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HEDGING IN SCIENTIFIC RESEARCH ARTICLES: POSITIVE AND NEGATIVE CONSEQUENCES

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Abstract: This article focuses on the positive and negative consequences of the widely used rhetorical strategy of hedging in scientific research articles. On the one hand, appropriate hedging allows academic writers to introduce knowledge claims in the Discussion sections of research articles with caution and modesty in order to avoid denial, promote writer-reader interaction and thus facilitate the acceptance of new claims in today's highly competitive academic environment. On the other hand, hedging was criticized as being a sign of excessive caution and academic cowardice that may potentially lead to ambiguity, absence of genuine writer-reader interaction and lack of commitment. Given the numerous pragmatic functions assigned to hedging, it is ultimately individual, linguistic, socio-pragmatic, disciplinary and cultural factors that influence the interpretation of hedges by the target readers as members of specific discourse communities.

Keywords: hedging, scientific research articles, knowledge claims, writer-reader interaction, pragmatic functions.

The current scientific environment is characterized by an extremely large publication output reflected in the vast number of research articles published every year in numerous scientific journals all over the world in all fields of scientific research. Regardless of whether publication takes place online or on paper, thousands of manuscripts are submitted for publication so that their authors can not only achieve the primary goal of research, that of spreading new knowledge in a field, but also gain and consolidate an individual position within a higher education institution or discourse community. Higher academic rankings at individual level also increase the visibility and prestige of universities, which constantly fight to achieve high rankings and thus attract more students, gain access to funding and become involved in important research projects.

In this dynamic and competitive context, the authors of scientific research articles must be aware that, besides solid research skills and carefully designed studies, it is through the appropriate use of linguistic and rhetorical resources that they can persuade the target readers, members of the same discourse community, of the validity and relevance of newly introduced knowledge claims. If successful writer-reader interaction occurs and the new claims are accepted and further cited in subsequent publications, individual academics can achieve various private

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goals and intentions mentioned in the literature by Bhatia (2004, 2008, 2012), Hyland (1998c, 2005), Hyland and Salager-Meyer (2008), Hyland and Tse (2004).

Several rhetorical strategies are normally employed in academic writing in order to persuade the target readers of the validity and relevance of scientific findings. Such strategies include the appropriate use of personal pronouns, citations, self-references, boosters and hedges. The latter, which are routinely used in the *Discussion* sections of research articles, represent appropriate tools in written academic discourse because of their communicative, rhetorical and interactive nature. Hedges were heavily studied and assigned various pragmatic functions. Thus, they were viewed as precision strategy for accurately introducing propositional content (Adams Smith, 1984; Skelton, 1987, 1988); tool able to portray writers as modest and honest (Swales, 1990); politeness strategy meant to protect writers (Myers, 1989; Crompton, 1997); or polypragmatic phenomenon with overlapping functions (Hyland, 1996a, 1996b, 1998a).

The polypragmatic character of hedges, which acknowledges their overlapping functions, summarizes their beneficial consequences when used and interpreted appropriately by academic writers and readers. Thus, hedges were mainly classified according to their pragmatic function into content-motivated and reader-motivated hedges (Hyland, 1996a, 1996b, 1998a). The content-motivated class was further divided into accuracy-based and writer-based hedges.

By using accuracy-based hedges (e.g. *approximately*, *generally*, *barely*), the goal of academic writers is to introduce knowledge claims with a high degree of accuracy, although their research may not have generated definitive data. In this way, the new claims will not be perceived as entirely different from what the target readers already know and accept in a given field. At the same time, writers can build a modest and honest identity, thus decreasing their chances of having the new claims overthrown. Therefore, accuracy-based hedges can be interpreted as a wish for objectivity in scientific writing. In this view, claims are introduced with caution and tentativeness not because they lack validity and reliability, but because they wish to be as close to the truth as possible. The idea that hedging helps achieve objectivity as a prerequisite of scientific writing was also stressed by Prince et al (1982) or Markkanen and Schröder (1997).

Also part of the content-motivated class, the goal of writer-based hedges is that of protecting the writer's reputation and avoiding the possible denial of claims, this time by limiting author commitment to the truth of propositions. By using writer-based hedges such as *it seems*, *the data indicate*, *the evidence shows*, authors can safely speculate about the implications and relevance of results and thus introduce higher-level claims than those usually associated with accuracy-based hedges. Hyland (1996b) best summarized the pragmatic differences between accuracy based and writer-oriented hedges. The first are proposition-focused, as their goal is to increase the precision of claims despite deliberately rendering them fuzzier, while the second type are writer-focused, as they aim to blur the relation between the writer and the claim, not the claim itself, so that the author's involvement diminishes in order to avoid negative consequences resulting from the rejection of claims.

On the other hand, given the interactive nature of academic discourse, reader-motivated hedges are used in the attempt to establish an interpersonal relationship with the target readers, who are thus assigned the active role of judging the validity of claims and of ultimately participating in the knowledge making process. Since reader acceptance is a crucial factor in scientific writing, authors must introduce claims in such a way as to gain the acceptance of their peers. By introducing new information in a categorical way, without leaving room for

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negotiation or feedback, readers are reduced to a passive role that contravenes the social dimension of scientific communication. Instead, by cautiously introducing claims under the form of hedged statements with provisional character, writers open a line of communication with their peers and adhere to the scientific norms required for gaining the acceptance, recognition and rewards of their discourse community.

Although both types of hedges serve to secure writer reputation within academic communication by guarding against possible error and rejection, reader-motivated hedges differ from writer-based ones. According to Hyland (1996a: 257), writer-based hedges are usually conveyed through impersonal expressions often used to comment on other people's work, while claims introduced by reader-motivated hedges are marked as personal opinions through explicit reference to the writer (e.g. *we believe*, *we suggest*, *our analogy*, *we propose*, *our interpretation*, etc).

The use of hedges in written academic discourse has received extensive attention from specialists in linguistics, mainly due to their high occurrence as rhetorical and interpersonal strategies in research articles. However, the view that hedges are essential rhetorical tools employed in scientific communication has not been unanimously embraced. The available literature also revealed negative reactions to hedging from some linguists, but also from scientists directly involved in the use of hedges in their capacity as academic writers and readers.

Chronologically speaking, Adams Smith (1983) reviewed the style encountered in medical research articles and summarized twelve features most heavily criticized by editors and contributors alike. These include "hedging and unnecessary qualification, reflecting academic cowardice or at least over-caution", as well as the extensive use of qualifiers, intensifiers, impersonal constructions, passive verb forms, abstract nouns, compression, or avoidance of personal pronouns, which render medical writing confusing, fragmented, depersonalized and downright boring, as if the purpose of language were not to reveal but to conceal information (Adams Smith, 1983: 1122-1123).

Later, similar opinions in favor of increased clarity, logic, directness and preciseness in scientific writing were also expressed. In this respect, an in-depth look at the real issues behind the difficulties of scientific writing was offered by Marie-Claude Roland, the Director of Linguistics and Research Practices at the French National Institute for Agricultural Research in Paris in an article suggestively entitled "Publish and perish. Hedging and fraud in scientific discourse" (2007). Besides pointing out the fact that that researchers' problems are not connected with writing per se but are mainly generated by methodological issues and an inability to define objectives and present results in context, Roland heavily criticized excessive hedging and the avoidance of personal commitment, which leads to a vague style of writing and even to fraudulent behavior. Thus, hedging was regarded alongside plagiarism and misquotation as sources of ambiguity, illegibility and misinterpretations similar to fraud. The extensive use of hedging through impersonal style, passives, modals and a descriptive approach primarily in *Introduction* and *Discussion* sections of research papers was mainly associated with the existence of a "ready-to-write model" in danger of establishing a "ready-to-think" model characterized by a defensive lack of commitment and lack of genuine argumentation and debate, which bear negative consequences on the critical thinking skills of young scholars and possibly encourage "institutional fraud" (Roland, 2007: 425).

Another inside view was offered by the editor of the Journal of the European Medical Writers Association, Elise Langdon-Neuner (2009). Scientific writing was strongly criticized in

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this editorial for its lack of simplicity, excessively long sentences, exaggerated preference for impersonal and passive constructions and uncertainty caused by the overuse of hedges when expressing personal opinion. All these could possibly hinder the reading process and create confusion among target readers, who thus may have a difficult time identifying truly innovative claims, placing them in the appropriate context and establishing their exact scientific value for the development of a particular field. As a result, even if certain claims could be valuable, linguistic and rhetorical choices may prevent them from turning into widely accepted scientific truths.

Another issue connected with the practice of hedging and overhedging was raised by Horn (2001), who studied the consequences of citing hedged statements in scientific research articles and showed how such a practice can actually contribute to the creation of scientific knowledge. When scientists preserve hedges in the statements they cite, or even increase the uncertainty of the cited claim by using a more powerful hedge, they maintain or increase the provisional character of the respective statement. This will render the reading process more difficult and increase the responsibility of the readers, whose task is to decide whether the new information is reliable and to what extent. On the other hand, by dropping the initial hedge, or by using verbs that support the certainty of the statement cited, writers acknowledge a scientific fact and consequently enhance the strength of their own conclusions. Although this practice diminishes reader responsibility, if a hedge is dropped prematurely, before enough scientific evidence is collected, inaccurate or insufficiently supported information may become scientific truth and generate incorrect conclusions.

Instances when writers use hedges in *Discussion* sections but not in the *Abstract* of the same paper were also identified as failing to meet the recommendations of the Council of Biology Editors (CBE), according to which *Abstracts* should closely mirror research articles. However, the results of this study revealed that biologists maintained original hedges in 60-68% of cases according to the investigated corpus, thus displaying conservativeness and caution when citing hedged statements (Horn, 2001: 1092). Such an approach suggests the complexity of hedging as well as the intricacies and possibly manipulative character of scientific writing despite its overt purpose of creating scientific truth.

The practice of adding or dropping hedges when citing can also be viewed as changing the statement types described by Latour and Woolgar (1986), who identified five different types of scientific conclusions depending on the amount of factual information or speculation they contain. They also correlated these five types with the "modalities" that were used to express them. In this context, "modalities" are ways of presenting non-definitive assertions through modal verbs and other linguistic realizations. Thus, type 5 statements representing already accepted knowledge in a certain field, and type 4 statements denoting facts normally found in textbooks are written without the help of modalities. Conversely, modalities are heavily employed in type 3 statements, which represent the provisional statements normally encountered in the *Discussion* sections of research articles, type 2 statements, which are suggestions and invitations to further studies, and type 1 statements that are represented by the most speculative claims.

Contextual knowledge in a certain scientific field is key for the correct interpretation of these different statement types. Such awareness also helps perceive how modifying a type reflects the status of the facts that it refers to. For instance, introducing a claim as a type 4 statement, which does not need to be accompanied by a hedge, indicates an already accepted

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scientific fact. Again, removing hedges without scientific backup might mislead the interpretation of the target readers, especially if they are not thoroughly familiar with the latest information in their field, which, given the huge number of research articles available, is an extremely difficult endeavor. The importance of differentiating between facts and opinion for successful scientific communication and progress was also highlighted by Swales (1990), Salager-Meyer (1994), Markkanen and Schröder (1997) or Fraser (2010).

These critical views from members of the international scientific community involved in writing and publication activities indicate how scientific writing style and the creation of knowledge can be negatively affected by the inappropriate use and interpretation of hedges, overhedging or other practices. However, the communicative, rhetorical and interactive nature of hedges allows them to continue to constitute appropriate and generally accepted tools for successful scientific communication in today's dynamic and competitive academic environment.

Researchers have always acknowledged the importance of the socio-pragmatic context for the correct usage and interpretation of hedges (Salager-Meyer, 2000; Hyland and Salager-Meyer, 2008; Fraser, 2010; Millán, 2010; Alonso-Alonso et al, 2012). The socio-pragmatic context was regarded as an integral part of the pragmatic competence required for successful written academic communication (Fraser, 2010; Alonso-Alonso et al, 2012; Hyland and Salager-Meyer, 2008).

The correct interpretation of hedges was also found to depend on several other factors such as the cultural background of target readers (Lewin, 2005; Vold, 2006; Martín- Martín, 2008; Hyland and Salager-Meyer, 2008; Millán, 2010; Alonso-Alonso et al, 2012), cross-linguistic and cross-disciplinary variation (Vold, 2006; Millán, 2010; Vasquez and Giner, 2008; Alonso-Alonso et al, 2012), the response of the target readers (Hyland, 2000; Lewin, 2005; Alonso-Alonso et al, 2012), and their use and interpretation by native vs. non-native speakers of English (Martín- Martín, 2008; Hyland and Salager-Meyer, 2008; Alonso-Alonso et al, 2012).

In conclusion, given the numerous pragmatic functions assigned to hedging, it is ultimately individual, linguistic, socio-pragmatic, disciplinary and cultural factors that influence the interpretation of hedges by target readers as members of specific discourse communities.

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