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Hedges in Biology Research Articles: What Types and Frequency do Algerian Authors Use?

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Abstract

This paper aims at examining the use of hedging by Algerian scientists in the research article genre. To this end, a corpus of 31 articles, extracted from 5 Algerian locally published journals in the field of biology was analysed in terms of type, frequency and distribution of hedges across the research article sections. The quantitative analysis indicates that Algerian biologists employ different types of hedges with different proportions. However, main verbs' category is the most prominent type of hedges in this data. Specifically, non-factive reporting sub-class of verbs is the highest over all other types of hedges. Algerian biologists seem to rely heavily on these verbs as strategical devices to provide support and further evidence to their own findings. Implications of this study can help placing hedging competence as an important rhetorical skill within the context of teaching scientific English.

Keywords: Hedges, research article genre, Algerian biologists, type and frequency.

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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 et de répartition. L'analyse quantitative indique que leurs auteurs utilisent différents types de marqueurs dans des proportions différentes. Cependant, la catégorie « Verbes principaux », plus précisément, la sous-catégorie « les verbes introducteurs de citation » est le type de marqueur le plus fréquemment utilisé. Les résultats de cette analyse suggèrent que ce choix rhétorique (prévalence de cette catégorie) permet aux chercheurs d'appuyer et de valider les résultats de leurs propres travaux. Les implications de cette étude contribuent à développer de nouvelles compétences dans l'enseignement de l'Anglais scientifique.

Mots clés : article de recherche, hedging, biologistes Algériens, type et fréquence.

ملخص

يهدف هذا المقال الى دراسة استخدام العلماء الجزائريين لأسلوب المراوغة اللفظية في نمط مقال البحث. تحقيقا لهذه الغاية ، تم تحليل مجموعة من 31 مقالة بحثية مستخرجة من 5 مجلات جزائرية منشورة محليا في مجال البيولوجيا من حيث نوع و تكرار وتوزيع هذا الأسلوب عبر أقسام مقال البحث. يشير التحليل الكمي إلى أن علماء البيولوجيا الجزائريين يستخدمون أنواعًا مختلفة من اسلوب المراوغة اللفظية بنسب مختلفة لكن فئة الأفعال الرئيسية و على وجه التحديد أفعال الإخبار هي الأكثر استخداما . يبدو أن العلماء الجزائريين يعتمدون بشدة على هذه الأفعال من خلا ل الاقرار بأعمال الباحثين الآخرين عند مناقشة نتائجهم. نأمل أن تساعد هذه الدراسة في ادراج كفاءة اسلوب المراوغة اللفظية كمهارة بلاغية مهمة في تدريس الإنجليزية العلمية.

الكلمات المفتاحية : اسلوب المراوغة اللفظية- مقال البحث- علماء البيولوجيا الجزائريين- نوع و تكرار.

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I- Introduction :

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. According to Hyland [1:116], scientific research articles are thus regarded as "socially constructed artefacts." 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" [ibid: 196]. These practices whereby scientists interact with other researchers aim to persuade the reader to accept the scientists' claims. 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. Every other statement are non-factive or hedged statements: these are propositions a scientist assumes to be true as far as he claims so and convinces the reader to be so. In other words, the scientists' new claims have a negotiability character. Hedges are some writing strategy by which authors negotiate their new claims in an attempt to transform their research results into convincing, "well established" knowledge claims. The use of these rhetorical means of persuasion helps the scientist place appropriately his claims and the whole research within the discourse community paradigm. As Blisset [2:141] 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." Toning done does not mean the understatement of the claim but the language used to express the claim. Hedges are significant means by which writers can express a perspective on their statements. Thus, they are among the essential features which shape the research article genre and the utilization of them in academic writing is a requisite.

This great importance of the use of hedges, however, is not visible to non-native authors compared to native writers, a topic which has to be investigated [Hinkel, 3]. Therefore, this paper aims at addressing how and to what extent Algerian biologists, as non-native users of English, hedge their claims in their research papers. In specific terms, we sought to answer the following questions:

a- What are the types and frequency of hedges in Algerian biology research papers?
b- How are these types distributed through the research article sections?

II- Review of the Literature:

1. Definition of a hedge

Used in different situations and explained in different terms, the concept of *hedges* lends itself to many definitions. These latter, inevitably, lead to this necessary question: is there any consensus about the meaning of the term?

The earliest investigation on hedging was Zadeh's study [4] on *Fuzzy Logic*. However, the first primarily linguistically oriented treatment of hedging is found in the study of George Lakoff [5] in his publication "*Study in meaning criteria and the logic of fuzzy concepts".* 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 viewed as, ...* etc.) According to him [ibid:195], hedges are "words whose job it is to make things fuzzier or less fuzzy."

For Zuck and Zuck [6:172] hedges are "the process whereby the author reduces the strength of what he is writing." In the same line of thought, Crismore and Vand Kopple [7:185] consider 'hedges' as items which "signal a tentative or cautious assessment of the truth or referential information." However, Crompton [8] 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 [8:11] argues that a "functionally-based definition of hedging is desirable" 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 (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" (ibid). The portrayals of literature, nonetheless, indicate that the most commonly used definition of hedging is the one proposed by Hyland [1:1] 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.

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. Surface Features of Hedging:

There are many classifications of hedges devices in literature. The diversity of taxonomies 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. The absence of a unified taxonomy of hedges is also attributed to the complex and multi-functional nature of hedges. Brown and Levinson [9:146] have discussed this issue and argue that "it should be born in mind that the semantic operation of hedging can be achieved in indefinite numbers of surface forms." 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 taxonomy [10] is based on her attempt to match the grammatical forms with their functional categories. Hyland [11] studied hedging in cell and molecular biology and attempted to provide a framework which reflects the "polypragmatic" nature of hedges devices in research articles. Despite the differences in these classifications of hedges and others, there are common or core categories of hedges which most researchers agree upon:

Modal Auxiliaries: *may, might*, and *would.*
Epistemic Verbs*: indicate, seem and speculate.*
Epistemic Adjectives: *somehow, possible and probable.*
Epistemic Adverbs: *possibly, probably and presumably.*
Epistemic Nouns*: possibility, probability and tendency.*

Clearly enough, one concept closely connected with hedging is modality. Makkannen and Schröder [12] 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. However, not all modality is hedging or vice versa. Nash [13:23] illustrates the use of *may* in the following examples:

(1) Researchers *may* have found a cure for influenza.
(2) Patients *may* only smoke outside the building.

In the first example, the modal *may* is used to express the speaker's lack of confidence and tentativeness towards his proposition: epistemic possibility. The modal *may* here is considered a hedge. Yet, in the second example, the modal *may* is used in its non-epistemic sense (root meaning) which is not associated with hedging. The modal *may* here expresses permission. Thus, modal auxiliaries are polysemous and can convey a range of meanings, which can be associated with hedging. Modal auxiliaries are by no means the sole markers to express the epistemic function. Epistemic lexical verbs, tentative adjective, adverbs, and nouns can also fall within the semantic area to express the hedging function.

3. Hedging in Research Articles

Hedges have stirred up ample scholarly consideration and debate and numerous studies have been conducted to examine these devices in various disciplines, languages and across different genres, by native and non-native authors.

For example, Butler's [14] study 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 results showed 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 and might.* Added to this, the introduction and discussion are much more frequently hedged than other sections.

In his pioneering work, Hyland [11] studied hedging in cell and molecular biology research articles by English authors. He analysed a corpus of 26 research papers 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 realized by main verbs, adverbs, adjectives, modals and nouns.

In a cross-linguistic study, Falahati [15] compared the use of hedges in 12 Persian and English research papers in chemistry, medicine, and psychology. His findings indicate that the English papers are more hedged than the Persian ones. Similarly, Martin-Martin [16] examines hedging in English and Spanish research papers on clinical health and psychology. He came to the conclusion that the two languages share many commonalities in their use of hedging. However, "more protection to face author" can be found in the English language.

In another line of research, ElMalik and Nesi [17] compared the use of hedges in 20 medical research articles by British and Sudanese writers. They concluded that hedges occur more frequently in British papers than in the Sudanese'. In the same vein, Nasiri [18] examined hedging devices in 20 research articles in the field of Civil Engineering written by American and Iranian. The analysis indicated that American authors tend to use more hedges than their counterparts.

Having reviewed some literature, it should be noted that despite the numerous studies on hedging from various angles, few studies have tackled the use of hedges by Arab authors in scientific research papers. This study aims at filling this gap and contributes to an examination of the use of these subtle features by Arab writers.

III-Methodology

1. The Corpus

The material for the present research consists of 31 scientific research articles written in English by Algerian scientists and published in local journals. Target journals of biology have been selected from ASJP (Algerian scientific journal platform) website, which offers a number of journals published in the chosen domain. All the selected journals are peer-reviewed articles. At first, around 51 articles have been randomly downloaded and to make sure that the articles of the corpus are about biology and its related disciplines, all the papers were counterchecked by specialist informants. Since we have been also interested in the distribution of hedges through the research article structure (IMRD), articles which do not follow the format (Introduction, Method, Results, and Discussion) have been eliminated. Consequently, we finished up with a corpus which contains 31 articles consisting of 69672 token words. The size of the corpus, hopefully, would help us dig thoroughly into the use of hedging by Algerian biologists.

Journal Title	N	Year of publication
PhytoChem & BioSub	**14**	2016-2019
La revue "Sciences & technologie. C Biotechnologies	**7**	2014-2016
Genetics and Biodiversity journal	**2**	2019
AGROBIOLOGIA	**2**	2019
Algerian Journal of Natural Product	**6**	2015-2019
Total	**31 (100%)**	**2014-2019**

Table 1: Number and Journal Titles in the Corpus

2. Data Collection Procedure

Given the nature of hedges, it was fairly difficult to construct an adequate method for the purposes of the present study. Accordingly, some factors and considerations have been taken into account in designing the quantitative analysis. The

sample articles were analysed using Laurence Anthony Antconc program [19], which is a software having seven tools. We have only used the Word list function tool which counts the number of occurrences of specific items. To conduct the electronic analysis, a list of possible hedging devices has been devised and compiled based on Varttala's [20] research scheme. 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. According to the taxonomy proposed by Varttala [20], a quantitative analysis was conducted to determine the frequency of hedging forms and their percentages. Varttala's categorization of hedges is a revised version of Hyland's [1] taxonomy.

1. Model auxiliary verbs
2. Main 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. Nonfactive assertive nouns
5.2. Tentative cognition nouns
5.3. Nouns of tentative likelihood
6. Clausal elements.
7. Questions.
8. Other Hedges

Figure 1: Classification of Hedging Forms Varttala [20: 289]

Because of the highly contextual nature of hedges, the electronic search was followed by a meticulous manual search to examine the identified hedges. A decision has also to be made between epistemic and root modality. We have followed the 1000-word approach which 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 article or the examined section. In addition to the relative frequency per 1000, the relative percentage of a particular hedging device was counted as well.

IV- Results

To answer the first question in this study, the types and frequency of occurrence of hedges in the Algerian biology corpus have been examined. The following table summarizes the results of the quantitative analysis:

Type of a hedge	Raw number	Frequency Per 1000	%
Modal Auxs.	**153**	**2.19**	**10.09**
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
Main Verbs Total	**672**	**9.6**	**44.33**
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
Adjectives Total	**225**	**3.2**	**14.84**
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
Adverbs Total	**247**	**3.53**	**16.29**
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
Nouns Total	**31**	**0.43**	**2.04**
Clausal	**11**	**0.16**	**0.73**
Questions	00	00	00
Other hedges	**177**	2.54	**11.68**
Total	**1516**	**21.65**	100%

Table 2: The Frequency of Occurrence and Percentage of Hedges

Upon the examination of the above table, the examined corpus contains 1516 hedges (or 21.65 per 1000 words). As the breakdown of the types of hedges demonstrate, main 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. Though the results of adjectives and adverbs are approximate, with a number of occurrences of 225 and 247 respectively, adverbs are the second frequently used type of hedges. Modal auxiliaries' type is not numerous with an account of 156 hits. We can say that these latter are modest types of hedges compared with main verbs. However, the remarkable modest categories were "nouns" and "clausal" with a density of only 2.04 and 0.73 per 1000 words respectively. Questions are completely absent in this data. 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.

To answer the second question in this study, a comparison of the occurrence of hedges in each section yields the following results.

	Auxs.	**Main verbs**	**Adjs**	**Advs.**	**Nouns**	**Clausal**	**Other hedges**	**Total**
Introduction	18	67	40	67	9	3	74	278
Materials and Methods	5	78	33	41	2	5	20	184
Results and 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 3: Incidence of Hedges along the Research article Sections

	Totals	Introduction	Materials and Method	Result and Discussion	Conclusion
Total Words	69672	9406	23471	33609	3186
Total Devices	1516	278	184	**947**	107
Percentage	100%	18.34	12.14	**62.47**	7.05

Table 4: Overall Incidence and Percentage of Hedging along the Research Article Sections

As can be gleaned from the tables, it appears 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 section ranks second after the discussion section amounted of 18.34%. The Conclusion tends to be the least hedged section with a number of occurrences of only 107 devices accounted for only 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.

V- Discussion and Conclusion:

The analysis has yielded some reflective results about the use of hedging in the examined corpus. In general, the quantitative analysis has revealed that Algerian scientists employ different types of hedges. Main verbs' category was the highest employed type of hedges. Over the main verbs, the non-factive tentative reporting verb sub-class appeared to predominate over the other types in the present data. The most frequently occurring ones were *show* (n=171), *report* (n= 83) and *find* (n=67) as shown in the examples below:

(3) These results were *found* to be highly consistent with those *reported* by Kebir et al.

(4) Some studies *show* no selective antimicrobial activity towards the bacteria Gram (+) or Gram (-).

(5) However, *we* did not *report* any recovery of body weight in the diabetic animals treated with melatonin and fluoexetin.

These findings corroborate with Hylands' [11] research on biology research papers. Though he used a different taxonomy, he found that main verbs are the most prominent type of hedges. Our study shows that the frequency of hedges used by Algerian biologists is close to Hylands' results (the overall number of hedges in his corpus was 1568) and the order of hedges types is remarkably the same as well. However, it is worth noting that the verbs *indicate*, *suggest*, *appear* and *propose* are the most frequently used verbs in Hyland's study. He claims that these four verbs and mainly *indicate* and *suggest* occur very often in scientific writing.

Prima facie, these results might indicate that Algerian biologists make great use of previous research findings to acknowledge other researchers' work. They might also suggest that relying heavily on reporting verbs is a strategical device that scientists use to provide further support to their own findings and a means of persuading their readers of the reliability of their work. These verbs can be used with "abstract rhetors" (*these results, some studies*) 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, [1]). As example (5) indicates, 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.

Adverbs are the second most frequent means of hedging in this research, a result which is consistent with Hyland's [11]. The Adverbs *some (n*= 42), significantly (n=34) and *about* (n=25) were the most employed items.

(6) 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.

The use of such adverbs manipulates the precision when quantifying data and results. They exhibit tentative approximation in order not to offer precise numerical data. This is said to be an acceptable degree of imprecision for the sake of specifying the informational content being as accurate as possible (Hyland, [1]).

Remarkably, in the same line with adverbs, the most frequent used sub-class of adjectives was "Adjectives of indefinite degree". The most frequently used adjectives were *significant* (n=86) and *major* (n=27). This type is also used to avoid commitment to precise figures.

(7) Moreover, the essential oil showed s*ignificant* antimicrobial activity but the ethanol extract showed low antimicrobial activity.

(8) Several *major* characteristics associated with sexual reproduction distinguish angiosperms, making this the most advanced subphylum phanerogams.

The "other hedges" category ranks more than modal auxiliaries which entail that hedging is basically a lexical phenomenon. The prominent ones being *most* (*of*) (n=66) and *several* (n=52).

(9) Tisane is the *most* known and widespread form of preparation from olive leaves of human use**.**

Modal auxiliaries are not numerous in this data, a result which is also aligned with Hyland's [11] study. The following figure shows the overall number of modals in the corpus:

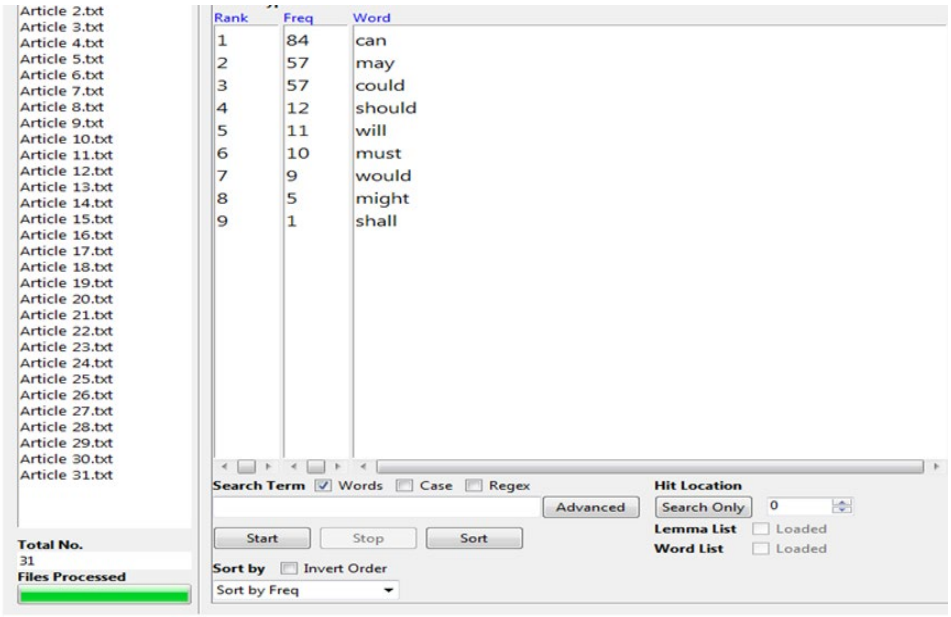

Figure 2: Number of Modal Auxiliaries

Over 246 modals, 153 were used epistemically. The most employed modals were *could* (n= 56) and *may (n=53)*. According to Hyland [21], these two modals tend to appear more frequently by authors in hard sciences in order to objectify their research.

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

(11) 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.

Though the modal *can* is used in its epistemic meaning in only 28 hits, it is the most used modal in the corpus (n=84), which might be related to authors' familiarity with it. On the other hand, the modals *might (n=5)*, *would (n=6)*, *must (n=1)* and *should* (n=0) were under-represented. However, in Butler's study [14] and Hyland's research [11], the modals *would*, *may*, *could*, *might* and *should* are the most frequently used modals. That is why, the Algerians' use of modals in this corpus can be described as "limited" with an absence of other tentative modals like *would* and *might*. This infrequent occurrence is likely to be due to the complexity of using modals by NNS. According to Hykes [22], NNS have a difficulty in using modals properly especially when it comes to writing up their own research in a research article. Therefore, authors adopt a strategy of avoidance.

The comparison of the use of hedges across the research article sections reveals differences in the frequency of hedging types in the different sections. This can be justified by the different rhetorical functions attributed to each section (Falahati, [15]). In the Algerian corpus, the Result and Discussion is the most hedged section, a result which is consistent with other studies (Hyland, [11], Salager-Meyer [10] &Varttala [19]). In this section, writers do not to offer the last word on the topic, but they rather provide possible explanations. Salager-Meyer [10:163] explains "it is in this section of research papers that writers speculate, argue, contrast and extrapolate from the described results, and at the same time avoid stating results too conclusively so that the reader can note that the authors are not claiming to have the final word on the subject." The introduction section is the second hedged part, a finding which is also confirmed by most studies (e.g. Salager-Meyer, [10] &Yang, [23] which have stressed that the Discussion and Introduction are the most hedged sections. Researchers employ hedges in the introduction as a strategy to introduce and mention the limitations of previous studies and state a niche for their study.

In sum, as claimed by Hyland [1], doing research on the use of hedging uncovers how scientists write on science. Indeed, the present study could reflect how Algerian biologists write their research articles. Notably, the great reliance on non-factive reporting verbs in this data characterizes their writing. Interestingly, however, most studies (see for example ElMalik and Nesi [17] which compared the use of hedges in native and non-native research articles tend to focus on the frequency of occurrence of hedges, concluding that hedges occur more frequently in native papers. Hyland [24] claims that non-native writers fail to hedge and the question to be asked here: is hedging in non-native writing a problem of frequency of occurrence, or is it a problem of appropriateness of use? What is it that the lexical choice of the verb "suggest" is preferred to "show" or the modal auxiliary "would" instead of "could". We believe that NNS's writing would gain more efficiency if more attention is focused on the "appropriate use" of hedging by non-natives. Despite the bulk of research on hedging, we still know little about how these rhetorical resources are used, should be used and better expressed, particularly by non-native writers. What should be said here is that further research is necessarily warranted and some aspects await more detailed analyses. In practical terms, these findings and further research on hedging by non-native authors would hopefully help in designing appropriate pedagogical materials to raise science students' awareness of why, how and when hedges are used.

Examples' Source Articles

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. doi:10.163.pcbsj/2016.10.-2-39

Athamena, S., Laroui, S., & Athamena, M. (2016). Phenolic composition, antimicrobial activity of rosmarinus officinalis. *Sciences and technologies.44*, 47-58. Retrieved from http://revue.umc.edu.dz/index.php/c/article/view/2872.

Bousmid, A., Boulacel, M., & Benlaribi, M. (2015). Floral biology of four species of rosaceae. *Sciences & Technologie*, *41*, 28-34. Retrieved from http://revue.umc.edu.dz/index.php/c/article/view/1981.

Chirane,M ., Benchaban, O., Bousbia, N., & Zenia, S. (2019).Antioxidant and Antimicrobial activities of essential oil and ethanol extract of santolina chamaecyparissus L. *Revue Agrobilogia.*, *9* (2), 1660-1668. Retrieved from http//www.agrobiologia.net.

Nacer, W., Baba Ahmed, F., Merzouk, H., Benyagoub, O., & Bouanane, S. (2019). Antihyperlipidimic and antixodiant effects of the microalgae nannochloropsis gaditana in streptozotocin-induced diabetic rats. *Revue Agrobilogia, 9* (2), 1474-1483. Retrieved from http//www.agrobiologia.net.

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- Appendix: Types of Hedges with examples from the corpus

	Type of a Hedge	**Examples**
1	Non-factive reporting verbs	*show- - find-note-report- suggest- notice*
2	Tentative cognition verbs	*see- believe- estimate- support- assume- predict*
3	Tentative linking verbs:	*Seem- appear- tend*
4	Probability adjectives	*Possible- likely- expected-suggested- potential*
5	Adjs. of indefinite frequency	*Frequent-typical-usual-approximate-rare*
6	Adjs. of indefinite degree	*Moderate-considerable-major-small-common*
7	Probability Adverbs	*Possibly-probably- -potentially*
8	Advs. of indefinite degree	*Rather-quite-slightly-largely- -mostly*
9	Advs. of indefinite frequency	*Frequently-generally-commonly-rarely-*
10	Approximative adverbs	*almost- about- nearly- around- some- just-*
11	Non-factive assertive nouns	*Indication- prediction- evidence*
12	Tentative cognition nouns	*Assumption-evaluation-hypothesis*
13	Nouns of tentative likelihood	*Possibility-probability-attempt*
14	Other Hedges	*Several-little-few-in general-most (of)*