a supplementary category to account for other kinds of hedges which do not fit into the mentioned categories. The results of them are shown in table 31:

| <b>Item</b>    | <b>Raw number</b> | <b>F</b>    | <b>Percentage</b> |
|----------------|-------------------|-------------|-------------------|
| Many           | 49                | 0.70        | 27.68             |
| Several        | <b>52</b>         | <b>0.75</b> | <b>29.38</b>      |
| Few            | 7                 | 0.10        | 3.95              |
| In general     | 0                 | 0           | 0                 |
| To some degree | 00                | 00          | 00                |
| Most (of)      | <b>66</b>         | <b>0.95</b> | <b>37.29</b>      |
| Little         | 3                 | 0.04        | 1.69              |
| <b>Total</b>   | <b>177</b>        | <b>2.54</b> | <b>100%</b>       |

**Table 31. The Frequency and Percentage of “Other Hedges”**

Table 31 shows that the number of the occurrences of “other hedge” is 177 with an amount of 2.54 per 1000 words. It can be seen that *most*, *several* and *many* figure prominently in the examined corpus. The following instances illustrate the use of such hedges:

**Example 54:** However, the *most* distant germs, compared to the primary structure of their 16S RNAs, are *Enterococcus faecalis* and *Bacillus mojavensis* (60.1%). (A 20)

**Example 55:** COX-1 is constitutively expressed in healthy cells responsible for regulating thrombogenesis and protecting gastrointestinal tract, while COX-2 is inducing during inflammation processes in response to different types of cytokines in *many* cell types [3]. (A 14)

**Example 56:** *Several* anti-inflammatory drugs have shown dose-dependent ability to inhibit thermally-induced protein denaturation. (A 8)

## 5.6. Clausal Elements

Conditional clauses are considered as one common clausal hedging phenomenon. The corpus contained 11 if-clauses amounting of 0.15 per 1000 words. The following examples illustrate the use of this type of hedges:

**Example 57:** The present study is aimed mainly to: (1) analyze the essential oil extracted from the aerial part and determine the phenolic compounds from the ethanol extract; (2) Investigate the antioxidant and antimicrobial activities for to determine *if* these essential oil and ethanol extract could be used as natural preservatives. (A 1)

**Example 58:** These results can only be conclusive *if* the size of the study population will be larger. (A23)

**Example 59:** It is worth clarifying that rats were considered diabetic only *if* their blood glucose level exceeded 127 mg/dl; they were then used in the present study. (A 1)

As the examples indicate, the use of *if clauses* reveals the dependence of one clause upon the other in which the presence of the stated conditions is necessary for the stated outcomes to occur. The use of *if clauses* hedges the outcomes as it qualifies the commitment of the writer towards the information presented be it theory, model or methodology. *If-clauses* are regarded reader-oriented hedges.

### 5.2.7. Questions

Interrogative constructions are means by which the writer involves and engages the reader into the research (Hyland, 1998a). In the examined corpus, no questions have been detected.

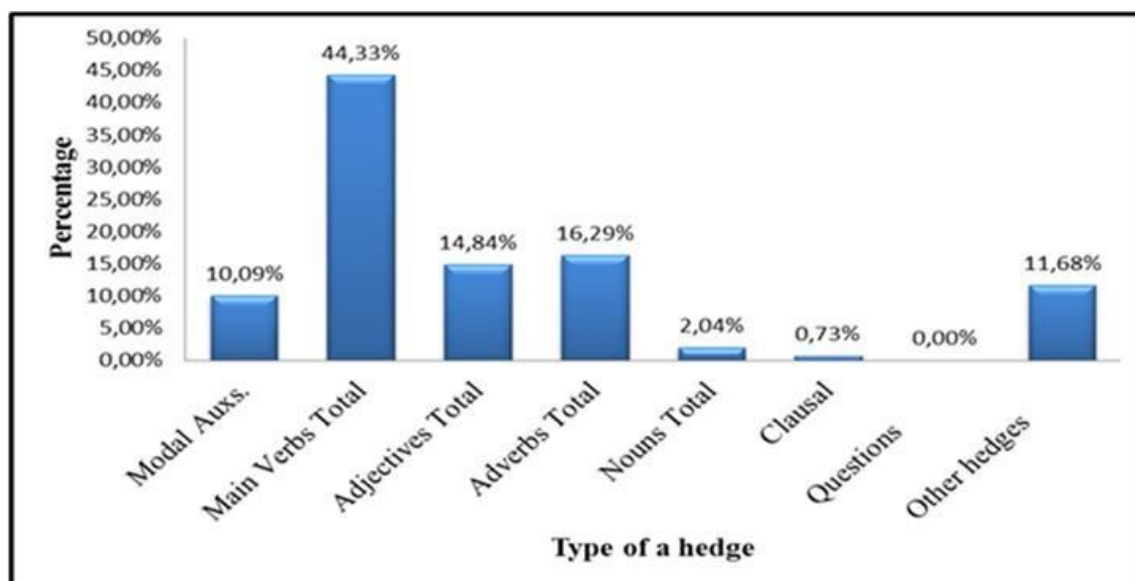
## 5.3. Summary of the Quantitative Analysis

In this first step in the corpus analysis procedure, we have provided a quantitative analysis of the occurrence of hedges devices in the Algerian biology corpus. The following table 32 summarises the results of the quantitative analysis:

| Type of a hedge              | Raw number  | Frequency<br>Per 1000 | Percentage   |
|------------------------------|-------------|-----------------------|--------------|
| <b>Modal Auxs.</b>           | <b>153</b>  | <b>2.19</b>           | <b>10.09</b> |
| Non-factive reporting Vs     | 456         | 6.53                  | 30.08        |
| Tentative cognition Vs       | 189         | 2.68                  | 12.47        |
| Tentative linking Vs         | 27          | 0.39                  | 1.78         |
| <b>Main Verbs Total</b>      | <b>672</b>  | <b>9.6</b>            | <b>44.33</b> |
| Probability Adjectives       | 25          | 0.35                  | 1.65         |
| Adj. of indefinite degree    | 164         | 2.34                  | 10.82        |
| Adj. of indefinite frequency | 36          | 0.51                  | 2.37         |
| <b>Adjectives Total</b>      | <b>225</b>  | <b>3.2</b>            | <b>14.84</b> |
| Probability Adv.             | 5           | 0.07                  | 0.33         |
| Adv. of indefinite degree    | 101         | 1.45                  | 6.66         |
| Adv. of indefinite frequency | 45          | 0.64                  | 2.97         |
| Approximative Advs.          | 96          | 1.37                  | 6.33         |
| <b>Adverbs Total</b>         | <b>247</b>  | <b>3.53</b>           | <b>16.29</b> |
| Non-factive assertive Ns.    | 3           | 0.03                  | 0.20         |
| Tentative cognition Ns       | 18          | 0.25                  | 1.19         |
| Tentative likelihood Ns      | 10          | 0.15                  | 0.66         |
| <b>Nouns Total</b>           | <b>31</b>   | <b>0.43</b>           | <b>2.04</b>  |
| <b>Clausal</b>               | <b>11</b>   | <b>0.16</b>           | <b>0.73</b>  |
| <b>Questions</b>             | <b>00</b>   | <b>00</b>             | <b>00</b>    |
| <b>Other hedges</b>          | <b>177</b>  | <b>2.54</b>           | <b>11.68</b> |
| <b>Total</b>                 | <b>1516</b> | <b>21.65</b>          | <b>100%</b>  |

**Table 32. The Frequency and Percentage of Hedges in the Corpus**

Visually, the following figure may better show the percentage of the use of hedges in the examined corpus:



**Figure 13. The Percentage of Hedges in the Corpus**

As can be seen from table 32 and the above figure 13, the examined corpus contains 1516 hedges (or 21.65 per 1000 words). As the breakdown of the types of hedges demonstrates, lexical verbs figure prominently with a number of occurrences of 672 verbs amounting of a percentage of 44.33% out of the total number of hedges. One can also notice that the results of adjectives and adverbs are approximate, with a number of occurrences of 225 and 247 respectively. Modal auxiliaries' type is not far from adjectives and adverbs with an account of 156 hits. Nonetheless, one can say that these latter are 'modest types' of hedges compared with lexical verbs. However, the remarkable modest categories were "nouns" and "clausal" with a density of only 0.43 and 0.16 per 1000 words respectively. Surprisingly, the category of "other hedges" figures more than modal auxiliaries, nouns and clausal types of hedges with a number of occurrences of 177 times.

#### **5.4. Incidence of Hedges across the Research Article Sections**

The research article is divided into four parts or sections: the Introduction, Material and Method, Results and Discussion and the Conclusion sections. All the articles in the corpus adhered to the conventional Introduction, Methods- Results- Discussion pattern. The second step in the corpus analysis procedure was to check whether there might be differences in the incidence of occurrences of hedges through the research article sections. This analysis seeks to answer one of the questions concerned with the most hedged section in the Algerian biology corpus.

#### 5.4.1. Incidence of Hedging in the Introduction Section

The introduction section is one of the most significant rhetorical sections in the research article genre. Table 33 shows the incidence of hedging in this section:

| Type of a Hedge              | Introduction (9406 tokens) |                    |              |
|------------------------------|----------------------------|--------------------|--------------|
|                              | Raw number                 | Frequency Per 1000 | %            |
| <b>Modal Auxs.</b>           | <b>18</b>                  | <b>1.91</b>        | <b>6.47</b>  |
| Non-factive reporting Vs     | 38                         | 4.04               | 13.66        |
| Tentative cognition Vs       | 27                         | 2.87               | 9.71         |
| Tentative linking Vs         | 2                          | 0.21               | 0.719        |
| <b>Main Verbs Total</b>      | <b>67</b>                  | <b>7.12</b>        | <b>24.10</b> |
| Probability Adjectives       | 2                          | 0.21               | 0.719        |
| Adj. of indefinite degree    | 26                         | 2.76               | 9.35         |
| Adj. of indefinite frequency | 12                         | 1.28               | 4.31         |
| <b>Adjectives Total</b>      | <b>40</b>                  | <b>4.25</b>        | <b>14.38</b> |
| Probability Adv.             | 00                         | 00                 | 00           |
| Adv. of indefinite degree    | 12                         | 1.28               | 4.31         |
| Adv. of indefinite frequency | 24                         | 2.55               | 8.63         |
| Approximative Advs.          | 31                         | 3.29               | 11.15        |
| <b>Adverbs Total</b>         | <b>67</b>                  | <b>7.12</b>        | <b>24.10</b> |
| Non-factive assertive Ns.    | 2                          | 0.21               | 0.719        |
| Tentative Cognition Ns       | 5                          | 0.53               | 1.798        |
| Tentative likelihood Ns      | 2                          | 0.21               | 0.719        |
| <b>Nouns Total</b>           | <b>9</b>                   | <b>0.95</b>        | <b>3.23</b>  |
| <b>Clausal</b>               | <b>3</b>                   | <b>0.32</b>        | <b>1.079</b> |
| <b>Questions</b>             | <b>00</b>                  | <b>00</b>          | <b>00</b>    |
| <b>Other Hedges</b>          | <b>74</b>                  | <b>7.87</b>        | <b>26.61</b> |
| <b>Total</b>                 | <b>278</b>                 | <b>29.55</b>       | <b>100%</b>  |

**Table 33. Incidence of Hedging in the Introduction Section**

The results indicate that the number of hedges in the introduction sections is 278 devices which could be described as low. The quantitative analysis can also reveal that the introduction section exhibits different types of hedges appearing with different shares. “Other hedges” category , lexical verbs and adverbs figure considerably prominent in this section. However, the categories of “nouns” and clausal elements, on the other hand, are infrequent.

#### 5.4.2. Incidence of Hedging in the Materials and Method Section

The Material and Method section is meant to provide in detail the experimental design, the materials, technical equipment and methods used by the scientist. The following table 34 demonstrates the results of the incidence of hedging in this section:

| Type of a Hedge              | Material and Method (23471 Tokens) |                    |              |
|------------------------------|------------------------------------|--------------------|--------------|
|                              | Raw number                         | Frequency Per 1000 | %            |
| <b>Modal Auxs.</b>           | <b>05</b>                          | 0.21               | <b>2.72</b>  |
| Non-factive reporting Vs     | 27                                 | 1.15               | 14.67        |
| Tentative cognition Vs       | 48                                 | 2.05               | 20.086       |
| Tentative linking Vs         | 3                                  | 0.13               | 1.63         |
| <b>Main Verbs Total</b>      | <b>78</b>                          | <b>3.33</b>        | <b>42.39</b> |
| Probability Adjectives       | 00                                 | 00                 | 00           |
| Adj. of indefinite degree    | 27                                 | 1.15               | 14.67        |
| Adj. of indefinite frequency | 06                                 | 0.25               | 3.26         |
| <b>Adjectives Total</b>      | <b>33</b>                          | <b>1.40</b>        | <b>17.93</b> |
| Probability Adv.             | 00                                 | 00                 | 00           |
| Adv. of indefinite degree    | 12                                 | 0.51               | 6.52         |
| Adv. of indefinite frequency | 06                                 | 0.26               | 3.26         |
| Approximative Advs.          | 23                                 | 0.98               | 12.5         |
| <b>Adverbs Total</b>         | <b>41</b>                          | <b>1.75</b>        | <b>22.28</b> |
| Non-factive assertive Ns.    | 00                                 | 00                 | 00           |
| Tentative Cognition Ns       | 2                                  | 0.09               | 1.086        |
| Tentative likelihood Ns      | 00                                 | 00                 | 00           |
| <b>Nouns Total</b>           | <b>02</b>                          | <b>0.09</b>        | <b>1.09</b>  |
| <b>Clausal</b>               | <b>05</b>                          | <b>0.21</b>        | <b>2.71</b>  |
| <b>Questions</b>             | <b>00</b>                          | <b>00</b>          | <b>00</b>    |
| <b>Other Hedges</b>          | <b>20</b>                          | <b>0.85</b>        | <b>10.87</b> |
| <b>Total</b>                 | <b>184</b>                         | <b>07.84</b>       | <b>100%</b>  |

**Table 34. Incidence of Hedging in Materials and Method Section**

It is apparent based on the mentioned information that the overall incidence of hedges in the material and method section was 184 with a density of 7.84 per 1000 words, which could also be described as infrequent. The type of hedge which manifested a good deal of occurrences was the main verbs' type with a percentage of 42.39 % out of the total number of hedges in this section. The second frequent type of hedges was "adverbs" with a number of occurrences of 41 times. On the other hand, the number of occurrences of modal auxiliaries and nouns is considerably low.

### 5.4.3. Incidence of Hedging in the Result and Discussion Section

The Result and discussion section is the most persuasive rhetorical part in the research article. The results of this section are summarised in table 35:

| Type of a Hedge              | Result and Discussion (33609 Tokens) |                    |              |
|------------------------------|--------------------------------------|--------------------|--------------|
|                              | Raw number                           | Frequency Per 1000 | %            |
| <b>Modal Auxs.</b>           | <b>114</b>                           | <b>3.39</b>        | <b>12.03</b> |
| Non-factive Reporting Vs     | 360                                  | 10.71              | 38.01        |
| Tentative Cognition Vs       | 98                                   | 2.92               | 10.34        |
| Tentative Linking Vs         | 21                                   | 0.62               | 2.217        |
| <b>Main Verbs Total</b>      | <b>479</b>                           | <b>14.25</b>       | <b>50.58</b> |
| Probability Adjectives       | 19                                   | 0.57               | 2.00         |
| Adj. of Indefinite Degree    | 97                                   | 2.89               | 10.24        |
| Adj. of Indefinite Frequency | 16                                   | 0.48               | 1.689        |
| <b>Adjectives Total</b>      | <b>132</b>                           | <b>3.94</b>        | <b>13.39</b> |
| Probability Adv.             | 04                                   | 0.12               | 0.42         |
| Adv. of Indefinite Degree    | 72                                   | 2.14               | 0.21         |
| Adv. of Indefinite Frequency | 15                                   | 0.45               | 1.58         |
| Approximative Advs.          | 38                                   | 1.13               | 4.01         |
| <b>Adverbs Total</b>         | <b>129</b>                           | <b>3.84</b>        | <b>13.62</b> |
| Non-factive Assertive Ns.    | 01                                   | 0.03               | 0.10         |
| Tentative Cognition Ns       | 07                                   | 0.21               | 0.73         |
| Tentative Likelihood Ns      | 06                                   | 0.18               | 0.63         |
| <b>Nouns Total</b>           | <b>14</b>                            | <b>0.42</b>        | <b>1.48</b>  |
| <b>Clausal</b>               | <b>02</b>                            | <b>0.06</b>        | <b>0.21</b>  |
| <b>Questions</b>             | <b>00</b>                            | <b>00</b>          | <b>00</b>    |
| <b>Other Hedges</b>          | <b>77</b>                            | <b>2.29</b>        | <b>8.13</b>  |
| <b>Total</b>                 | <b>947</b>                           | <b>28.19</b>       | <b>100%</b>  |

Table 35. Incidence of Hedging in the Result and Discussion Section

It can be seen that the Result and Discussion section exhibit a total use of 947 hedges, which is the highest number of occurrences compared to the other sections. The discussion section makes great use of main verbs as these account for 50.58 % out of the total number of hedges in this section. Besides, Lexical hedging seems more common and varied whereby the occurrences of modal auxiliaries (N=114), adjectives (N=132), adverbs (N=129), nouns (N=14) and other hedges (N=77) are more frequent than in the other sections.

#### 5.4.4. Hedging in the Conclusion Section

The following table shows the results of the incidence of hedging in the Conclusion sections of the examined corpus:

| Type of a Hedge              | Conclusion (3186 Tokens) |                    |              |
|------------------------------|--------------------------|--------------------|--------------|
|                              | Raw number               | Frequency Per 1000 | %            |
| <b>Modal Auxs.</b>           | <b>16</b>                | <b>5.02</b>        | <b>14.95</b> |
| Non-factive Reporting Vs     | 31                       | 9.73               | 28.97        |
| Tentative Cognition Vs       | 16                       | 5.02               | 14.95        |
| Tentative Linking Vs         | 1                        | 0.31               | 0.93         |
| <b>Main Verbs Total</b>      | <b>48</b>                | <b>15.06</b>       | <b>44.86</b> |
| Probability Adjectives       | 04                       | 1.26               | 3.74         |
| Adj. of Indefinite Degree    | 14                       | 4.39               | 13.04        |
| Adj. of Indefinite Frequency | 02                       | 0.63               | 1.87         |
| <b>Adjectives Total</b>      | <b>20</b>                | <b>6.28</b>        | <b>18.69</b> |
| Probability Adv.             | 01                       | 0.31               | 0.93         |
| Adv. of Indefinite Degree    | 05                       | 1.57               | 4.67         |
| Adv. of Indefinite Frequency | 00                       | 00                 | 00           |
| Approximative Advs.          | 04                       | 1.26               | 3.73         |
| <b>Adverbs Total</b>         | <b>10</b>                | <b>3.14</b>        | <b>9.35</b>  |
| Non-factive Assertive Ns.    | 00                       | 00                 | 00           |
| Tentative Cognition Ns       | 04                       | 1.26               | 3.74         |
| Tentative Likelihood Ns      | 02                       | 0.63               | 1.87         |
| <b>Nouns Total</b>           | <b>06</b>                | <b>1.89</b>        | <b>5.61</b>  |
| <b>Clausal</b>               | <b>01</b>                | <b>0.31</b>        | <b>0.93</b>  |
| <b>Questions</b>             | <b>00</b>                | <b>00</b>          | <b>00</b>    |
| <b>Other Hedges</b>          | <b>06</b>                | <b>1.89</b>        | <b>5.61</b>  |
| <b>Total</b>                 | <b>107</b>               | <b>35.59</b>       | <b>100%</b>  |

**Table 36. The Incidence of Hedging in the Conclusion Section**

Overall, the Conclusion section contains 107 hedges (or 35.43 per 1000 words). The figures in this conclusion section sound to be the lowest. Remarkably, the prominent frequent hedge type is the category of “main verbs” comprised of 44.86 % out of the total number of hedges in this section. However, other forms of hedging in this section are modest and limited.

## 5.5. Summary of the Distribution of Hedging Through the Research Article Sections

A comparison of the occurrence of hedges in each section yields the following results. The following tables present the distribution of hedges in the different sections of the analysed research articles:

|                      | Auxiliaries | Main verbs | Adjectives | Adverbs | Nouns | Clausal | Other hedges | Total |
|----------------------|-------------|------------|------------|---------|-------|---------|--------------|-------|
| Introduction         | 18          | 67         | 40         | 67      | 9     | 3       | 74           | 278   |
| Materials & Methods  | 5           | 78         | 33         | 41      | 2     | 5       | 20           | 184   |
| Results & Discussion | 114         | 479        | 132        | 129     | 14    | 2       | 77           | 947   |
| Conclusion           | 16          | 48         | 20         | 10      | 6     | 1       | 6            | 107   |
| Total                | 153         | 672        | 225        | 247     | 31    | 11      | 177          | 1516  |

**Table 37. Incidence of Hedging across the Sections of Research Articles**

|               | Totals | Introduction | Materials & Method | Result & Discussion | Conclusion |
|---------------|--------|--------------|--------------------|---------------------|------------|
| Total Words   | 69672  | 9406         | 23471              | 33609               | 3186       |
| Total Devices | 1516   | 278          | 184                | 947                 | 107        |
| F             | 21.65  | 3.99         | 2.64               | 13.59               | 1.54       |
| Percentage    | 100%   | 18.34        | 12.14              | 62.47               | 7.05       |

**Table 38. The Frequency and Percentage of Hedging across the Research Article Sections**

Upon examination of the above tables, it would appear that the Result and Discussion is the most hedged section in the examined corpus with a number of occurrences of 947 constituting a percentage of 62.47% out of the total number of hedges. It makes more than a half out of the whole. The Result and Discussion contains the highest frequency of occurrences of almost all types of hedges (except for clausal elements). The Introduction is the second hedged section with a share of 18.34 %. The Material and Method section is the third hedged section with a number of 184 occurrences. The Conclusion tends to be the least hedged section accounted for 7.05 % out of the whole. Interestingly, however, all sections appear to rely heavily on the category of “Main Verbs” in comparison with other types of hedges.

## **5.6. Pragmatic Analysis**

The Pragmatic analysis based on Malášková’s (2014) taxonomy, which is principally built upon the model of Hyland (1998a), has been used in our research to account for the functions served by hedging in the examined corpus. The functions of hedges are classified into: content-oriented hedges, writer-oriented hedges and reader-oriented hedges.

### **5.6.1. Content-oriented Hedges**

The corpus encompasses 1505 content oriented hedges. The following table summarises the results of content-oriented hedges:

| <b>The Device</b>   | <b>Raw number</b> | <b>Percentage</b> |
|---------------------|-------------------|-------------------|
| <b>Modal Auxs</b>   | 153               | 10.17             |
| <b>Main verbs</b>   | <b>672</b>        | <b>44.65</b>      |
| <b>Adjectives</b>   | 225               | 14.95             |
| <b>adverbs</b>      | 247               | 16.41             |
| <b>Nouns</b>        | 31                | 2.06              |
| <b>Other hedges</b> | 177               | 11.76             |
| <b>Total</b>        | <b>1505</b>       | <b>100%</b>       |

**Table 39. Raw Number and Percentage of Content-oriented Hedges**

Content-oriented hedges are expressed by modal auxiliaries, adjectives, adverbs, nouns and other hedges. Thus, the content-oriented function is mainly lexical. As table 39 reveals, main verbs' category is the most used type of hedges amounted for 44.65%.

### 5.6.2. Writer-oriented Hedges

Core cases of writer-oriented hedges entail passive constructions, clausal subjects, abstract rhetors, attribution to literature and impersonal reference to research/methods+limit. The following table shows the results of writer-oriented hedges in the examined corpus:

| <b>Strategy</b>                                           | <b>Raw number</b> | <b>Percentage</b> |
|-----------------------------------------------------------|-------------------|-------------------|
| <b>Passive constructions</b>                              | 132               | <b>15.05</b>      |
| <b>Clausal Subjects</b>                                   | 39                | 4.44              |
| <b>Attribution to literature</b>                          | 490               | 55.87             |
| <b>Abstract rhetors</b>                                   | 203               | 23.14             |
| <b>Impersonal reference to research / methods + limit</b> | 13                | 1.48              |
| <b>Total</b>                                              | <b>877</b>        | <b>100%</b>       |

**Table 40. Raw Number and Percentage of Writer-oriented Hedges**

### 5.6.2.1. Passive Constructions

The corpus includes a total of 132 passive voice constructions. The following examples illustrate the use of this type of hedges in the examined corpus:

**Example 60:** These methods *are suggested* in Bergey's Manual Determinative Bacteriology... (A 19)

**Example 61:** Flavonoids *have been reported* to inhibit pathogens bacteria. (A 28)

**Example 62:** The results obtained were found consistent with those reported by Kebir et.al. [31]. (A 1)

### 5.6.2.2. Clausal Subjects

As it is apparent from the table, the corpus exhibits a total of 39 clausal subjects' instances. The following examples are typical illustrations of this type of hedges:

**Example 63:** *It could be concluded that* methanol extract of Crocus Sativus L., constitute a potent source of polyphenols, an excellent... (A 11)

**Example 64:** *It could suggest* that heating of olive leaf extract causes hydrolyses of polyphenolic compounds with high molecular mass, leading to the formation of compounds...(A 3)

**Example 65:** In addition, *it has been reported* that the antimicrobial activity of esothiocynates derived from onion and garlic is related to the inactivation of intracellular enzymes through... (A 6)

### 5.6.2.3. Attribution to Literature

The corpus encompasses 490 instances of attribution to literature. Here are some instances of this function in the studied corpus:

**Example 66:** In addition, the method of extraction (extraction solvent and temperature) can also influence the content of polyphenols and flavonoids (*Conde et al., 2009; Lee et al., 2003*) prepared extracts. (A 18)

**Example 67:** *According to [19]*, Gram-positive bacteria are more sensitive to the action of flavonoids than Gram negative bacteria. (A 21)

**Example 68:** In the present study, the pregnant rats that received cafeteria diet had an increase in total food and energy intakes that may explain the body weight, *as described previously [2, 3, 7-9]*. (A 30)

#### 5.6.2.4. Abstract Rhetors

Another strategy by which writers distance themselves from propositions is the use of abstract rhetors. The results show a total use of 203 abstract rhetors. These are some instances of abstract rhetors:

**Example 69:** *The data obtained* revealed a significance decrease in the LPL activities of liver, pancreas and adipose tissue in rats of diabetic groups, as previously reported by... (A 1).

**Example 70:** On the other hand, *our results showed* no significant effect after treatment of melatonin and fluoxetine in diabetic rats. (A 22)

**Example 71:** *In the present work*, we studied the effect of different concentrations obtained from *G. alypum* on cell proliferation of cell line heap 2 at a density of 105 cells/well. (A 25)

#### 5.6.2.5. Impersonal Reference to Research/Methods Limits

The examined corpus encompasses 13 impersonal reference instances. These are some examples taken from our corpus:

**Example 72:** These results can only be conclusive *if the size of the population will be larger*. (A 23)

**Example 73:** However, *the relatively small size of the cohorts used for these studies does not reveal the real effect* of these polymorphisms on this pathology. (A 23)

**Example 74:** It would be better to use these methods *for better bacterial identification*. (A 20)

**Example 75:** Therefore, *further work* is under way to identify their *precise* antibacterial mechanisms. (A 28)

### 5.6.3. Reader-oriented Hedges

Core cases of reader-oriented hedges include questions, clausal elements and personal attribution. Table 41 below summarises the results of this function in the examined corpus:

| Strategy                  | Raw number | Percentage |
|---------------------------|------------|------------|
| Questions                 | 00         | 00         |
| Hypothetical Conditionals | 17         | 7.77       |
| Personal Attribution      | 202        | 92.23      |
| Total                     | 219        | 100%       |

**Table 41: Raw number and Percentage of Reader-oriented Hedges**

#### 5.6.3.1. Questions

Interrogative constructions could serve as hedges in the sense that they engage the reader more closely to the research (Hyland, 1998a). As table 41 demonstrates, the corpus includes no instances of questions.

### 5.6.3.2. Hypothetical Conditionals

In the quantitative analysis, hypothetical conditionals have primarily been concerned with *if-clauses*, which exhibit a total use of 11 hits in the examined corpus. We have also counted hypothetical conditional clauses realised by the modal *would*. According to Hyland (1998 a), the use of hypothetical conditionals indicates the attempt of the writer to suggest alternatives in offering one possibility among many. By doing so, the writer leaves the room open to the response of the reader.

**Example76:**... (2) Investigate the antioxidant and antimicrobial activities for to determine *if these essential oil and ethanol extract could be used as natural preservatives*. (A1)

**Example 77:** The formation of these products *would* mask the real decrease of TP content. (A 3)

**Example 78:** Further field trial and chemical analysis of the active compounds of this plant *would* give strong antioxidants and antifungal activity comparable to synthetic molecules. (A 9)

### 5.6.3.3. Personal Attribution

The use of personal attribution accompanied by epistemic verbs soften the information presented making it provisional and not categorical. The table shows that the corpus contains 202 instances of personal attribution, making it the most used strategy with a share of 93.23%.

**Example 79:** In the light of these results, *we can conclude* that the extracts from the two plants do not contain antifungal agent of the inhibition. (A 24)

**Example 80:** *We also found* that triglyceride levels of diabetic animals increased significantly in comparison with control rats ... (A 22)

**Example 81:** *Under our experimental conditions*, prolonged treatment with melatonin and fluoxetine does not cause any change in body weight in diabetic animals. (A 22)

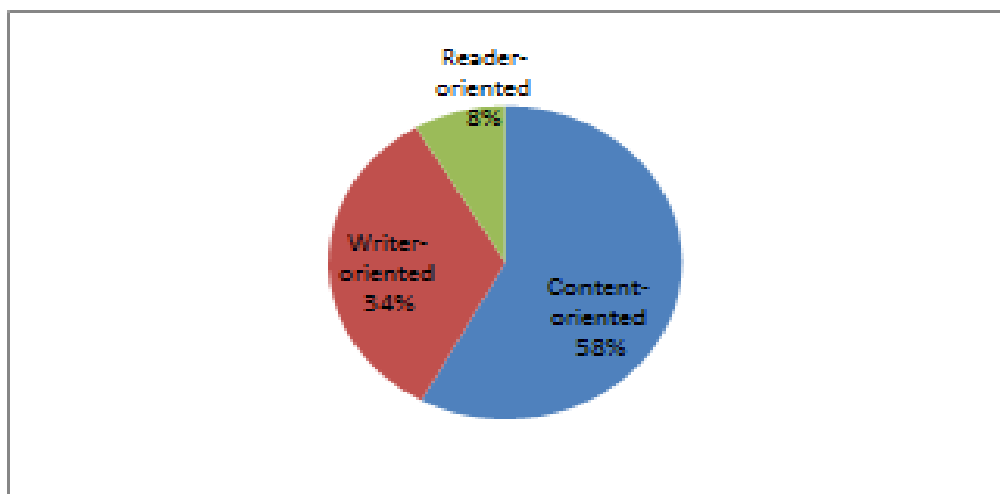
## 5.7. Summary of the Pragmatic Analysis

In this third stage in the corpus-analysis procedure, we have moved to shed light on the functions of hedges devices in the Algerian biology research articles. Despite the difficulty of the pragmatic analysis due to many reasons, we have attempted to take into account contextual considerations which play an important role for the understanding of the functions of hedging (Hyland, 1998a). The functions of hedging are highly associated with the content, the writer and the reader, resulting in content-oriented, writer-oriented and reader-oriented hedges. With regard to the obtained results, table 42 abridges the results of the pragmatic investigation:

| Functions        | Raw number | Percentage |
|------------------|------------|------------|
| Content-oriented | 1505       | 57.86      |
| Writer-oriented  | 877        | 33.71      |
| Reader-oriented  | 219        | 8.42       |
| Total            | 2601       | 100%       |

**Table 42. Overall Results of the Pragmatic Analysis**

Visually, the following figure may better show the results of the pragmatic analysis in the examined corpus:



**Figure 14. Overall Results of the Pragmatic Functions**

Overall, the pragmatic analysis demonstrates that content-oriented hedges are the most prominent category in the examined corpus, with a number of occurrences of 1505 hedges, which constitutes a percentage of 57.86 % out of the total number of hedging. Writer-oriented hedges are the second with a number of occurrences of 877 hedges which makes a percentage of 33.71%. The least frequent function, however, is reader-oriented hedges in which the number of hedges under this function is only 219 which comprises a share of 8.42 % out of the total number of hedges.

## Conclusion

This chapter examines the quantitative and pragmatic analyses of hedging in the corpus. The analyses have yielded some reflective results about the use of hedging and have answered the raised questions. On the whole, the analysis has revealed that Algerian scientists in this study employ different types of hedges with different proportions. Besides, the analysis has also suggested that the Result and Discussion is the most hedged section. Remarkably, the

category of “Main Verbs” figured prominently in all the sections. The pragmatic analysis has indicated that Algerian scientists use hedges mainly to express the propositional content (content-oriented hedges).

## Chapter Six

### Discussion of the Results

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## **Chapter Six**

### **Discussion of the Results**

#### **Introduction**

The analysis in Chapter Five has provided data about the types of hedges, the incidence of these forms across the different rhetorical sections and the pragmatic functions of hedging in the studied corpus. This chapter attempts to offer an in depth discussion of the data in respect to the works of Hyland (1998a) and Varttala (2001).

The chapter is a presentation of the interpretation of the results of the surface-level analysis (quantitative analysis) focusing on the most numerically employed types of hedges in the corpus. There is besides a discussion of the most hedged sections in the research article, providing some extracts to consider the rhetorical purposes of hedges in these sections. Section three underlines the pragmatic motivations for the use of hedging by Algerian biologists in this research.

#### **6.1. Discussion of the Quantitative Analysis**

As stated previously, the quantitative analysis has examined the semantic realisations of hedges types in the studied corpus based on Varttala's (2001) typology. The following table summarises the most employed types of hedges in the Algerian corpus and in Hyland's corpus (1998a):

| Category     | Items per 1000 words | Percent | Raw number |
|--------------|----------------------|---------|------------|
| Main Verbs   | 9.6                  | 44.33   | 672        |
| Adverbs      | 3.53                 | 16.29   | 247        |
| Adjectives   | 3.2                  | 14.84   | 225        |
| Other Hedges | 2.54                 | 11.68   | 177        |
| Modal Aux.   | 2.19                 | 10.09   | 153        |
| Nouns        | 0.43                 | 2.04    | 31         |

**Table 43: Results of the Most Occurring Types of Hedges in the Corpus.**

| Category |               | Items per<br>1,000 words | percent | Raw<br>number |
|----------|---------------|--------------------------|---------|---------------|
| Lexical  | lexical verbs | 4.9                      | 23.3    | 366           |
|          | adverbs       | 4.4                      | 21.0    | 329           |
|          | adjectives    | 3.9                      | 18.8    | 294           |
|          | modal verbs   | 3.5                      | 16.6    | 259           |
|          | modal nouns   | 1.1                      | 5.4     | 85            |
|          | <b>Total</b>  | 17.8                     | 85.1    | 1333          |

**Table 44. The Most Occurring Hedges' Types (Hyland, 1998 a, p.104)**

Overall, as demonstrated in Tables 43 and 44 above, the results of the most mitigating forms of hedges in the Algerian scientists' corpus align with the results in Hyland's corpus, though he used a different taxonomy. The highly occurring types of hedges and how they are used by Algerian biologists in this data will thoroughly be discussed.

### 6.1.1. Main Verbs

Main verbs have been the most frequently used category of hedges by Algerian biologists in this data. This result is analogous to Hyland's (1998 a) and Varttala's (2001)

findings in which lexical verbs have been the most common mitigating forms in their corpus. For Varttala (2001), there have not been so much numerical results about the use of lexical verbs as hedges. It appears that Hylands' (1998 a) investigation, according to Varttala, is the only in-depth study into the use of full verbs. According to Hyland (1998 a), main verbs

Represent the most transparent means of coding the subjectivity of the epistemic sources and are generally used to hedge either commitment or assertiveness. Their numerical significance thus reflects their rhetorical versatility in contexts where categorical assertions rarely represent the most effective means of expression (pp.119-120).

The rhetorical versatility of full verbs might often make them more common exponents of modality than modal auxiliaries (Varttala, 2001). Epistemic main verbs offer the writer means of expressing the non-factual status of propositions. Also, they provide him with ways of expressing the writer's commitment with great precision and caution. Consider the following example:

**Example 1:** The results of the molecular docking have allowed as to *suggest* a possible explanation of the binding mode of the luteolin and their interactions with important residues in active site of ..... ( A14)

In example (1), the epistemic value of the main verb *suggest* accompanied by an abstract rhetor (the results of ) clearly indicates the speculation of the writers' statement denoting that what is being said is a possibility and not a certainty. Using such verbs allows the writer to express "speculation or guesses or ideas about what might happen or be true rather than facts" (Merriam-Webster, 2014).

According to Hyland (1998 a), the choice of a given epistemic verb is strategic. Thus, the preponderance of non-factive tentative reporting verbs over the two-sub classes in the Algerian corpus could be regarded as a strategy.

Reporting verbs are significant devices to indicate the writer's attitude towards the findings and the research of other colleagues in a community (Thompson & Yiyun, 1991; Hyland, 1999). For Hyland (2005 b), these are grammatical instruments by which writers express their stance in academic research papers. Bloch (2010) states that reporting verbs in academic research articles are regarded as intrinsic tools to support the writers' claims and persuade the reader of the significance and justifiability of the claim. Writers, thus, are incumbent to use such verbs to create reliability and credibility to their own work. Therefore, the choice of a reporting verb is critical.

In a corpus study on attribution by using reporting verbs across disciplines, Ädel and Garretson (2006) came to conclude that reporting verbs are not idiosyncratic in each discipline and it seems complicated to attribute distinctive verb groups across disciplines.

| Disc | Top Ranking Verbs (starting with the most frequent)                                     |
|------|-----------------------------------------------------------------------------------------|
| BIO  | note, suggest, propose, argue, find, cite, describe, observe, show                      |
| ECO  | find, show, argue, identify, point out, propose, present, examine                       |
| LIN  | argue, say, claim, point out, describe, discuss, suggest, state, propose, mention       |
| PHI  | argue, claim, say, note, state, think, suggest, believe, mean, conclude                 |
| PSY  | find, suggest, argue, use, examine, point out, discuss, show, state, conclude           |
| SOC  | argue, define, call, state, see, believe, say, write, describe, suggest                 |
| IOE  | suggest, use, find, say, conclude, mention, study, state, propose, investigate, propose |

**Table 45: Most Common Reporting Verbs across Disciplines (Ädel & Garretson, 2006, p.275)**

As can be seen, *note*, *suggest*, *propose* and *argue* are the most frequently used verbs in biology according to this study. On the other hand, In Hyland's (1998 a) corpus, *indicate*, *suggest*, *appear*, *propose* and *seem* have been the most occurring verbs. Hyland (1998 a)

claims that these are more prominent verbs in scientific writing specifically *indicate* and *suggest*:

| Item     | Research articles |
|----------|-------------------|
| indicate | 10.8              |
| suggest  | 9.1               |
| appear   | 4.0               |
| propose  | 2.8               |
| seem     | 2.3               |
| report   | 1.7               |
| predict  | 1.5               |
| assume   | 1.1               |

**Table 46: Most Commonly Occurring Verbs Expressing Mitigation (Hyland, 1998 a, p. 128)**

However, in the Algerian corpus, *show*, *report*, *find*, *observe* and *indicate* have been the top five ranking verbs. These verbs will be separately discussed as follows:

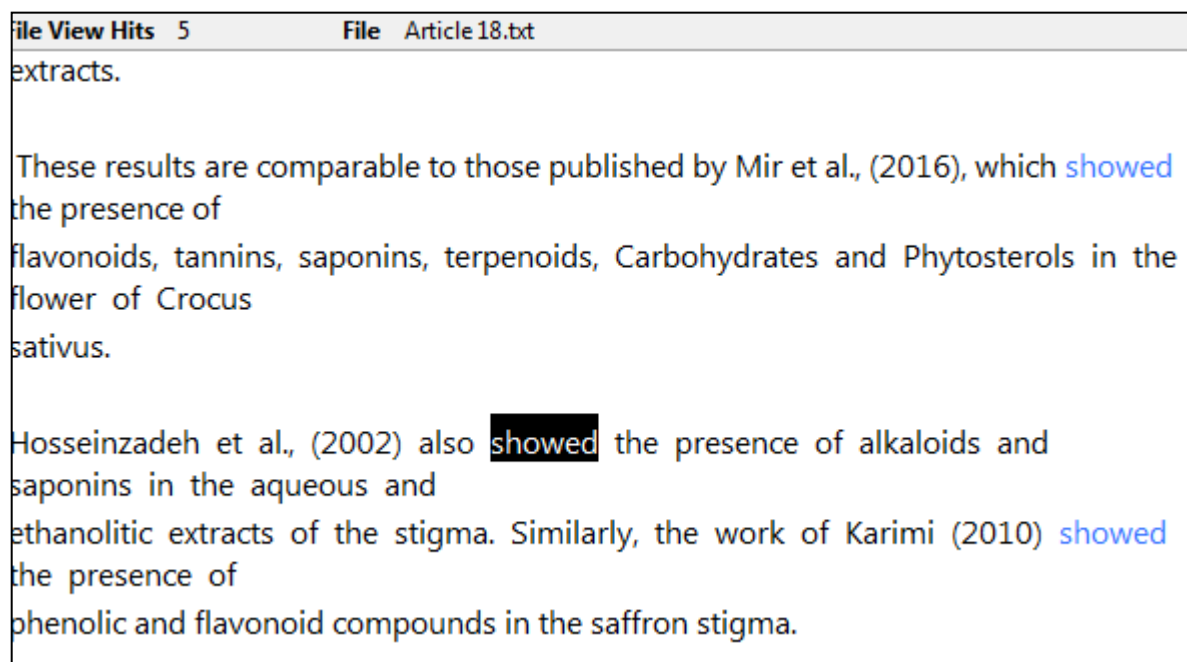
#### ❖ The verbs Show/Report/Find

According to Hyland (1998 a), one way among the possible ways to express the non-factual status of the propositional content is the use of “the evidential verb category” which encompasses other sub-classes. The verbs *show*, *report* and *find* belong to the quotative verb sub-class. The quotative verbs “imply a certain amount of doubt as evidentiary justification is required for their support” (p.120).

**Example 2:** In this context, Daubresse et al. (1996) and Ye.et al. (2012) *report* that fluoxetine decreases hypertriglyceridemia in patients with type 2 diabetes. (A 22)

**Example 3:** Lavender was *found* to be ineffective in controlling the Salmonella typhimuriumstrains and these results were contrasted with that of [1] who *reported* lavender with potentially effective with MIC ranged from ... (A 6)

#### Example 4:



As illustrated in the aforementioned examples, by employing the quotative verbs the scientist acknowledges previous literature not just “to give credit to other researchers and to use other work in the cumulative construction of knowledge” (Charles, 2006, p.326), but also to express his stance towards what is reported.

Notably, in the Algerian corpus, the verbs *seem* and *appear*, which are high in Hyland’s corpus, have been the least employed verbs. According to Hyland (1998a), these verbs belong to ‘the sensory evidential verbs’ which is another sub-class of epistemic evidential verbs. These verbs can express more cautious and tentative attitudes than the verbs *report* and *show* as in the following examples:

**Example 5:** It *appears* legitimate to wonder about the biological and ecological impacts induced by these stressing environmental conditions on the one hand... (A15)

**Example 6:** Consanguinity alone does not *seem* to be the main cause of  $\beta$  thalassemia. (A23)

### ❖ The Verb Indicate

The verb *indicate* is the most used verb in Hyland's corpus. Yet, in the Algerian corpus, it is the fifth most occurring verb (N =39). The verb *indicate* belongs to the speculative category according to Hyland (1998 a). In its epistemic use, the verb *indicate* could be used with different connotations. According to Oxford Dictionary (2014), *indicate* has the meaning of "to strongly suggest".

**Example 7:** The preliminary qualitative phytochemical analysis of the *H. scoparium* was carried out for detection of secondary metabolites and results *indicate* that all the phytochemical constituents were found to be present including ...(A 11)

**Example 8:** The results *indicate* clearly that reducing power of the two extract is most often related to the respective interaction times. (A 2)

**Example 9:** The data *indicated* that *Staphylococcus aureus* was the more sensitive strain tested to the oils of *Mentharotundifolia* with the strongest inhibition zone ...(A 4)

The verb *indicate* has never been employed with personal pronouns (I/We), but with abstract rhetors as in the previously mentioned examples which aims to "deflect attention from the true writer" (Vass, 2015, p.345). According to Hyland (1998 a), the use of verbs like *indicate* is part of the impersonalisation of the scientific discourse whereby the data is the centre of the epistemic judgement. To this end, "encouraging an interpretation close to 'makes us think that X', or ' leads us to the conclusion that X', rather than 'my interpretation is that X' " (p. 124).

Another epistemic meaning of the verb *indicate* is to express an opinion in an indirect way (Macmillan Dictionary, 2014) like the following examples:

**Example 10:** Joly and al. 2014 *indicate* that the increase in HbA2 is the consequence of a relative increase in the proportion of globin chains relative to  $\beta$  globin chains. (A 23)

**Example 11:** Romdhan and al. 2014 *indicate*, on the other hand, an average age of 9 years in the Tunisian population with extremes ranging from 2 to 17 years. (A 23)

To recapitulate, writers use hedges to “adjust the strength of their claims and modify their confidence in statements” (Hyland, 1998a, p. 127). Therefore, the choice of a given epistemic lexical verb is both critical and strategic. According to the data obtained, Algerian biologists rely heavily on non-factive tentative reporting verbs over the other sub-classes. The choice of a given reporting verb reflects the writer’s stance towards the source mentioned, “demonstrating exactly how strongly the writer wishes to be aligned with the cited work” (Hyland, 1998 a, p. 75). Consequently, given that the choice of a given verb can indicate different levels of commitment, the use of verbs such as *seem* and *appear* (which are infrequently used in the Algerian corpus) can reflect a more reserved position to the information presented than the verbs *show* and *report*. In other words, the reporting verbs *show*, *find* and *report* might indicate a more positive commitment than the verbs *indicate*, *suggest*, and *appear*. Therefore, the occurrence of verbs such as *report* and *show* more than *indicate* and *appear* might reflect the Algerian biologists’ tendency in this data to convince their readers by referring to evidence from other researchers as a support to their claims: Evidential hedges over speculative. Yet, this is not the case in Hyland’s corpus where speculative hedges are over evidential ones, suggesting the tentative and attentive positions of scientists towards their claims rather than a focus on evidence as in the Algerian corpus. Consequently, there seems a problem in the pragmatic choices they made when using some verbs over others.

### 6.1.2. Epistemic Adverbs

Epistemic adverbs are the second most frequently used type of hedges, a result which is consistent with Hyland's (1998 a) research. Surprisingly, despite this major presence in research articles, adverbs and adjectives have caught little attention into their epistemic functions (Hyland, *ibid*). According to Biber et al. (1999), epistemic adverbs are a type of stance adverbs by which users "convey their judgments and attitudes, to claim the factual nature of what they are saying, and to mark exactly how they mean their utterances to be understood " (p.776). For Hyland (1998 a), epistemic adverbs are considered as a part of the broad category of epistemic modality markers which serve to express the writer's attitude towards the truth value of the proposition. From his standpoint, Wierzbicka (2006) states that epistemic adverbs are used to enable the writers "to partly 'objectify' their stand, to hint at some valid grounds for it, to convey an expectation that their stance would be seen by other people as reasonable" (p. 259). Seemingly, these researchers and others might classify epistemic adverbs differently, but they all agree upon the function of tentative adverbs in establishing the authorial presence, stance and attitude of the writer in a text.

Over the sub-classes of adverbs, adverbs of indefinite degree (N=101) and approximative adverbs (N=96) have been the most employed types of adverbs. *Some*, *significantly* and *about* are the most occurring adverbs in the studied corpus:

**Example 12:** After 24 h of incubation, the aqueous extracts caused from 15-well plate of large rounded polymorphic, shrunken nuclei, which were rounded into many groups (figure 6), while *some* of the cells in monolayer were not completely destroyed ... (A 25)

**Example 13:** It is obtained from stigmas, and all harvesting operations are carried out by hand (a dry stigma in the saffron plant weighs *about* 2 mg and each flower contains three, *about* 150,000 saffron flowers must be carefully cooked, harvested ... (A 18)

**Example 14:** The cafeteria diet *significantly* increased plasma glucose, cholesterol and triglyceride levels in both obese mothers and their newborns compared to control values (Table 3) (A 30)

Adverbs like *some* and *about* demonstrate numerical imprecision and can denote an adherence to Gricean maxims (see chapter two) are a rhetorical technique in scientific discourse. Because in science every word tells, those markers of approximation help the writer specify the state of knowledge as accurately as possible. They are items which manipulate precision in quantification reflecting variability in scientific data, regarded as an intrinsic aspect in scientific data. *Some* and *about* are labeled “approximators” in Salager-Meyer’s (1994) taxonomy and she claims that “approximators is the hedging category which most closely reflects what we would call the institutionalized language of science” (p.154). That is to say, approximation is part of the language of science whereby the employment of such items is inevitable. For Salager-Meyer (1994), the use of these devices can help the scientist to present the true state of a statement be it clear and exact as it should be. Also, adverbs of indefinite degree and approximative adverbs can denote purposive fuzziness for making the statement more acceptable to the reader and, hence, minimizing the risk of opposition and boosting the chance of ratification (Salager-Meyer, 1994).

### 6.1.3. Epistemic Adjectives

Epistemic adjectives are the third topmost occurring devices of hedges, a result which is also aligned with Hyland's (1998 a) study. They are also markers which can mirror the writer's attitude towards the propositional content. Like adverbs, the use of epistemic adjectives indicates the writer's stance by showing his/her judgment of research claims. Moreover, Hyland (2006) explains that:

In a context where the accreditation of knowledge depends on the consensus of the research community and the need to evaluate evidence, to comment on its reliability, and to avoid potentially hostile responses, expressions such as *might*, *perhaps*, and **possible** can contribute to gaining the acceptance of research claims (p.694).

Surprisingly, over the types of adjectives used in the corpus, adjectives of indefinite degree (N= 164) have been the most frequently employed ones. Consider the following instances:

**Example 15:** The leaves were cut into *small* pieces 0.5 to 0.7 cm in diameter and put in Eppendorf tubes containing 100 of the extraction solution. (A 17)

**Example 16:** When *significant* changes were observed, least *significant* tests were applied to locate the source of *significant* difference. (A 1)

This category is also meant to avoid commitment to precise figures: imprecision. For Hyland (1998a), Dubois (1987) and Channell (1990), hedges might be used when imprecision is permissible in a particular research community. In hard sciences, authors have to consider quantification so that they can achieve precision. Using these kinds of hedges does not aim “to dilute their certainty but, instead, to present a real picture of how far their measurement

varies from standard disciplinary norms and to create shared understandings with the readers” (Takimoto, 2015, p. 99).

The most frequently adjectives have been *significant* (N=81), *major* (N=27), *common* (N=20), *possible* and *small* (N=15). According to Hyland (1998 a), the adjective “significant” has acquired a technical meaning in scientific writing to express objective and measurable appraisal. About the other adjectives, the adjective *possible* is a more familiar hedge, Hyland (1998a) claims. *Possible* can have both a root and epistemic meaning, though the latter is more common in scientific discourse.

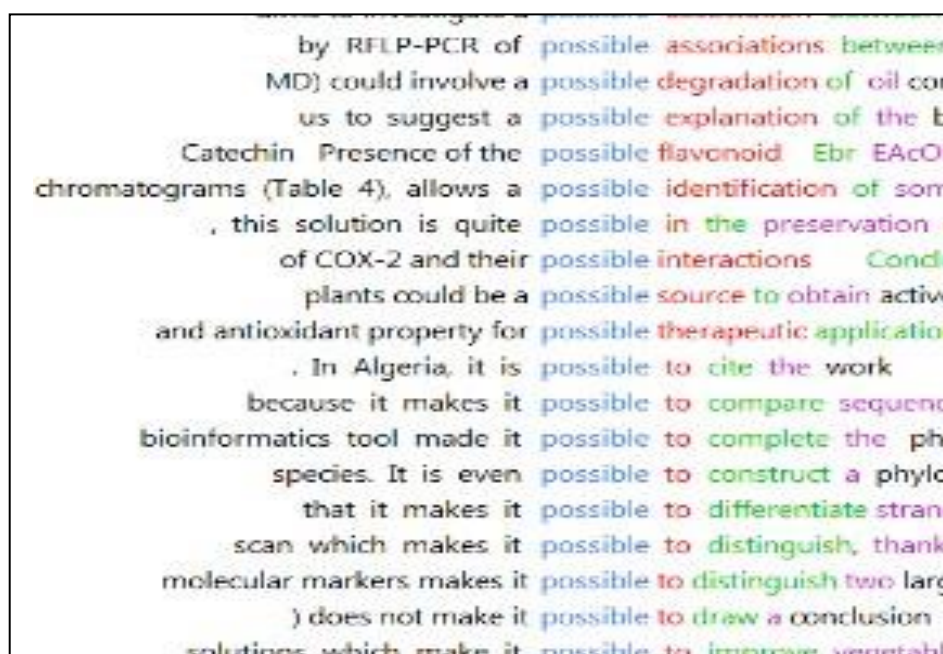


Figure 15. Extract of the Concordances of the Adjective *Possible*

#### 6.1.4. Other Hedges

The category of “Other hedges” is among the topmost employed types of hedges in the Algerian corpus (N=177). These are some examples of this category:

**Example 17:** *Several* anti-inflammatory drugs have shown dose-dependent ability to inhibit thermally-induced protein denaturation. (A 8)

**Example 18:** Crocus genus consists of *about* 85 species and most of them are considered as economically valuable. (A 5)

The high occurrence of this category confirms that hedging is basically a lexical phenomenon. Interestingly, this category also reveals quantification in the Algerian corpus as in the use of epistemic adverbs and adjectives. There might be some reasons behind the use of such items, “such as the omission of numerical data where it cannot be obtained, or the avoidance of exact figures where they are not regarded as necessary, or when absolutely accurate numbers are not available” (Varttala, 2001, p. 148).

#### **6.1.5. Modal Auxiliaries**

Realisations of modality enable the writer to quantify the world with greater precision. Using modal auxiliaries, the writer presents his propositions as opinions rather than assertive statements in an attempt to persuade the reader. Thus, modal auxiliaries indicate the writer’s attitude towards their propositions According to Chen (2010), the appropriate use of modals can be an indicator of the overall language proficiency of the writer. However, some research into the use of modal auxiliaries (De Carrico, 1986; Hinkel, 1995) has reported the difficulty in appropriately using modals by writers, particularly non-native speakers of English. To this end, the wrong use of modal auxiliaries will result in doubts of the presented arguments and the finding examined in the article (Hyodo, 1993).

After the contextual analysis of the identified modal auxiliaries in the whole Algerian corpus, there were 2.19 instances of modals accounting for 10.09 % of all hedges types:

| <b>Modals</b>       | <b>Corpus (69672)</b> |
|---------------------|-----------------------|
| <b>Could</b>        | <b>0.80</b>           |
| <b>May</b>          | <b>0.76</b>           |
| <b>Can</b>          | <b>0.4</b>            |
| <b>Would</b>        | <b>0.09</b>           |
| <b>Might</b>        | <b>0.07</b>           |
| <b>Will</b>         | <b>0.06</b>           |
| <b>Must</b>         | <b>0.01</b>           |
| <b>Should/Shall</b> | <b>00</b>             |
| <b>Totals</b>       | <b>2.19</b>           |

**Table 47. Frequencies of Modals in the Corpus per 1000 Words**

| <b>Modal verb</b> | <b>Journals<br/>75, 000<br/>words</b> |
|-------------------|---------------------------------------|
| would             | 10.4                                  |
| may               | 9.2                                   |
| could             | 6.4                                   |
| might             | 3.6                                   |
| should            | 2.4                                   |
| cannot            | 0.8                                   |
| will              | 0.8                                   |
| must              | 0.8                                   |
| shall             | 0.0                                   |
| ought to          | 0.0                                   |
| <b>Totals</b>     | <b>34.4</b>                           |

**Table 48. Frequencies of Modals in per 10,000 words (Hyland, 1998a, p.107)**

To begin with, in Hyland's (1998 a) corpus, modals are not numerous compared with other types of hedges, a result which also corroborates with this study. Hyland (1998 a) has justified the infrequent use of modals claiming that modals "must be seen with a general framework in which they are one important way of indicating qualification of factuality and providing writer perspective" (p.155). *May* and *could* are among the most employed modals in the current study and in Hyland's (1998a) research. According to Biber et al. (1999), *may* is

common in academic writing. However, some differences can be detected in the use of some modals by Algerian biologists and in Hyland's corpus.

The first observation is concerned with the use of the modals *would*, *might* and *should*. According to Coates (1983), *would* is the main hypothetical marker with epistemic use. Specifically, in scientific writing, *would* is generally used with a sense of prediction and hypothetically. In the Algerian corpus, only 9 occurrences of *would* in the whole corpus, out of which 6 could be perceived as hedges. This result does not corroborate with Hyland's finding (1998 a) in which *would* is the most frequently used marker in his corpus.

In addition, the modal *might* is also under-represented in the Algerian corpus. Yet, Hyland (1998 a) claims that *may* and *might* are regarded as prototypical hedges. No instances of the modal *should* as a hedge have been detected in the present corpus. These results might be explained by the fact that "NNS writers have a restricted lexical repertoire that often leads to a shortage of hedging devices employed in L2 writing text" (Hinkel, 2004, p. 314). Consequently, because of the limited repertoire of epistemic modals, non-native users would adopt an avoidance strategy.

Another observation is made in the use of the modal *can*. According to Biber et al. (1999), "can is especially ambiguous in academic prose, since it can often be interpreted as marking logical possibility or ability" (p.492). Considering the ambiguous meaning of the modal *can*, it has been totally true when trying to analyse the functions of this modal in the Algerian corpus. For Biber et al., (1999), the ambiguous meaning of *can* in academic prose is relatively expected. Referring to the initial results of the total occurrence of the modal, *can* has been the most used modal in the whole corpus (N=84). This might reflect Algerian writers' familiarity with this modal compared with the modal *would*, for instance. The

overuse of the modal *can* in L2 writing in comparison with other modals is acknowledged in literature (Hyland & Milton, 1997; Biber et al., 1999; Yang, 2018). 34.52% of *can* (N=28) has been used as epistemic in the Algerian corpus, which is a high percentage compared with other studies. Collins (2009), for example, reports that in his corpus only 1.1% of *can* was used with epistemic meaning and the rest with indeterminate meaning (p.98). Similarly, Brewer (1987) and Hyland (1998 a) did not detect any use of *can* with epistemic meaning. On the other hand, in Varttala's (2001) research corpus, not less than 27 hits of the modal *can* in epistemic use.

Back to the Algerian corpus, noticeably, on many occasions, the use of *can* could be rather replaced by *may* or *might* as the writer is aiming at offering probable explanations and, thus, expressing tentativeness and uncertainty. To explain this point, consider the following examples:

**Example 19:** The differences found *can* be attributed to several reasons such as, methods of extraction ([8]; [23]; [37], preparation of the extract, solvent used, the sensitivity of the bacteria [38] and finally the part of the plant used [31]. (A 24) (Discussion section)

**Example 20:** This *can* be explained by the importance paramount of the mobility of trace elements and their position against the availability of living beings. A 10 (Discussion section)

Most of the use of *can* as epistemic has been found in the Discussion section whereby writers are invited to convince their readers and evaluate their attitudes towards their claims. The use of *can* as epistemic, compared with the foregoing studies, might be thus justified by Algerians' perceptions of the functions of the modal. Likewise, Orta (2010) commenting on the use of modal verbs, particularly *can*, by Spanish writers writes that "there appears to be a mismatch in the expression of epistemic meanings between some modal verbs: "can" absorbs

some of the possibility uses of “may” and “could” (p.87). According to Orta (2010), the use of *can* instead of *may* or *could* might be attributed to a general tendency towards the use of *can* and a lack of modalisation. In other words, the problem seems to be pragmatic. From another but related angle, the underuse of *might* (N=5), said to be more tentative, could also explain the high frequency of the use of the modal *can* in epistemic use in the Algerian corpus.

## 6.2. Hedging Incidence along the Research Article Sections

According to Varttala (2001), the hedging phenomenon in research articles is not equally distributed across the RA sections; some sections appear to be more hedged than others. Indeed, with an eye on the results of the incidence of hedging across the Algerian research article sections, the Result and Discussion section is the most hedged section (N= 947). This result is in line with previous findings (cf Salager-Meyer (1994), Hyland (1998 a), Varttala (2001). The introduction is the second, Materials and Methods is the third and the conclusion is the least.

### 6.2.1. Hedging in the Result and Discussion Section

As seen in chapter five (section 5.5), the Result and Discussion section contains the highest occurrences of almost all forms of hedges. Here are some instances:

**Example 21:** Hosseinzadeh et al., (2002) also *showed* the presence of alkaloids and saponins in the aqueous and ethanolic extract of the stigma. Similarly, the works of Karimi (2010) *showed* the presence of flavonoid compounds in the saffron stigma. (A 18)

**Example 22:** However, the essential oil from the root of *P. halepensis* was characterized by a *large* amount of hydrocarbon compounds (98.8%) made up of ... (A13)

**Example 23:** The inhibition zone increased *significantly* with the concentration of the extracts, a fact also *noticed* by Dordevic and his collaborators, [29]. (A24)

**Example 24:** Another explanation *might* be that phenolic compounds interfere with membrane function and interact with membrane proteins, causing deformation in structure and functionality [23]. (A 6)

**Example 25:** *Rotundifolia* used consists of *several* natural active substances or a *few* of them must have this antioxidant capacity. (A 4)

**Example 26:** These results can only be conclusive *if* the size of the study population will be larger. (A 23)

This section begins by presenting the results of the scientists' findings, a process which, according to Hyland (1998), is argumentative and not only expository. Consider the following extracts:

**Extract 1:** *It was found that* rats in the diabetic group presented *significantly* high levels of plasma glucose and glycated hemoglobin, while the hemoglobin level decreased in a *significant* manner when compared with that of control group rats. However, when microalgae *Nannochloropsis gaditana* was fed to diabetic rats, *it tended* to bring the above values to near normal (table 2). (A 1)

**Extract 2:** The experimental reducing power values of the *Zillamacropetra* and *Buboniomgravelones* aqueous extracts before and after optimization can be found in table 1. *The results indicate* clearly, that reducing power of the two extract is *most often* related to the respective interaction times. (A 2)

The use of hedges here is meant to persuade the reader by trying to constitute a logical and plausible presentation of the results obtained based on experimental information. According to Salager-Mayer (1994), the use of hedges in this section is to achieve accuracy and precision. To quote her words:

[h]edging may present the true state of the writer's understanding and may be used to negotiate an accurate representation of the state of the knowledge under discussion. In fact, academic writers may well wish to reduce the strength of claims simply because stronger statements would not be justified by the experimental data presented. In such cases researchers are not saying less than what they mean but are rather saying precisely what they mean by not overstating their experimental results (p.162).

The use of the passive voice and clausal subject (extract 1) disguise the source of the data presented and withdraw the writers' responsibility towards the information presented. Writers, then, to achieve academic credibility should go beyond their data to provide more general interpretations.

In the second step after the presentation of the research outcomes, scientists have to place their results into a wider body of knowledge when discussing their own findings. Consider the following extracts:

**Extract 3:** In the present study, induction of diabetes by STZ resulted in a loss of body weight in rats. This reduction in body weight *can be attributed to* the acceleration of lipid and protein catabolism caused by peripheral non-use of glucose by insulin-sensitive tissues, which leads to muscle atrophy and loss of tissue protein (Widemaier et al., 1995). *Under our experimental conditions*, prolonged treatment with melatonin and fluoxetine does not cause any change in body weight in diabetic animals. These results are in agreement with the findings of Ha et al., 1999; Jiang et al., 2016 who *reported* that treatment of diabetic rats with melatonin had no effect on body weight. (A22)

**Extract 4:** In the present study, the pregnant rats that received the cafeteria diet had an increase in total food and energy intakes that *may* explain the higher body weight, as described *previously* [2,3,7-9]. Offspring of these dams were heavier than offspring from dams fed control standard diet, *in agreement with previous studies*. ...Increase glucose,

cholesterol, triglyceride and reduced HDL-C levels are the key characteristics of dyslipidemia in obesity [32]. We showed that offspring of cafeteria fed-dams had significantly higher glucose and lipid concentrations than offspring of control dams fed normal diet, in agreement with previous studies [9, 33]. (A 30)

Clearly, the extracts show the writers' attempt to interpret his results and discuss his findings in relation with other fellows' works. In extract 3 and 4, whenever the writer discusses a given result of his research, he compares it with previous studies. The aim is to situate the scientists' own work within an acceptable endeavour and to convince the reader of the reliability of the scientists' claims. Noticeably, the interpretations of the results are hedged. There seems to be an effort "to bring the reader into agreement with the author on what the experimental results mean" (Thompson, 1993, p. 118). Thus, the use of hedges in this section serves a persuasive function par excellence. The use of *under our experimental conditions* (extract 3) form or strategy of hedges refers to the experimental limitations suggested by the scientist by which the results can be considered as valid (Hyland, 1998). Besides, such expressions protect the scientist from negative reactions readers may impose via referring to certain circumstances and conditions when discussing the results of his own research.

### 6.2.2. Hedging in the Introduction Section

The introduction is the second most hedged section in the Algerian corpus. As described by Skelton (1988), the Introduction is as tentative as the Arts paper. Here are some illustrations of the employed types of hedges:

**Example 27:** Indeed, recent studies have *found* that this disease affects about 4 % of the world population and is expected to rise to 5.4 % in 2025 [2, 3]. (A 1)

**Example 28:** It is an aromatic grass which is presented in the form of shrub, under sapling or herbaceous that belongs to the family of Labiees [3], measuring *approximately* 0.8 to 2 m in height [4]. (A 24)

**Example 29:** The remediation technologies of heavily heavy metal contaminated soils are *generally* extremely complicated and expensive. (A 27)

**Example 30:** The family of lamiaceae has *several* species whose lavender is the most popular in the Mediterranean basin. (A17)

**Example 31:** In obese patients, the increase in oxidative damage *may* be a consequence of hyperglycaemia, hyperlipidaemia, increase tissue lipid levels, inadequate antioxidant defences, increased rates of free radical formation and chronic inflammation [16]. (A 30)

According to Hyland (1998), “the works on introductions thus shows that writers are responsive to rhetorical pressures, rarely commencing with a simple purpose statement, but typically displaying an attempt to situate a claim in an important area of scientific endeavour” (p.27). One of the main pressures puts on the scientists in the introduction is creating a research space in order to locate their claims or study within a significant area and to highlight their purposes. Consider the following extracts:

**Extract 5:** *Nannochloropsisgaditana* is a microalga that belongs to the *Eustigmatophyceae* class, which is known as a source of proteins and polyunsaturated fatty acids [9, 10]. Recently, *it has been documented that* this marine alga possesses variety of bioactive compounds that exhibit highly beneficial effects on health through their hypoglycaemic and hypolipidemic properties [11, 12]. However, *to the best of our knowledge, no prior studies have been reported in the literature so far on the effect of Nannochloropsisgaditana on* Streptozotocin-induced diabetic rats. Consequently, *the purpose of the present work* consists of exploring the effects of *Nannochloropsisgaditana* on lipid profile, lipase activities and redox status in diabetic rats. (A 1)

**Extract 6:** However, although *it is well documented that* the consumption of diets high in 3 PUFA *can* improve metabolic alterations, their beneficial effects on maternal and neonate obesity have not been elucidated. *Previous studies have shown* that linseed oil supplementing during pregnancy has beneficial effects on neonate metabolic parameters and health [25, 26]. In addition, linseed oil induces epigenetic changes in maternal and offspring livers [27]. *To the best of our knowledge, there are no reports in the literature* on the effect of linseed oil supplementation on metabolic status during maternal obesity and their repercussions on the offspring. Because linseed oil *may* influence maternal and fetal metabolisms and because maternal obesity has profound effects on neonate metabolisms in humans and also in animals, our aim was to *evaluate* the consequences of linseed oil supplementation in the diet before and during gestation on maternal ... (A 30)

In order to locate their studies, scientists have to go back to previous studies and establish a territory through reviewing them. They need to create a niche through mentioning the shortcomings and limitations of the relevant literature on the topic, as illustrated in the aforementioned extracts (what Swales refers to as “establishing a niche” 1990, p. 145). In other words, they need to show a gap somewhere to be able to identify the purpose of their own work. However, discussing the drawbacks of previous literature is not an easy task and it could be a face threatening act, as Myers (1989) suggests “any academic knowledge claim is a threat or Face Threatening Act (FTA) to other researchers in the field because it infringes on their “freedom to act” (p.19). Therefore, the use of hedges (for example, *to the best of our knowledge, no prior studies have been reported in the literature so far*, the modal *may*) helps the scientist to be on safeguards while talking about other scientists’ works. Hedges thus allow writers to show “adherence to the communally rules of the scientific ‘game’ ” (Varttala, 2001, p. 245). Part of this game is to avoid too bald assertions when commenting on colleagues’ works.

### 6.2.3. Hedging in the Materials and Method Section

The Materials and Method section is the third hedged section in the Algerian corpus. Despite the fact that the Material and Method section does not contain as frequent forms of

hedges as the two previously discussed sections, it is of interest to see how hedges are used in this section and for which purposes. Here are some illustrations of the types of hedges:

**Example 32:** The test tube was allowed to stand in a vertical position and *observed* over a 30 minute period of time. (A 11)

**Example 33:** *About* 3-4 wells in each plate of 6 mm diameter were loaded in essential oil and were punched in agar surface with the help of a sterilized borer for placing the extracted oil samples. (A 28)

**Example 34:** ...; the *small* size of these fragments required the preparation of a more resolute agarose gel at 3 %. (A 23)

**Example 35:** *Several* pieces of *Pinus halpensis* bark are cut with a sterile scalpel and put down... (A 19)

**Example 36:** For the antimicrobial activity, the most common is the minimum inhibitory concentration (MIC) which *may* be determined by direct contact in agar or liquid medium. (A21)

**Example 37:** It is worth clarifying that rats were considered diabetic only *if* their blood glucose level exceeded 127 mg/Dl; they were then used in the present study. (1)

**Example 38:** The *evaluation* of cellulases activity inhibition was expressed as diameter of inhibition zone ... (A12)

The Method and Material section is mostly characterised by formulaic descriptions of the processes, procedures and methods of the study. These latter should also adhere to the discourse community guidelines. To quote Prelli's words (1989):

Typically, procedures scientists choose and describe in research reports are those the authors think will meet the audience's approval. Procedures reported are likely to be standardised of getting at the facts or of calculating data. If the audience understands or endorses the procedures, they are more likely to judge the authors and their claims favourably (p.156).

In other words, the acceptance of the scientists' employed methods is a significant stage for the approval of his claims. Consider the following extract:

**Extract 7:** After *about* a 30 m in the incubation period at room temperature, the absorbance was read against a blank at 515 nm. DPPH free radical scavenging activity in percentage (%) was *estimated* utilizing the following recipe... (A10)

Hedges can be used in this section to express approximation in order to express the true state of the experimental procedures. Agentless constructions are also a feature of this section. The use of the passive voice can reflect the writer's wish to minimize the responsibility towards the data presented.

#### 6.2.4. Hedging in the Conclusion Section

The conclusion is the last hedged section. Here are some instances of the most used types of hedges in this section:

**Example 39:** The oil was *found* to have significant antibacterial activity and therefore can be used as a natural antimicrobial agent for the treatment of several infections. (A 4)

**Example 40:** However, the relatively *small* size of the cohorts used for these studies does not reveal the real effect of these polymorphisms on B-thalassemia using a *large* sample. (A23)

**Example 41:** In conclusion, we can say that floral biology of the studies Rosacea is *quite* homogeneous and regular in ... (A31)

**Example 42:** The antimicrobial potential of the plant *may* be attributed to the various bioactive compounds present in the crude extracts. (A11)

**Example 43:** The oil was found to have significant antibacterial activity and therefore can be used as a natural antimicrobial agent for the treatment of *several* infections. (A 4)

**Example 44:** It finally tries to determine *if* the answer to the pressures applied to at the stage of germination constitutes a reliable early indicator of the behavior of the adult plant. (A15)

In the conclusion section, authors summarize the main issues discussed in the previous sections, can possibly mention the limitations of their work and they could also suggest future research. Consider the following extracts:

**Extract 8:** *On the basis of the data presented*; these flavonoids *may* be considered new chemical classes of antibacterial substances for infections that *may* be caused by bacteria in the future. Therefore, further work is under way to identify their precise antibacterial mechanism. (A28)

**Extract 9:** The result of the present study *suggest* that flavonoids extract of phlomisherbaventi L make an excellent alternative and can be used as a source of antioxidants for pharmacological preparations and a powerful substance against *Aspergillusniger* to replace chemical fungicides and can be used as eco-friendly product. Further field trial and chemical analysis of the active compounds of this plant *would* give strong antioxidant and antifungal activity comparable to synthetic molecules. (A 9)

In extract 8, concluding his topic, the author states a claim regarded as a new one in the discipline using the modal *may* and *on the basis of the data presented*, the latter is a writer-oriented hedge. Absolutely, the author is seeking for acceptance, but still reduces the responsibility towards the information presented. Myers (1989) explains that “when scientists

state their conclusions they “must stay within a certain consensus to have anything to say to members of [their] discipline, but must also have a new claim to make to justify publication” (p.5). In addition, the use of modals in the conclusion section as illustrated in extracts (8) and (9) is one of the strongest means to present the conclusion section “with a range of subtle gradations in strength and confidence” (Butler, 1990, p. 138). Furthermore, authors may use hedging in the conclusion section to speculate and predict future actions to be taken (Further field trial and chemical analysis of the active compounds of this plant *would* give strong antioxidant and antifungal activity comparable to synthetic molecules).

To conclude, the variation of the distribution of hedges across the research article sections is highly linked with the level of the claim the writers wish to make (Myers, 1989). The Result and Discussion section is the most hedged section as it is regarded as the most persuasive section in the RA whereby writers interpret, evaluate and make their research claims.

### **6.3. Pragmatic Analysis**

After discussing the semantic analysis of the use of hedges in the Algerian corpus, now we shift to the pragmatic perspective. In fact, underlying the pragmatic functions for the use of hedges is a complicated analysis as the hedges devices can express a plethora of meanings for particular users in particular settings (Hyland, 1998 a). However, the data has suggested that content-oriented hedges are the main pragmatic functions expressed by Algerian biologists in this study.

### 6.3.1. Content-oriented Hedges

The high frequency of content-oriented hedges in the Algerian corpus might be explained by the fact that these forms of hedges are regarded as “institutionalised” language of science (Hyland, 1996 b, p.440). All the types of content-oriented hedges are lexical items, that is why they are easy to be used by scientists. Content-oriented hedges are mainly concerned with how the writer expresses the propositional content. The content should be accurate, precise and real. More importantly, the propositional content should adhere to the scientific community practice. These practices are highly related with the way and the manner the scientist should express his claims in order to be accepted.

**Example 45:** Moreover, rhamnetin resulted to be more active than quercetin and morin, *probably* because of the methoxy in the A-ring, which makes this molecule more hydrophobic [27]. (A28)

**Example 46:** Obesity is one of the most *common* health problems for pregnant women. (A30)

**Example 47:** Other researchers have *suggested* that antimicrobial components of the plant extracts cross the cell membrane...(A 9)

Therefore, the language used by the scientist when expressing his claims is important as it allows the writer state his research claims with the required accuracy and reliability features. Specifically, content-oriented hedges enable the scientist “to report the results of their research with the greatest possible accuracy and reliability while still making only the claims for which they have evidence” (Malášková, 2014, p.152).

Noteworthy, content-oriented hedges do not only appear in single instances as the previously mentioned examples, but they can also occur in more complex constructions functioning as writer or reader oriented hedges.

**Example 48:** *The results indicate* clearly that reducing power of the two extract is most often related to the respective interaction times. (A 2)

**Example 49:** *We suggest* that the allele C is at position 677 of MTHFR is highly conserved in our study population. (A 23)

In example 48, the non-factive tentative verb *indicate* is used with an abstract rhetor and the whole construction is a writer-oriented hedge. In example 49, the non-factive verb *suggest* is accompanied by personal attribution functioning as a reader-oriented hedge. This can highly show the polypragmatic nature of hedges. In addition, writers can seek to realise more than one single goal, thus their motivations for the use of hedges might not be clearly cut.

### 6.3.2. Writer-oriented Hedges

The writer-oriented function of hedges reduces the personal involvement of the writer towards the information stated. Thus, this function helps the writer distance and shield himself from the proposition “because the writer cannot personally guarantee the proposition” (Coetzer, 2002, p.107). Hence, by using writer-oriented hedges the writer is minimizing the probability of refutation (Hyland, 1998 a). The devices used to express the writer-oriented function “do not affect the propositional content of an utterance, but imply that the writer is not fully committed to its truth” (Hyland, 1998 a, p. 171). The most distinguishing feature of

writer-oriented hedges is the absence of writer agentivity. Unlike content-oriented hedges, writer-oriented hedges can be more difficult to recognize.

### 6.3.2.1. Attribution to Literature

The first most used strategy under the writer-oriented hedges has been attribution to literature (N= 490). Writers might diminish the responsibility towards their propositions by attributing to literature. In this sense, they refer to a wider body of knowledge and other sources of information when they discuss their results. This strategy of hedges is generally called “attribution hedges” and “attribution shields” by Prince et al. (1982).

Attributing to literature indicates how scientists interpret and evaluate their propositions by relating them to another source. Scientists might refer to previous research to strengthen and support their argument. The most commonly used expression is “according to..” as shown in the following figure:

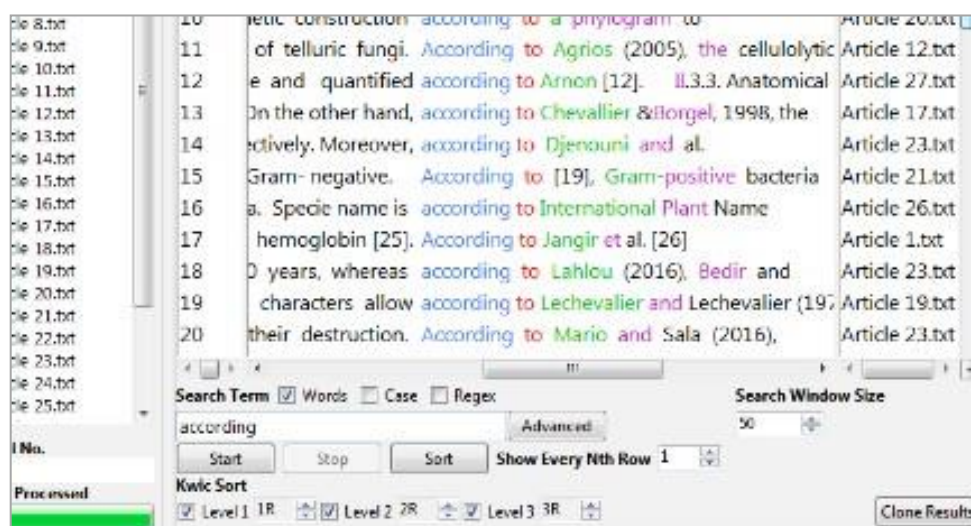


Figure 16. Concordance Sample of *according to* in the Corpus

In addition to this formula which is considered as a direct attribution to source, writers might also use the scientists' name with a reporting verb as in (50) and (51) or the idea of the scientist accompanied by a citation at the end of the statement as in (52):

**Example 50:** Similarly, *Belhadi (2011) reported* an average red blood cell count of 3.899 / $\mu$ L in patients, a low level of MVC, MCHC and Hb. (A23)

**Example 51:** *Houseinzadeh et al., (2002) showed* the presence of alkaloids and saponins in the aqueous and ethanolic extracts of the stigama. (A 18)

**Example 52:** Therefore, type of extraction solvent as well as isolation procedures may have a significant impact on the yield of extraction polyphenols from plants material [16]. (A6)

#### 6.3.2.2. Abstract Rhetors

The second most frequent strategy has been abstract rhetors according to the data obtained (N= 203). Like passive constructions, abstract rhetors also reflect the impersonal character of scientific discourse and are considered as significant key features. Their use serve “ to suppress human agency, [and] to imply that what are essentially rhetorical acts arguing , showing, demonstrating, suggesting \_ can be accomplished without human volition” (Halloran, 1984, p.75). Consider the following examples:

**Example 53:** *These results* demonstrate the antioxidant properties of melatonin already reported by several studies.. (A22)

**Example 54:** On the basis of *these data* presented, these flavonoids may be considered new chemical classes of antibacterial substances for infections that may be caused by bacteria in the future. (A28)

As the mentioned examples can show, there is a focus on inanimate objects (results, data) as the basic source of information and not on the writer himself when presenting claims. To this end, the use of abstract rhetors reduces the writer's involvement and presence in the text, ending with "the author's invisibility" (Molino, 2010, or self-effacement (Salager-Meyer, 2001).

### 6.3.2.3. Passive Constructions

Passives are considered as a feature of scientific discourse (Halliday & Martin 1993; Gustafsson 2006; Banks, 2008). Passive constructions reinforce the impersonal nature of scientific discourse. Campos (2003) indicates that the use of impersonal marks in scientific discourse is not solely connected with the "neutrality" requirement of academic conventions but also with the argumentative strategy in general" (p.235).

Often, passives constructions characterise objectiveness in discourse. According to Markkanen and Schröder (1997), passive constructions enable the writer to avoid complete responsibility towards the propositional information. Therefore, passivisation in research papers is a means of avoiding commitment (Hyland, 1998 a). The role of the use of the passive voice in scientific research articles is complicated and assigning functions of its use needs particular contextual evidence.

**Example 55:** These results *were found to be* highly consistent with those reported in previous studies. (A1)

**Example 56:** the absorbance of haemoglobin content in the suspensions *was estimated* at 560 nm. (A 5)

#### 6.3.2.4. Clausal Subjects

Another means by which writers shield themselves from the information presented is the use of clausal subjects. In the Algerian corpus, constructions with “the introductory *it*” are not frequently employed. The use of such constructions enables the author to express his stance in an objective and depersonalised manner by concealing the source of information.

**Example 57:** *It appears legitimate to wonder about the biological and ecological impacts induced by these stressing environmental conditions on the one hand, and to understand the mechanisms concerned by the plants to adapt to these new environmental conditions.* (A15)

**Example 58:** *It may be noted that this species is sensitive to the crude extract and  $\frac{3}{4}$  dilution.* (A21)

Interestingly, the introductory *it* is accompanied by an epistemic verb like example (57) or modal auxiliaries and the passive form as in example (58). Surely, such combinations strengthen the impersonal character of the information presented and also reflect the writer’s cautious attitudes in order to enhance the acceptability and validity of the claims discussed.

#### 6.3.2.5. Impersonal Reference to Research/Methods Limits

Writers may also refer to the limitations they encounter when doing their research and employ their methods. This strategy which acts as a writer-oriented hedge is the least used in the Algerian corpus (N=13). In Hyland’s research (1998a), reference to research/method limitation is considered as “strategic hedges” as opposed to “lexical hedges”. Noteworthy, it seems that the use of strategic hedges in scientific research articles has not been thoroughly investigated, described by some researchers as “an unexplored area of study”. In strategic hedges among which impersonal reference to research/methods limit is one, the epistemic and

mitigating force does not result from specific individual sets, but it is the whole discourse strategy. The use of such a strategy tones down the certainty of the authors' claims in order to protect the author from possible criticism by the discourse community.

**Example 59:** *However, the relatively small size of the cohorts used for these studies does not reveal the real effect of these polymorphisms on this pathology.* (A 21)

**Example 60:** *These results can only be conclusive if the size of the population will be larger.* (A 19)

### 6.3.3. Reader-oriented Hedges

Reader-oriented hedges have been the least employed pragmatic function by Algerian biologists in this data. Reader-oriented hedges reveal the role of the reader in the ratification of knowledge. They reflect the writers' attention to the interactional and negotiability nature of their statements (Hyland, 1996 b). Assertive statements leave no room for discussion and negotiation and they rather neglect the role of the reader in the accreditation of knowledge as he may accept or refuse the new knowledge. Therefore, the use of reader-oriented hedges appeals to the reader as an intelligent scientist whose response is essential in the communication process of knowledge claims whereby he is invited to engage in a dialogue. In line with this interpersonal dimension which motivates the use of reader-oriented hedging, there is a normative aspect which dictates on writers to adhere to the community conventions. Hyland (1998 a) stresses the fact that that the ignorance of the reader in the RA will make "claims as excathedra assertions" which "display an unacceptable deviant persona" (p.178). Personal attribution has been the most used strategy as a reader-oriented hedge in the studied corpus (N=202). Only 17 instances of hypothetical conditionals and no instances of questions (N=00) in the corpus.

### 6.3.3.1. Personal Attribution

Personal attribution is a kind of attribution in which authors refer to themselves using personal pronouns (1st person sing. and pl. personal and possessive pronouns) accompanied by verbs such as (think, suppose). The use of such a combination could indicate that “a degree of freedom to manipulate conventions is permitted” (Hyland, 1998a, p.452). By employing personal attribution, writers minimize the generalizability of their claims showing that these latter are personal judgments and not facts (Myers, 1989). Consider the following example:

**Example 61:** With these results, *we* can suggest that the luteolin has the ability as an inhibitor for Cyclooxygenase-2, and to confirm this result it remains an experimental study in vitro or in vivo. (A14)

Thus, when presenting claims, the use of personal attribution by scientists softens the information presented making it provisional and not categorical. According to Hyland (1998 a), “ by specifying a personal source, however, the writer shifts the interpretive frame, drawing attention to the relation of the work to the investigator, and signaling the claim is left open to the reader’s judgment ” (p.182). Consider the following example:

**Example:** In *our* study, the pregnant rats fed bacteria presented an increase in plasma glucose, cholesterol and triglyceride concentrations compared to pregnant rats fed standard diet. (A 30)

The use of *we* and *our* denotes a shared context to invite the reader into the reasoning process, calling him to make logical inferences. That is to say, the writer and reader “are cooperatively involved in the relevant activity” (Brown & Levinson, 1987, p.125). The use of

we is not only in case of a group of scientists, but even with one single scientist which reflects a more “modest self-image” (Vladimirou 2007, p.151).

To sum up, the pragmatic results have showed that the motivations for the use of hedges by Algerian biologists have been a desire to present the propositional content as it should be (content-oriented hedges). There appears also a desire to make some distance from this content (writer-oriented hedges). Despite the low percentage of reader-oriented hedges, I think that the scientist’s attempt to protect himself from opposition by shielding himself from responsibility towards the information presented (writer-oriented hedges) is also a reflection and consideration of the reader. Furthermore, “none of the functions is more important than the remaining ones and the ultimate goal of the authors of research articles – that is gaining acceptance and credibility and establishing oneself as a valid member of the respective discourse community – is achieved by a complex interplay of all three hedging functions” (Malášková, 2014, p.172 ).

## Conclusion

To conclude, in this chapter we have attempted to interpret the data obtained in chapter five. In general terms, the results of the most employed types of hedges in the Algerian corpus are consistent with the research of Hyland (1998 a) and Varttala (2001) in which main verbs are the most numerically employed types of hedges. However, in more specific terms, there appears a tendency by Algerian biologists in this data to express more positive stance to previous research as indicated in their frequent use of verbs like *show* and *report*. The preponderance of non-factive tentative reporting verbs might reflect Algerian biologists’ reliance on reporting previous research to support their claims. On the other hand, verbs as *indicate*, *appear* which are more epistemic are infrequently used in the corpus. It

seems that Algerian biology scientists have a restricted lexical repertoire of the most prototypical hedges. This has been also observed in their use of modals in which they adopt an avoidance strategy. The Result and the Discussion section has been the most hedged section whereby writers interpret their results and make their research claims. The examination of the pragmatic functions used in the present corpus indicates that Algerian biologists use hedges to express their content in an accurate and reliable manner.

## General Conclusion and Recommendations

This study has attempted to investigate the difficulties in the use of hedging by Algerian biology scientists in a corpus of 31 research articles. To this end, a corpus analysis has been carried out to identify the frequency of the types of hedges, their distribution across the sections of the research article and the pragmatic functions they perform.

The results suggest that main verbs are the most predominant employed hedges. More specifically, non-factive tentative reporting verbs are the highest used sub-class of verbs. The three topmost verbs are *show*, *find* and *report* which show a more positive stance towards the works cited. On the other hand, verbs like *appear*, *seem*, *suggest* and *indicate* which can be regarded as more tentative are less frequently used in the corpus. The second and third most used types of hedges are epistemic adverbs and epistemic adjectives respectively. The fourth most frequently used type is “other hedges”. Interestingly, it appears that Algerian biologists use these three types to express quantification. Epistemic modals which are generally perceived as the main means to express the epistemic meaning are limited. Also, Algerian biologists, in this study, tend to avoid some modals like *would* and *might*.

On the whole, the results of the examination of hedges in the Algerian corpus support the claim stressed by previous literature that hedging is basically a lexical phenomenon (Hyland, 1998a; Varttala, 2001; Clemen, 2002; Poveda Cabanes, 2007; Martin-Martin, 2008). In addition, the result that main verbs are the predominant type of hedges is consistent with the works of Hyland (1998 a) and Varttala (2001). These studies highlight the importance of lexical verbs as items which can also express the epistemic meaning. However, what has characterised the use of lexical verbs by Algerian scientists in this data is their reliance on verbs which show more positive commitment towards the information presented than verbs

which show more tentativeness. Such a problem might be due to their limited lexical repertoire and a shortage in hedging devices. It may also indicate a problem in the pragmatic choices scientists made when expressing their claims. One can query about their awareness of the differences between, for example, the verb *show* and *indicate*. The ability to use hedges appropriately and in a native-like fashion is not only a linguistic but also a pragmatic competence.

The distribution of hedging across the sections of the research article has indicated that the Result and Discussion Section is the most hedged one, a result which is analogous to previous research on hedging (Hyland, 1998a; Varttala, 2001). It is in this section that writers interpret their results and make new claims about their findings.

The results of the pragmatic analysis of hedging do not corroborate with the work of Hyland (1998 a) in which reader –motivated functions are prominent in his research, particularly personal attribution, dissimilar to the Algerian corpus. However, the three functions overlap and it is sometimes difficult to make a clear cut-line between them.

On the light of these findings, the following suggestions could be made:

Hedging should be taught to non- native students. They are not only supposed to recognise hedges, but they need to know when to soften their claims and which lexical elements are appropriate in order to reach their discourse objectives. As an initial stage, lexical familiarity of the most frequent and prototypical markers of hedging will offer students a repertoire which will be developed in more advanced stages.

On the same grounds, when producing hedges, non–native students should also consider and be aware of the reader’s role in the ratification of their knowledge claims since

meeting readers' expectations is critical for the acceptance of claims. The awareness of the reader helps the author in considering the overall pragmatic context which entails both the use of interpersonal and rhetorical strategies.

There should be some reading and writing classrooms exercises to equip NNSE academics with the necessary knowledge to express hedging. It is also highly recommended to use context through the use of authentic materials in their own areas of study to improve "meaning potential". While using hedges in writing, more focus is to be given to the reader's expectations, different views and possible reactions. Here are some tasks to teach hedging to students (based on some readings):

- Ask learners to read a text and highlight all the hedges they find and explain their answers.
- Ask learners to highlight reporting verbs in a text and signal the speech acts they express (a new claim, opposition with previous literature,...)
- Ask learners to highlight epistemic verbs, adjectives and nouns in a passage.
- Ask students to present tentative information in different ways and exchange their answers with peers and discuss their rhetorical effectiveness.
- Ask learners to write an essay or a short article for a class journal on a topic of interest, presenting new ideas and claims.
- Provide learners with different statements and ask them how the choice of a give verb can alter the meaning:
  - 1) In his research, X (suggests-shows) that .....
  - 2) X (reports-finds) that .....
- Provide learners with different variations of one statement from the strongest claim to the weakest claim and ask them to order.

Such kinds of exercises will allow learners to recognise and identify hedges and be aware of the nuances of some verbs by highlighting their specific meaning to be able to use them appropriately. The tasks proposed here are suggestive ways to develop learners' awareness of the hedging phenomenon. Above all, the hope is to assist non-native learners who wish to be part of the academic world in improving their hedging competence in order to gain membership in a discourse community. Therefore, materials designers, ESP practitioners and teachers "have the responsibility to help students acquire an awareness of why, how and when hedges are used" (Salager-Meyer, 1997, p.142).

The researcher hopes that this study will inspire other Algerian researchers to conduct future investigations on hedging for the topic remain a fertile ground for further examinations in the other language departments of the Algerian universities. It might be suggested that a worthy area of investigation, for example, is the effectiveness of teaching hedges to non-native students.

## References

- Aarts, J. (2002). Does corpus linguistics exist? Some old and new issues. In L.E. Breivik & A. Hasselgren (Eds), *From the COLT's mouth... and others'* (pp.1-17). Brill Rodopi.  
[https://doi.org/10.1163/9789004334267\\_001](https://doi.org/10.1163/9789004334267_001)
- Abdi, R. (2011). Metadiscourse strategies in research articles: A study of the differences across subsections. *Journal of Teaching Language Skills*, 3(1), 1-16.
- Abdollahzadeh, E. (2011). Hedging in postgraduate student theses: A cross-cultural corpus study. *In International Conference on Languages, Literature and Linguistics*, 26, 581-586.
- Adams Smith, D. (1984). Medical discourse: Aspects of author's comment. *English for Specific Purposes*, 3, 25-3 .[https://doi.org/10.1016/0272-2380\(84\)90004-0](https://doi.org/10.1016/0272-2380(84)90004-0)
- Ädel A., & Garretson, G. (2006). *Citation practices across the disciplines: The case of proficient student writing*. University of Michigan Press.
- Afful, J. B. A. (2005). *A rhetorical analysis of examination essays in three disciplines: The case of Ghanaian undergraduate students*[Unpublished PhD thesis]. University of Singapore, Singapore.
- Aissaoui, T. (2017). Essential steps for Algerian researcher to target ISI journals. *International Journal of Science and Research*, 6(1), 305-13.  
<https://doi.org/10.21275/art20163684>
- Allison, D. (1999). Key concepts in ELT: Genre. *English Language Teaching Journal*, 53(2), 144.

- Anthony, L. (2019). AntConc 3.4.3. Waseda University.  
<http://www.antlab.sci.waseda.ac.jp/software.html>
- Askerhave, I., & Swales, J. (2001). Genre identification and communicative purpose: A problem and a possible solution. *Applied Linguistics*, 22(2), 195-212.  
<https://doi.org/10.1093/applin/22.2.195>
- Atkinson, M., D. Kilby., & I. Roca. (1982). *Foundations of General Linguistics*. London: George Allen & Unwin.
- Atkinson, D., & Biber, D. (1994). Register: A review of empirical research. In D. Biber & E. Finegan (Eds.), *Sociolinguistic perspectives on register* (pp.351-385). Oxford University Press.
- Austin, J. (1962). *How to do things with words*. Oxford University Press.
- Banks, D. (1994). Hedges and how to trim them. *Applications and Implications of Current LSP Research*, 2, 587-592.
- Banks, D. (2008). *The development of scientific writing. Linguistic features and historical context*. Equinox.
- Barber, C. (1962). Some measurable characteristics of modern scientific prose. In F. Behre (Ed.), *Contributions to English syntax and philology: Gothenburg studies in English* (vol 14, pp. 21-43). University of Gothenburg.
- Barton, E.L., & Stygall, G. (2004). *Discourse studies in composition*. Hampton Publisher.
- Bawarshi, A. S. & Reiff, M. J. (2010). *Genre: An introduction to history, theory, research and pedagogy*. Parlor Press.

- Bazerman, C. (1984). Modern evolution of the experimental report in physics: Spectroscopic article in physics review. *Social Studies of Science*, 14, 163-196.
- Bazerman, C. (1988). *Shaping written knowledge: The genre and activity of the experiential article in science*. University of Wisconsin Press.
- Bazerman, C. (1994). *Constructing experience*. SIV Press.
- Bazerman, C. (1997). The life of genre, the life in the classroom. In W. Bishop & H. Ostrom (Eds.), *Genre and writing: Issues, arguments, alternatives* (pp.19-26). Boynton/Cook Publishers.
- Belanger, M. (1982). *A preliminary analysis of the structure of the discussion sections in ten neuroscience journal articles*. Aston University Reference Collection.
- Berkenkotter, C., & T. Huckin. (1995). *Genre knowledge in disciplinary communication: Cognition/ culture/power*. Lawrence Erlbaum.
- Bernstein, B. (1970). Education cannot compensate for society. *New Society*, 15(387), 344-47.
- Bhatia, V. K. (1993). *Analysing genre: Language use in professional settings*. Longman.
- Bhatia, V. K. (2002). Applied genre analysis: A multi-perspective model. *Iberica*, 4, 3-19.
- Bhatia, V. K. (2004). *Worlds of written discourse: A genre-based view*. Continuum.
- Bhatia, V., Flowerdew, J., & Jones, R. H. (Eds.). (2008). *Advances in discourse studies*. Routledge.
- Biber, D. (1993). Representativeness in corpus design. *Literary and Linguistic Computing*, 8 (4), 243–57. <https://doi.org/10.1093/lc/8.4.243>

- Biber, D. (2006). Stance in spoken and written university registers. *Journal of English for Academic Purposes*, 5(2), 97-116. <https://doi.org/10.1016/j.jeap.2006.05.001>
- Biber, D., & Finegan, E. (Eds.).(1994). *Sociolinguistic perspectives on register*. Oxford University Press on Demand.
- Biber, D., Conrad, S., & Reppen, R. (1998). *Corpus linguistics: Investigating language structure and use*. Cambridge University Press.
- Biber, D., Johansson, S., Leech, G., Conrad, S., & Finegan, E. (1999). *The Longman grammar of spoken and written English*. Longman.
- Biber, D., & Conrad, S. (2009). *Register, genre and style*. Cambridge University Press.
- Blissett, M. (1972). *Politics in science*. Brown.
- Bloch, J. (2010). A Concordance-based study of the use of reporting verbs as rhetorical devices in academic papers. *Journal of Writing Research*, 2(2), 219-244.
- Bloor, M. & Bloor, T. (1991). Cultural expectations and socio-pragmatic failure in academic writing. In P. Adams, B. Heaton & P. Howarth (Eds.), *Socio-cultural issues in English for academic purposes* (pp. 1- 12). Modern English Publications/British Council.
- Bowker, L., & Pearson, J. (2002). *Working with specialized language: A practical guide to using corpora*. Routledge.
- Brewer, N. M. (1987). *Modality and factivity: One perspective on the meaning of the English modal auxiliaries* [Unpublished Dissertation]. University of Leeds, Leeds, U.K.
- Brown, G., & Yule, G. (1983). *Discourse analysis*. Cambridge University Press.

- Brown, P., & Levinson, S. C. (1987). *Some universals in language usage politeness*. Cambridge University Press.
- Bruffee, K. A. (1986). Social construction, language, and the authority of knowledge: A bibliographical essay. *College English*, 48(8), 773-790. <https://doi.org/10.2307/376723>
- Buitkienė, J. (2008). Hedging in newspaper discourse. *Žmogus ir žodis*, 10(3), 11-15.
- Burns, L. (1991). *Vagueness: An investigation into natural languages and the sorites paradox* (Vol. 4). Kluwer Academic Publisher.
- Butler, C. S. (1990). Qualifications in science: Modal meanings in scientific texts. In Walter Nash (Ed.), *The writing scholar: Studies in academic discourse* (pp.137-70). SAGE.
- Bybee, J. L., & Fleischman, S. (Eds.). (1995). *Modality in grammar and discourse* (Vol. 32). John Benjamins Publishing.
- Campos, A. (2000). *The expression of persona in academic discourse: A contrastive study (Catalan, Spanish and English)* [Doctoral Thesis]. University of Valencia.
- Candlin, C. N. (1997). General Editor's preface. In B.L. Gunnarsson, P. Linell & B. Nordberg (Eds.), *The construction of professional discourse* (pp. ix-xiv). McMillan.
- Carter, R. (1993). *Introducing applied linguistics*. Penguin.
- Chandler, D. (1997). An introduction to genre theory. *Molochronic*. <http://www.aber.ac.uk/media/Documents/intgenre/intgenre.html>
- Channel, J. (1990). Precise and vague quantities on writing in economics. In Walter Nash (Ed.), *The writing scholar: Studies in academic discourse* (Vol 3, pp.95-117). SAGE.

- Charles, M. (2006). Phraseological patterns in reporting clauses used in citation: A corpus-based study of theses in two disciplines. *English for Specific Purposes*, 25(3), 310-331. <https://doi.org/10.1016/j.esp.2005.05.003>
- Chen, H. I. (2010). Contrastive learner corpus analysis of epistemic modality and interlanguage pragmatic competence in L2 writing. *Journal of Second Language Acquisition and Teaching*, 17, 27-51.
- Clemen, G. (1997). The concept of hedging. In R. Markkanen & H. Schroder (Eds.), *Hedging and discourse: Approaches to the analysis of a pragmatic phenomenon in academic texts* (pp. 235-248). Walter de Gruyter.
- Clyne, M. (1991). The Sociocultural dimension: The dilemma of the German-speaking scholar. In H. Schröder (Ed.), *Subject-oriented texts: Languages for special purposes and text theory* (pp. 49-68). De Gruyter. <https://doi.org/10.1515/9783110858747.49>
- Coates, J. (1983). *The semantics of the modal auxiliaries*. Routledge.
- Coates, J. (1987). Epistemic modality and spoken discourse. *Transactions of the Philosophical Society*, 85, 100-131.
- Coe, R. (2002). The new rhetoric of genre: Writing political briefs. In A. Johns (Ed.), *Genre in the classroom: Multiple perspectives* (pp. 197-210). Lawrence Erlbaum Associates.
- Coe, R. M., & Freedman, A. (1998). Genre theory: Australian and North American approaches. In M. L. Kennedy (Ed.), *Theorizing composition: A critical sourcebook of theory and scholarship in contemporary composition studies* (pp. 136-147). Greenwood.

- Coetzer, A. (2002). *Hedging in occupational therapy report writing* [master's dissertation]. University of South Africa.  
[https://uir.unisa.ac.za/bitstream/handle/10500/17917/dissertation\\_coetzer\\_a.pdf;sequence=1](https://uir.unisa.ac.za/bitstream/handle/10500/17917/dissertation_coetzer_a.pdf;sequence=1)
- Connor, U., & Kaplan, R.B. (1987). *Writing across languages: Analysis of L2 text*. Addison Wesley.
- Cook .G. (1989). *Discourse*. Oxford University Press.
- Coulthard, M. (1994). On analysing and evaluating text. In M. Coulthard (Ed.), *Advances in written text analysis* (pp.1-11). Routledge.
- Coulthard, R. M. (1985). *An introduction to discourse analysis*. Longman.
- Crismore, A. (1984). The rhetoric of social studies textbooks: Metadiscourse. *Journal of Curriculum Studies*, 16(3), 279-296.
- Crismore, A., & VandeKopple, W. J. (1988). Readers' learning from prose: The effects of hedges. *Written Communication*, 5(2), 184-202. <https://doi.org/10.1177/0741088388005002004>
- Crismore, A. & Fransworth, R. (1990). Metadiscourse in popular and professional science discourse. In W. Nash (Ed.), *The writing scholar: Studies in academic discourse* (pp. 118- 136). SAGE.
- Crismore, A., Markkanen, R., & Steffensen, M. (1993). Metadiscourse in persuasive writing: A study of text written by American and Finnish university students. *Written Communication*, 10(1), 39- 71. <https://doi.org/10.1177/0741088393010001002>

- Crompton, P. (1997). Hedging in academic writing: Some theoretical problems. *English for Specific Purposes*, 16(4), 271-287. [https://doi.org/10.1016/S0889-4906\(97\)00007-0](https://doi.org/10.1016/S0889-4906(97)00007-0)
- Crompton, P. (2012). Characterising hedging in undergraduate essays by middle Eastern students. *The Asian ESP Journal*, 8(2), 55-78.
- Crystal, D. (1987). *The Cambridge encyclopaedia of language*. Cambridge University Press.
- Crystal, D. (1995). *The Cambridge encyclopaedia of language*. Cambridge University Press.
- De Beaugrande, R. (1980). *Text, discourse, and process: Toward a multidisciplinary science of texts*. Longman.
- De Figueiredo-Silva, I. M. (2001). Teaching academic reading: Some initial findings from a session on hedging [*Proceedings of the Postgraduate Conference*]. Department of Theoretical and Applied Linguistics, the University of Edinburgh.
- DeCarrico, J. (1986). Tense, aspect and time in the English modality system. *TESOL Quarterly*, 20(4), 665-682. <https://doi.org/10.2307/3586517>
- Declerck, R. (2011). The definition of modality. In A. Patard & F. Brisard (Eds.), *Cognitive approaches to tense, aspect and epistemic modality* (pp. 21-44). John Benjamins Publishing.
- Downing, A., & Locke, P. (1992). A university concise English grammar. Phoenix ELT.
- Dubois, B. L. (1987). Something on the order of around forty to forty-four: Imprecise numerical expressions in biomedical slide talks. *Language in Society*, 527-541.
- Dudley-Evans, T. (1994). Genre analysis: An approach to text analysis in ESP. In M. Coulthard (Ed.), *Advances in written text analysis* (pp. 219–28). Rutledge.

- Dudley-Evans, T.(1997).Five questions for LSP teacher training. In R. Howard & J. Brown (Eds.), *Teacher education for LSP* (pp. 58–67). Multilingual Matters.
- Eggins, S. (1994). *An introduction to systemic functional approach*. Pinter.
- Eggins, S. (2004). *An introduction to systemic functional linguistics* (2nd edition). Pinter.
- Eggins, S. (2007). *An introduction to systemic functional linguistics* (Second Edition).Continuum.
- Ewer, J. R., &Latorre, G. (1969). *A course in basic scientific English* (Vol. 382). Longman.
- Fahnestock, J. (1986). Accommodating science: The rhetorical life of scientific facts. *Written Communication*, 3(3), 275-9.<https://doi.org/10.1177/0741088386003003001>
- Fairclough, N. (1992). *Discourse and social change*.Polity Press.
- Fairclough, N., & Wodak. R. (1997). Critical discourse analysis.In T.A. Van Dijk, (Ed.) *Discourse as social interaction* (pp. 258-284).SAGE Publications.
- Falahati, R. (2004). *A contrastive study of hedging in English and Farsi academic discourse* [Master's dissertation]. University of Tehran. [http://dspace.library.uvic.ca/bitstream/handle/1828/714/falahati\\_2004.pdf?s](http://dspace.library.uvic.ca/bitstream/handle/1828/714/falahati_2004.pdf?s)
- Ferris, D. R. (2003). *Response to student writing: Implications for second language students*. Routledge.
- Flowerdew, J. (2000). Discourse community, legitimate peripheral participation, and the nonnative-English-speaking scholar. *TESOL Quarterly*, 34(1), 127-150.<https://doi.org/10.2307/3588099>
- Flowerdew, J. (Ed.) (2002). *Academic discourse*. Longman.

- Flowerdew, J. (2011). Reconciling contrasting approaches to genre analysis: The whole can equal more than the sum of the parts. In Belcher, Johns & Baltridge (Eds.), *New directions in English for specific purposes research* (pp. 119-140). University of Michigan Press.
- Flowerdew, L. (2012). *Corpora and language education*. Springer.
- Fraser, B. (1975). Hedged performatives. In Peter Cole & Jerry Morgan (Eds.), *Syntax and semantics* (Vol3, pp.44–68). Academic Press.  
[https://doi.org/10.1163/9789004368811\\_008](https://doi.org/10.1163/9789004368811_008)
- Gilbert, G. (1976). The transformation of research findings into scientific knowledge. *Social Studies of Science*, 6, 281-306. <https://doi.org/10.1177/030631277600600302>
- Goffman, E. (1967). *Interaction ritual: Essays on face to face behavior*. Anchor.
- Grabe, W., & Kaplan, R. (1997). On the writing of science and the science of writing: Hedging in science text and elsewhere. In R. Markkanen & H. Schröder (Ed.), *Hedging and discourse: Approaches to the analysis of a pragmatic phenomenon in academic texts* (pp. 151-167). De Gruyter.
- Granger, S. (2002). A bird's-eye view of learner corpus research. In S. Granger, J. Hung & S. Petch-Tyson (Eds.), *Computer learner corpora, second language acquisition and foreign language teaching* (Vol 6, pp.3-33). John Benjamins.
- Grice, H.P. (1975). Logic and conversation. In P.Cole & J. L. Morgan.(Eds.), *Syntax and semantics* (Vol 3, pp.14-58). Academic Press.
- Gries, S. T. (2006). Some proposals towards more rigorous corpus linguistics. *Zeitschrift für Anglistik und Amerikanistik*, 54(2), 191–202.

- Griffiths, P. (2006). *An introduction to English semantics and pragmatics*. Edinburgh University Press.
- Gustafsson, L. (2006). The passive in nineteenth-century scientific writing. In M. Kytö, M. Rydén & E. Smitterberg (Eds.), *Nineteenth-century English: Stability and change* (pp. 110-135). Cambridge University Press. <https://doi.org/10.1017/CBO9780511486944.005>
- Halliday, M. A. K. (1961). Categories of the theory of grammar, *Word*, 17, 241-292.
- Halliday, M.A.K. (1978). *Language as social semiotic: The social interpretation of language and meaning*. Edward Arnold.
- Halliday, M., McIntosh, A., & Stevens, P. (1964). *The linguistic sciences and language teaching*. Indiana University Press.
- Halliday, M.A.K., & Hasan, R. (1976). *Cohesion in English*. Longman.
- Halliday, M. A. K., & Martin, J. R. (1993). *Writing science: Literacy and discursive Power*. The Falmer Press.
- Halliday, M. (1994). *An introduction to functional grammar* (third edition). Edward Arnold.
- Halloran, S. M. (1984). The birth of molecular biology: An essay in the rhetorical criticism of scientific discourse. *Rhetoric Review*, 3(1), 70-83.
- Hanania, E. A. S. ,& Akhtar, K. (1985). Verb form and rhetorical function in science writing: A study of MS theses in biology, chemistry, and Physics. *English for Specific Purposes*, 4, 49-58. [https://doi.org/10.1016/0272-2380\(85\)90006-X](https://doi.org/10.1016/0272-2380(85)90006-X)
- Hardt-Mautner, G. (1995). 'Only connect'. *Critical discourse analysis and corpus linguistics*. UCREL.

- Harris, Z.S. (1952). Discourse analysis. *Language*, 28, 1-30.
- Hartmann, R.R.K., & Stork. F.C. (1972). *Dictionary of language and linguistics*. Applied Science Publisher.
- Helán, R. (2012). *Analysis of published medical case reports: Genre-based study* [Unpublished PhD Dissertation]. Masaryk University, Czech Republic.
- Hinkel, E. (1995). The use of modal verbs as a reflection of cultural values. *TESOL Quarterly*, 29(2), 325-343. <http://doi.org/10.2307/3587627>
- Hinkel, E. (1997). Indirectness in L1 and L2 academic writing. *Journal of Pragmatics*, 27(3), 361-386.
- Holmes, J. (1984). Modifying illocutionary force. *Journal of Pragmatics*, 8, 345-365.
- Hosman, L. A. (1989). The evaluative consequences of hedges, hesitations, and intensifies: Powerful and powerless speech styles. *Human Communication Research*, 15(3), 383-406.
- Hübler, A. (1983). *Understatements and hedges in English*. John Benjamins Publishing. <https://doi.org/10.1075/pb.iv.6>
- Hunston, S. (2002). *Corpora in applied linguistics*. Cambridge University Press.
- Hunston, S., & Thompson, G. (2000). *Evaluation in text: Authorial stance and the construction of discourse*. Oxford University Press.
- Hutchby, L., & Wooffitt, R. (1998). *Conversation Analysis: Principles, practices, and applications*. Polity Press.
- Hyland, K. (1994). Hedging in academic writing and EAP textbooks. *English for Specific Purposes*, 13(3), 239-256.

- Hyland, K. (1995). The author in the text: Hedging scientific writing. *Hong Kong Papers in Linguistics and Language Teaching*, 18, 33-42.
- Hyland, K. (1996 a). Talking to the academy: Forms of hedging in science research articles. *Written communication*, 13(2), 251- 281.
- Hyland, K. (1996 b). Writing without conviction? Hedging in science research articles. *Applied linguistics*, 17(4), 433-454.
- Hyland, K. (1998 a). *Hedging in scientific research articles*. John Benjamins Publishing. <https://doi.org/10.1075/pbns.54>
- Hyland, K. (1998 b). Persuasion and context: The pragmatics of academic metadiscourse. *Journal of Pragmatics*, 30, 437-455.
- Hyland, K. (1999). Academic attribution: citation and the construction of disciplinary knowledge. *Applied Linguistics*, 20(3), 341-367.
- Hyland, K. (2000). Hedges, boosters, and lexical visibility: Noticing modifiers in academic texts. *Language Awareness*, 9(4), 179-197.
- Hyland, K. (2002). Genre: Language, context, and literacy. *Annual Review of Applied Linguistics*, 22(1), 113-135.
- Hyland, K. (2003). Genre-based pedagogies: A social response to process. *Journal of Second Language Writing*, 12(1), 17-29.
- Hyland, K. (2005 a). *Metadiscourse: Exploring interaction in writing*. Continuum.
- Hyland, K. (2005b). Stance and engagement: A model of interaction in academic discourse. *Discourse Studies*, 7(2), 173-192.

- Hyland, K. (2006). Medical discourse: Hedges. In K. Brown (Ed.), *Encyclopedia of language and linguistics* (pp. 694-697). Elsevier.
- Hyland, K. (2007). Genre pedagogy: Language, literacy and L2 writing instruction. *Journal of Second Language Writing*, 16(3), 148-164.
- Hyland, K. (2009). *Academic discourse: English in a global context*. A& C Black.
- Hyland, K. (2013). ESP and writing. In Paltridge. B. & Starfield. S (Eds.), *The handbook of English for specific purposes* (pp.95-107). Willy-Blackwell.
- Hyland, K., & Milton, J. (1997). Qualification and certainty in L1 and L2 student' writing. *Journal of Second Language Writing*, 6(2), 183-205.
- Hyland, K., & Tse, P. (2004). Metadiscourse in academic writing: A reappraisal. *Applied Linguistics*, 25(2), 156-177.
- Hymes, D. (1964). *Language in culture and society: A reader in linguistics and anthropology*. Harper & Row.
- Hymes, D. (1971). Sociolinguistics and the ethnography of speaking. In E. Ardener (Ed.), *Social anthropology and language* (pp. 47-93). Routledge.
- Hymes, D. (1974). Ways of speaking. *Explorations in the Ethnography of Speaking*, 1, 433-451. <https://doi.org/10.1017/CBO9780511611810.029>
- Hyodo, S. (1993). *The art of scientific writing in English*. Tokyo University Press.
- Hyon, S. (1996). Genre in three traditions: Implications for ESL. *TESOL Quarterly*, 30(4), 693- 722.

- Johansson, S. (1995). *Mens sana in corpore sano: On the role of corpora in linguistic research. The European English Messenger*, 4(2), 19-25.
- Johnstone, B. (2002). *Discourse analysis*. Blackwell.
- Kaltenböck, G., Mihatsch, W., & Schneider, S. (Eds.). (2010). *New approaches to hedging*. Brill.
- Kaplan, R. B., & Grabe, W. (2002). A modern history of written discourse analysis. *Journal of Second Language Writing*, 11(3), 191-223. [https://doi.org/10.1016/S1060-3743\(02\)00085-1](https://doi.org/10.1016/S1060-3743(02)00085-1)
- Kay, H. and T. Dudley-Evans. (1998). 'Genre: what teachers think'. *ELT Journal*, 52(4), 308-14. <https://doi.org/10.1093/elt/52.4.308>
- Kennedy, G. (1998). *An introduction to corpus linguistics*. Addison Wesley Longman.
- Knapp, R., & Watkins, M. (2005). *Genre, text, grammar technologies for teaching and assessing writing*. UNSW Press.
- Knorr-Cetina, K. D. (1981). *The manufacture of knowledge: An essay on the constructivist and contextual nature of science*. Pergamon Press.
- Kuhn, T. (1970). *The structure of scientific revolutions* (2nd ed). University of Chicago Press.
- Labov, W. (1972). *Sociolinguistic patterns*. University of Pennsylvania Press.
- Lakoff, G. (1972). Hedges: a study in meaning criteria and the logic of fuzzy concepts. *The 8th Regional Meeting of the Chicago Linguistic Society* (pp.183-228).
- Lakoff, G. (1973). Hedges: A study in meaning criteria and the logic of fuzzy concepts. *Journal of Philosophical Logic*, 2(4), 458-508.

- Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Harvard University Press.
- Latour, B., & Woolgar, S. (1979). *Laboratory Life: The social construction of scientific facts*. SAGE.
- Lee, J. J. (2011). *A genre analysis of second language classroom discourse: Exploring the rhetorical, linguistic, and contextual dimensions of language lessons*. Georgia State University.
- Leech, G. (1983). *Principles of pragmatics*. Longman.
- Leech, G. (1992). Corpora and theories of linguistic performance. In J. Svartvik (Ed.), *Directions in corpus linguistics: Proceedings of the Nobel Symposium 82* (pp.105-122). De Gruyter.
- Leech, G., Deuchar, M., & Hoogenraad, R. (1982). *English grammar for today. A new introduction*. The MacMillan Press.
- Longman dictionary of contemporary English. (2001). (3rd Ed.). Person Education Limited, Longman.
- Luukka, M. R., & Markkanen, R. (1997). Impersonalization as a form of hedging. In R. Markkanen & H. Shroder (Eds.), *Research in text theory* (pp.168-187). Walter de Gruyter.
- Lyons, J. (1977). *Semantics*. Cambridge University Press.
- Lyons, J. (1983). Deixis and modality. In Félix Lobo & Heinz Morioka (Eds.), *Working papers in linguistics* (Vol 12, pp.77-117). Sophia University.

- Macmillan Publishers, (2014).*Macmillan dictionary*. Online available at <http://www.macmillandictionary.com/>
- Malášková, M. (2014). *Hedging in academic discourse: A comparative analysis of applied linguistics and literary criticism research article* [Doctoral dissertation].Masaryk University in Brno.
- Malmkjær, K. (2010). *The Routledge linguistics encyclopedia*. Routledge.
- Markkanen, R., & Schröder, H. (1987). *Hedging and its linguistic realizations in German, English and Finnish philosophical texts: A case study*. Erikoiskieletjakkäännösteoria. Vakki-seminaari VII. Vöyri, 31(1.2)
- Markkanen, R., & Schröder. H. (1997).Hedging: A challenge for pragmatics and discourse analysis.In R. Markkanen & H. Schroder (Eds.), *Hedging and discourse approaches to the analysis of a pragmatic phenomenon in academia texts* (pp.3-18). De Gruyter.
- Martin, J. R. (1984). Language, register and genre. In F. Christie (Ed.), *Language studies: Children's writing: Reader*. Deakin University Press.
- Martín, P. M. (2008). The mitigation of scientific claims in research papers: A comparative study. *International Journal of English Studies*,8(2), 133-152.
- Mathews, P.H. (2005). *Oxford concise dictionary of linguistics*. Oxford University Press.
- McArthur, T. (1996). *The Oxford companion to the English language*. Oxford University Press.
- McCarthy, M. (1991). *Discourse analysis for language teachers*. Cambridge University Press.
- McCloskey, D. N., & McCloskey, D. N. (1994). *Knowledge and persuasion in economics*. Cambridge University Press.

- McEnery, T., Xiao, R., & Tono, Y. (2006). *Corpus-based language studies: An advanced resource book*. Taylor & Francis.
- McEnery, T., & Wilson, A. (1996). *Corpus linguistics*. Edinburgh University Press.
- McEnery, T., & Hardie, A. (2012). *Corpus linguistics: Method, theory and practice*. Cambridge University Press.
- Meriem-webster.(2014). *Meriem-webster disctionary*. Online available at:  
<http://www.meriem-webster.com>
- Meyer, C. F. (2002). *English corpus linguistics: An introduction*. Cambridge University Press.
- Miller, C. (1984). Genre as social action. *Quarterly Journal of Speech*, 70, 151- 167.
- Mills, S. (1997). *Discourse*. Routledge.
- Mirhassani, A., & Reshadi, Z. (2001). The relationship between genre and Iranian EFL learners performance on open-ended and multiple choice test. *Iranian Journal of Applied Linguistics*, 68-80.
- Molino, A. (2010). Personal and impersonal authorial references: A contrastive study of English and Italian Linguistics research articles. *Journal of English for Academic Purposes*, 9(2), 86-101.
- Mulkay, M. (1979). *Science and the sociology of knowledge*. George Allen &Unwin.
- Myers, G. (1985). Texts as knowledge claims: The social construction of two biology articles. *Social Studies of Science*, 15(4), 593-630.

- Myers, G. (1988). The social construction of science and the teaching of English: An example of research. *Academic writing: Process and product*, 143-150.
- Myers, G. (1989). The pragmatics of politeness in scientific articles. *Applied Linguistics*, 10(1), 1-35. <https://doi.org/10.1093/applin/10.1.1>
- Myers, G. (1990). *Writing biology: Texts and the social construction of scientific knowledge*. University of Wisconsin Press.
- Myers, G. (1992). Textbooks and the sociology of scientific knowledge. *English for Specific Purposes*, 11(1), 3-17.
- Namsaraev, V. (1997). Hedging in Russian academic writing in sociological texts. In R. Markkanen & H. Schroder (Eds.), *Hedging and discourse: Approaches to the analysis of a pragmatic phenomenon in academic texts* (pp. 64-81). Gruyter.
- Nash, W. (1990). Introduction: The stuff these people write. In W. Nash (Ed.), *the writing scholar: Studies in academic discourse* (pp. 8-30).
- Nittono, M. (2003). *Japanese hedging in friend-friend discourse [Doctoral dissertation]*. Columbia University.
- Noorian, M., & Biria, R. (2010). Interpersonal metadiscourse in persuasive journalism: A study of texts by American and Iranian EFL columnists. *Journal of Modern Languages*, 20(1), 64-79.
- Nunan, D. (1993). *Introducing discourse analysis*. Penguin.
- Orta, I. V. (2010). A contrastive analysis of the use of modal verbs in the expression of epistemic stance in business management research articles in English and

- Spanish. *Ibérica, Revista de la Asociación Europea de Lenguas para Fines Específicos*, 19, 77-95.
- Overington, M. A. (1977). The scientific community as audience: Toward a rhetorical analysis of science. *Philosophy & Rhetoric*, 143-164.
- Oxford university press. (2014). Oxford dictionaries [Online]. Available at: <http://www.oxforddictionaries.com/>
- Palmer, F.R. (1979). *Modality and the English modals*. Longman.
- Paltridge, B. (1997). *Genre, frames and writing in research settings*. John Benjamins Publishing Company.
- Perkins, M. R. (1983). *Modal expressions in English* (Vol. 123). Ablex Publishing Corporation.
- Petraglia, J. (1991). Interrupting the conversation: The constructionist dialogue in composition. *Journal of Advanced Composition*, 37-55.
- Pindi, M., & Bloor, T. (1986). Playing safe with predictions: Hedging, attribution and conditions in economic forecasting. *Written Language*. BAAL 2.CILT.
- Powell, M. J. (1985). Purposive vagueness: An evaluation dimension of vague quantifying expressions. *Journal of Linguistics*, 21, 31-50.  
<http://dx.doi.org/10.1017/S002222670001001X>
- Prelli, L. (1989). *A rhetoric of science: Inventing scientific discourse*. University of South Carolina Press.
- Prince, E. F., Frader, J., & Bosk, C. (1982). On hedging in physician-physician discourse. *Linguistics and the Professions*, 8(1), 83-97.

- Propp, V. (1928). *The morphology of the folktale*. University of Texas Press.
- Raušová, V. (2016). *Hedging in academic discourse: Linguistic research articles* [Doctoral dissertation]. University of Prague.
- Rezanejad, A., Lari, Z., & Mosalli, Z. (2015). A cross-cultural analysis of the use of hedging devices in scientific research articles. *Journal of Language Teaching and Research*, 6(6), 1384.
- Richards, J.C. and Schmidt, R. (2002). *Longman dictionary of language teaching & applied linguistics* (3rd edition). Pearson Education Limited.
- Robberecht, P., & Van Peteghem, M. (1982). A functional modal for the description of modality [*The Fifth International Conference on Contrastive Projects*]. Jyväskylä.
- Rocci, A. (2009). Doing discourse analysis with possible words. In J. Renkema (Ed.), *Discourse, of course: An overview of research in discourse studies*. John Benjamins Publishing Co.
- Rounds, P. (1981). *On hedging in social science written texts*. University of Michigan (Mimeo).
- Salager– Meyer, F. (1994). Hedges and textual communicative function in medical written discourse. *English for Specific Purposes*, 13(2), 149- 171.
- Salager-Meyer, F. (1998). Language is not a physical object. *English for Specific Purposes*, 17, 295-301.
- Salager-Meyer, F., & Sales, J. C. (1991). A genre-based and text-type analysis of hedging in written medical English discourse. *Interface*, 6(1), 33-54.

- Schiffrin, D. (1980). Meta-talk: Organizational and evaluative brackets in discourse. *Sociological Inquiry*, 50(3-4), 199-236.
- Schiffrin, D. (1987). *Discourse markers*. Cambridge University Press.
- Schiffrin, D. (1994). *Approaches to discourse*. Blackwell.
- Schiffrin, D., Tannen, D. & Hamilton, H. E., (Eds.). (2001). *The handbook of discourse analysis*. Blackwell.
- Searle, J. (1975). Indirect speech acts. In P. Cole & J. Morgan (Eds.), *Syntax and semantics* (vol 3, pp.59-83). Academic Press.
- Simpson, P. (1990). Modality in literary-critical discourse. In W. Nash (Ed.), *The writing scholar studies in academic discourse* (pp. 63-94). SAGE.
- Sinclair, J. (1991). *Corpus, concordance, collocation*. Oxford University Press.
- Sinclair, J. (2005). Corpus and text - basic principles. In M. Wynne (Ed.), *Developing linguistic corpora: A guide to good practice* (pp.1-16). Oxbow Books.  
<http://www.ota.ox.ac.uk/documents/creating/dlc/>
- Skelton, J. (1988). The care and maintenance of hedges. *ELT journal*, 42(1), 37-43.  
<http://eltj.oxfordjournals.org/content/42/1/>.
- Slougui, D. (2009). *A social-context approach to writing for international publication: The case of Algerian scientists* [Doctoral dissertation]. University of Constantine 1, Algeria.
- Strunk, W. J., & White, E. (1959). *The elements of style*. Macmillan.
- Stubbs, M. (1983). *Discourse analysis*. Blackwell.

- Stubbs, M. (1986). A matter of prolonged field work: Notes toward a modal grammar of English. *Applied Linguistics*.7, 1-25.
- Stubbs, M. (1993). British traditions in text analysis: From Firth to Sinclair. In M. Baker, F. Francis and E. Tognini-Bonelli (Eds.), *Text and technology: In honour of John Sinclair* (pp.1–36). John Benjamins.
- Stubbs, M. (1996). *Text and corpus analysis*. Blackwell.
- Stubbs, M. (2001). *Words and phrases: Corpus studies of lexical semantics*. Blackwell.
- Swales, J. (1971). *Writing scientific English*. . Nelson.
- Swales, J. (1981). *Aspects of article introductions*. Language Studies Unit, University of Aston.
- Swales, J. (1987). Utilizing the literatures in teaching the research paper. *Tesol Quarterly*, 21 (1), 41-68.
- Swales, J. (1990). *Genre Analysis: English in academic and research settings*. Cambridge University Press.
- Swales, J. (1992). *Genre Analysis: English in academic and research settings*. Cambridge University Press.
- Swales, J. (2001). EAP-related linguistic research: An intellectual history. In J. Flowerdew & M. Peacock (Eds.), *Research perspectives on English for academic purposes* (pp.42-54). Cambridge University Press.
- Swales, J. M. (2004). *Research genres: Exploration and applications*. Cambridge University Press.

- Swales, J. M. (2009). Worlds of genre-metaphors of genre. In C. Bazerman, A. Bonini & D. Figueirido (Eds.), *Genre in a changing world* (pp.3-16). Parlor Press.
- Takimoto, M. (2015). A corpus-based analysis of hedges and boosters in English academic articles. *Indonesian Journal of Applied Linguistics*, 5(1), 95-105.
- Tatis, K., & Rowland, T. (2006). Vague language in Greek and English mathematical talk: A variation study in face-work [Conference of the International Group for the Psychology of Mathematics Education, Vol 5, pp. 257-264]. PME.
- Taylor, C. (2008). What is corpus linguistics? What the data says. *ICAME Journal*, 32, 179-200.
- Teubert, W. (1996). Editorial. *International Journal of Corpus Linguistics*, 1(1), iii-x.
- Teubert, W. (2005). My version of corpus linguistics. *International Journal of Corpus Linguistics*, 10(1), 1-13.
- Thomas, J. (1983). Cross-cultural pragmatic failure. *Applied Linguistics*, 4(2), 91-112.
- Thompson, D. K. (1993). Arguing for experimental “facts” in science: A study of research article results sections in biochemistry. *Written Communication*, 10(1), 106-128.
- Thompson, G and Hunston, S. (2006). (Eds.). *System and corpus: Exploring connections*. Equinox.
- Thompson, G., & Yiyun, Y. (1991). Evaluation in the reporting verbs used in academic papers. *Applied Linguistics*, 12(4), 365-382.
- Trimbe, L. (1985). *English for science and technology: A discourse approach*. Cambridge University Press.

- Van Dijk, T. (2009). Critical discourse studies: A socio-cognitive approach. In R. Wodak & M. Meyer (Eds.), *Methods of critical discourse analysis* (2nd ed., pp.62-86).SAGE.
- Van Dijk., T. A. (1985). Introduction: Discourse analysis as a new cross-discipline: RSE ANALYSIS (Vol 1). In T. A. van Dijk, (Ed.), *Handbook of discourse analysis* (pp.1-10). Academic Press.
- Van Dijk., T. A. (1997). *Discourse studies: A multidisciplinary introduction* (2nd ed.). SAGE.
- VandeKopple, W. (1985). Some exploratory discourse on metadiscourse. *College Composition and Communication*, 36, 82-93.
- Varttala, T. (2001).*Hedging in scientifically oriented discourse: Exploring variation according to discipline and intended audience* [PHD].University of Tampere, Tampere, Finland.
- Vass, H. (2004). Socio-cognitive aspects of hedging in two legal discourse genres. *Ibérica: Revista de la Asociación Europea de Lenguas para Fines Específicos (AELFE)*, 7, 125-141. <http://www.aelfe.org>.
- Vass, H. (2015). Analysing hedging in legal discourse using small-scale and large-scale corpora. *Research in Corpus Linguistics*, 27-35.
- Vassileva, I. (1997). Hedging in English and Bulgarian academic writing. In A. Duzsak (Ed.), *Culture and styles of academic discourse* (pp.203-221). De Gruyter.
- Vázquez I., & Giner, D. (2009). Writing with conviction: The use of boosters in modelling persuasion in academic discourses. *Revista Alicantina de Estudios Ingleses*, 22, 219-237.

- Vazquez, I., & Ginger, D. (2008). Beyond mood and modality: Epistemic modality markers as hedges in research articles. *Revista Alicantina de Estudios Ingleses*, 21, 171-190.
- Vladimirou, D. (2007). I suggest that we need more research': Personal reference in linguistics journal articles. *Lancaster University Postgraduate Conference in Linguistics and Language Teaching* (Vol. 1, pp. 139-157).
- Widdowson, H. G. (1996). *Linguistics*. Oxford University Press.
- Widdowson, H. G. (2007). *Discourse analysis*. Oxford University Press.
- Wierzbicka, A. (2006). *English: Meaning and culture*. Oxford University Press.
- Williams, S. (1981). *Styles: Ten lessons in clarity and grace*. Scott Foresman and Co.
- Winkler, A., & McCuen, J. (1989). *Writing the research paper: A handbook* (3rd ed). Sydney: Harcourt Brace Jovanovich.
- Yagız, O., & Demir, C. (2014). Hedging strategies in academic discourse: A comparative analysis of Turkish writers and native writers of English. *Procedia-Social and Behavioral Sciences*, 158, 260-268.
- Yang, Y. (2013). Exploring linguistic and cultural variations in the use of hedges in English and Chinese scientific discourse. *Journal of Pragmatics*, 50(1), 23-36.
- Yu, S. (2009). *The pragmatic development of hedging in EFL learner* [Doctoral dissertation] .<http://dspace.cityu.edu.hk/handle/2031/5731>
- Zadeh, L. A. (1965). Information and control. *Fuzzy Sets*, 8(3), 338-353.
- Zadeh, L. A. (1972). A fuzzy-set-theoretic interpretation of linguistic hedges. *Journal of Cybernetics*, 2(3), 4-34.

- Zhu, Y. (2014). A situated genre approach for business communication education in cross-cultural contexts. In V. Bhatia & S. Bremner (Eds.), *The Routledge handbook of language and professional communication* (pp.26-39). Routledge.  
<https://www.routledgehandbooks.com/doi/10.4324/9781315851686.ch3>
- Zuck J.G., & Zuck.L.V (1986). Hedging in newswriting. In A.M. Cornu, J.Van Parjis, M. Delahaye & L. Baten (Eds.), *Beads or Bracelets? How do we approach LSP* (pp.172-180).OUP.

# Appendices

## **Appendix A**

### **Research Articles' Corpus**

#### **Article 1:**

Nacer, W., Baba Ahmed, F., Merzouk, H., Benyagoub, O., & Bouanane, S. (2019). Antihyperlipidemic and antioxidant effects of the microalgae *nannochloropsis gaditana* in streptozotocin-induced diabetic rats. *Revue Agrobiologia*, 9(2), 1474-1483.

#### **Article 2**

Keffous F., Belboukhari H., Sekkoum K., Djeradi H., Cheriti A., Aboul-Enein, H... & Rebizi, N.M. (2019). Optimizing of the reducing power for antioxidant activity test and application on two medicinal plants. *Phytochem & Biosub Journal*, 13(2), 81-85.

#### **Article 3:**

Aouidi, F., & Hamdi, M. (2016). Antioxidant capacity and phenolic content in olive leaf tisane as affected by boiling treatment. *Phytochem & Biosub Journal*, 10(2), 39-50.

#### **Article 4:**

Haddache, N., Dehmani-hamzaoui, N., & Baaliouamer, A. (2017). Comparative analysis of chemical composition, antioxidant and antibacterial Activities of *Mentha rotundifolia* Essential oils from Algeria extracted by microwave and hydrodistillation. *PhytoChem & BioSub Journal*, 11(1), 65-72.

#### **Article 5:**

Gamoune, S., Nouiua, W. ,& Djaout.W. Antioxidant, antimicrobial and anti-inflammatory activities development of methanol extract of Saffron (*Crocus Sativus L.*) flowers wastes. (2019). *Phytochem & BioSub Journal*, 13(2), 102-108.

**Article 6:**

Boudjemaa, H. (2017). Characterisation of antibacterial of butanol and aqueous extracts from Algerian *Lavandula angustifolia* Mill. (lamiaceae). (2017). *Phytochem & BioSub Journal*, 11 (3), 168-174.

**Article 7:**

keffous F., Belboukhari H., Sekkoum K., Djeradi H., Cheriti A, ... & Rebizi, N.M. (2017). Investigation of the antioxidant potential and total phenolics of *Bubonium graveolence* aerial parts. *Phytochem & Biosub Journal*, 11(1), 73-79.

**Article 8:**

Nouioua, W., & Gammoune, S, (2019). Antioxidant, antimicrobial and anti-inflammatory activities development of methanol extract of *Saxifraga veronicifolia* pers. (2019). *Phytochem & BioSub Journal*, 13 (2), 110-116.

**Article 9:**

Gammoune, S. (2017). Antioxidant and antimicrobial activities of flavonoids extract of *Phlomis herbaventi* L. *PhytoChem & BioSub Journal*, 11 (2), 96-102.

**Article 10:**

Bouzidi, A.M., Dif., M.M., Chihaoui, Gh., Taibi, S., & Toumi-Benali, F. (2018). First determination of polyphenols content, antioxidant activity and soil characterization of *Lavandula dentata* L. from Oran region. *Phytochem & BioSub Journal*, 12 (2), 117-124.

**Article 11:**

Fatehi, N., Allaoui, M., Berbaoui, H., Cheriti, A., Boulenouar, N., & Belboukhari, N. (2017). *Haloxylon scoparium*: An ethnopharmacological survey, phytochemical screening and antibacterial activity against human pathogens causing nosocomial infection. *PhytoChem & BioSub Journal*, 11(2), 104-109.

**Article 12:**

Boulenouar, N., Marouf, A., & Cheriti, A. (2017). New application of contact bioautography to evaluate enzyme inhibition “case of cellulases from *Fusarium oxysporum* f. sp. *albedinis*”. *PhytoChem & BioSub Journal*, 11 (3), 226-230.

**Article 13:**

Fekih, N., Allali, H., Arezki Ait, A.N., Merghache, D.M., & Costa, J. (2016). Chemical composition and antimicrobial potency of essential oils from roots of *Pinus* growing in Algeria. *PhytoChem & BioSub Journal*, 3, 96-102.

**Article 14:**

Ounissi, M., Kameli, A., & Kherraz, K. (2017). Docking study elucidate the binding mode of luteolin in the active site of inducible cyclooxygenase-2. *PhytoChem & BioSub Journal*, 11(2), 118-124.

**Article 15:**

Medjati, N., Hasnaoui, O., Hachemi, N., & Babali, B. (2016). Effect of hydrous and saline stress on seeds of *Chamaerops humilis* L. at the stage of germination. *PhytoChem & BioSub Journal*, 10 (3), 121-127.

**Article 16:**

Chirane, M., Benchaban, O., Bousbia, N., & Zenia, S. (2019). Antioxidant and Antimicrobial activities of essential oil and ethanol extract of *Santolin chamaecyparissus* L. *Revue Agrobilologia*, 9(2), 1660-1668.

**Article 17:**

Gadouche, L., Saadi, A., & Zidane, A. (2019). Molecular polymorphism in dentate lavender from littoral Algerian. *Genetics and Biodiversity Journal*, 3(2), 40-4.

**Article 18:**

Daoud, M., Loukidi, B., Talbi, W., Guermouche, B., Rouigueb, K., Azzi, R., Labaik, A., & Gaouar, S. (2019). . *Genetics and Biodiversity Journal*, 71-80.

**Article 19:**

Bensouici, K., Boudemagh, A., & Boulahrouf, A. (2015). Antifungal activity of actinomycetes isolated from several Algerian ecosystems against *pinushalepensis* wood decay fungi. *Sciences & Technologie C*, 41, 44-52.

**Article 20:**

Boubendir, A., Khelili, K., & Hamidechi, M.A. (2014). Importance of the bioinformatics tool in the confirmation of bacterial species isolated from raw milk: case of *stenotrophomonas* spp. *Sciences & Technologie C*, 42, 38-43.

**Article 21:**

Behidj-Benyounes, N., Dahmane, T., & Allem, A. (2016). Effectiveness of the flavonoids isolated from *thymus inodoros* by different solvents against some pathogenic microorganisms. *Sciences & Technologie C*, 43, 9-14.

**Article 22:**

Rebai, R., & Bouadah, A. (2016). Effects of melatonin on oxidative stress parameters in streptozotocin-induced diabetic rats. *Sciences & Technologie*, 43, 28-3.

**Article 23:**

Laouar, R., Saada, M., Bechkri, S., Rezgoune-Chellat, D., Abadi, N., & Satta, D. (2016). Genetic and hematological profiles of B-thalassemias in eastern Algeria. *Sciences & Technologie*, 44, 37-46.

**Article 24:**

Athamena, S., Laroui, S., & Athamena, M. (2016). Phenolic composition, antimicrobial activity of rosmarinus officinalis. *Sciences and technologies*.44, 47-58.

**Article 25:**

Irki, S., Mahmoudi,Y., & Hamidi, N. (2019). Histological study and cytotoxic effect of globularia alypum leaves. *Algerian Journal of Natural Products*, 7(2), 714-719. DOI: <http://dx.doi.org/10.5281/zenodo.3604984>

**Article 26:**

Boughendjioua, H., Hafsa, A., & Kadach, A. (2019). Antiacetylcholinesterase activity of sweet orange (citrus sinensis) essential oil from Algeria. *Algerian Journal of Natural Products*, 7(2), 701-705.

**Article 27:**

Aoumeur, H., Ait Hamadouche, N., Slimani, M., & Aoues, A. (2016). Evaluation of the toxic effect of lead on some parameters of growth radish plant (raphanus sativus L.). *Algerian Journal of Natural Products*, 4(1), 241-251.

**Article 28:**

Boudjemaa, H. (2017). Antibacterial activity of ethyl acetate extracts from Algerian cuperssus sempervirens var against some human pathogens bacteria. *Algerian Journal of Natural Products*, 5 (3), 524-529.

**Article 29:**

Miliani, A., Boukhatem, M.N., & Saidi, F. (2017). Chemical composition and antimicrobial activity of the Algerian laurus nobilis essential oil. *Algerian Journal of Natural Products*, 5(2), 507-514.

**Article 30:**

Benaissa, N., Merzouk, H., Merzouk, S.A., & Narce Michel. (2015). Effects of maternal linseed oil supplementation on oxidative stress markers in cafeteria diet induced obese rats. *Algerian Journal of Natural Products*, 3(3), 177-184.

**Article 31:**

Bousmid, A., Boulacel, M., & Benlaribi, M. (2015). Floral biology of four species of rosaceae. *Sciences & Technologie*, 41, 28-34.

## Appendix B

### Types of Hedges with Examples from the Corpus

|    | Type of a Hedge               | Realisations                                            |
|----|-------------------------------|---------------------------------------------------------|
| 1  | Modal Auxiliaries             | <i>May-might-could-would</i>                            |
| 2  | Non-factive Reporting Verbs   | <i>show- - find-note-report- suggest- notice</i>        |
| 3  | Tentative Cognition Verbs     | <i>see- believe- estimate- support- assume- predict</i> |
| 4  | Tentative Linking Verbs:      | <i>Seem- appear- tend</i>                               |
| 5  | Probability adjectives        | <i>Possible- likely- expected-suggested- potential</i>  |
| 6  | Adjs. of Indefinite Frequency | <i>Frequent-typical-usual-approximate-rare</i>          |
| 7  | Adjs. of Indefinite Degree    | <i>Moderate-considerable-major-small-common</i>         |
| 8  | Probability Adverbs           | <i>Possibly-probably- -potentially</i>                  |
| 9  | Advs. of Indefinite Degree    | <i>Rather-quite-slightly-largely- -mostly</i>           |
| 10 | Advs. of Indefinite Frequency | <i>Frequently-generally-commonly-rarely-</i>            |
| 11 | Approximative Adverbs         | <i>almost- about- nearly- around- some- just-</i>       |
| 12 | Non-factive Assertive Nouns   | <i>Indication- prediction- evidence</i>                 |
| 13 | Tentative Cognition Nouns     | <i>Assumption-evaluation-hypothesis</i>                 |
| 14 | Nouns of Tentative Likelihood | <i>Possibility-probability-attempt</i>                  |
| 15 | Other Hedges                  | <i>Several-little-few-in general-most (of)</i>          |

## Résumé

Cette étude se propose d'examiner l'utilisation des marqueurs linguistiques (*hedging*) dans les articles scientifiques écrits par des auteurs Algériens. Dans ce but, un corpus de 31 articles en biologie, parus dans 5 revues de publication locale, a été analysé en termes de type, de fréquence de répartition et de fonctions. L'objectif est de déterminer la fréquence de l'apparition des types de *hedging* dans le corpus cible, basé sur la classification de Varttala (2001), et de mesurer leur distribution au long des sections de l'article. De la même manière, la chercheuse a examiné les fonctions exprimées par ces dispositifs identifiées en se basant sur la classification du Malaskova (2014) qui concerne leur fonctions. L'analyse quantitative indique que les auteurs utilisent différents types de marqueurs dans des proportions différentes. Cependant, les chercheurs Algériens ont tendance à utiliser des verbes qui indiquent un engagement positif aux informations fournies, tel que « monter, trouver et reporter », beaucoup plus que des verbes qui indiquent une position plus réservée, tel que « indiquer, suggérer et sembler ». Ce problème peut être attribué à un répertoire lexical limité ainsi qu'à un manque d'outils appropriés de haies. En plus, la distribution de ces marqueurs au long des sections des articles de recherche indique que la section des résultats et de discussion est la plus « couverte ». Cela semble être en raison de la nature textuelle de recherche et la fonction de cette section. Dans cette section, les auteurs expliquent leurs conclusions et présentent leurs affirmations. L'examen des fonctions pragmatiques remplies par *hedging* indique que les biologistes dans cette recherche utilisent ces dispositifs rhétoriques pour principalement exprimer le contenu. Les conclusions de cette étude peuvent permettre aux praticiens à enseigner à leurs étudiants que *hedging* est une compétence pragmatique importante. Par conséquent, la chercheuse croit qu'il faut inclure l'apprentissage de ces marqueurs rhétorique dans les programmes académiques de l'enseignement de l'Anglais aux locuteurs non natifs.

**Mots clés :** article de recherche, *hedging*, biologistes Algériens, type et fréquence.

## الملخص

تبحث الدراسة الحالية بشكل أساسي في استخدام الباحثين أدوات التحويط في مجموعة مكونة من 31 مقال في علم الأحياء والتي نشرت في خمس مجلات وطنية يمكن التحصل عليها عن طريق الولوج الى الموقع الرسمي لمنصة المجلات العلمية الجزائرية (ASJP). تم إجراء تحليل سياقي نوعي و كمي لهذه الأدوات بهدف تحديد تواتر أنواع التحويط التي يظهر في المجموعة المستهدفة بناءً على تصنيف Varttala (2001) وقياس توزيعها عبر أقسام المقال . وبالمثل ، سعينا لتسليط الضوء على الوظائف التي تعبر عنها هاته الصيغ على أساس تصنيف Maláškova (2014). توضح النتائج المتوصل اليها أن الكتاب الجزائريين يميلون إلى استخدام الأفعال التي تشير إلى التزام أكثر إيجابية تجاه المعلومات المقدمة على غرار الأفعال 'يعرض ويجد ويقرر' أكثر بكثير من الأفعال التي تشير إلى موقف أكثر تحفظاً مثل 'يشير أو يقترح أو يظهر'. يمكن أن ترجع هاته المشكلة إلى امتلاك الباحثين المعنيين ذخيرة معجمية محدودة ونقص في أدوات التحويط المناسبة. علاوة على ذلك ، يشير توزيع التحويط عبر أقسام المقالات البحثية إلى أن قسم النتائج والمناقشة هو الأكثر تحوطاً وهذا يرجع أساساً للطبيعة والوظيفة النصية والبحثية لهذا القسم بحد ذاته ، إذ في طياته يفسر الكتاب نتائجهم ويقدمون حججهم. يشير فحص الوظائف البراغمية التي تؤديها افعال وتراكيب التحويط إلى أن الصيغ القائمة على أساس المضمون هي الأكثر استخداماً من ناحية الوظيفة. يمكن أن تساعد النتائج المتوصل اليها في الدراسة الحالية الأساتذة في اعتبار كفاءة استعمال ادوات التحويط مهارة مهمة يجب ادراجها في البرامج الاكاديمية المصممة لتدريس اللغة الإنجليزية العلمية للكتاب غير الناطقين بها.

الكلمات المفتاحية: أدوات التحويط، الوظائف ، وتيرة الاستخدام، المقال