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HEDGING AS A MULTIFUNCTIONAL PHENOMENON OF RESEARCH\POPULAR RESEARCH ARTICLES

The paper analyses the versatile usage of hedges in medical academic texts and compares the (sub)genre peculiarities of the scientific research articles (RA) and science popularization articles (PRA). While comparing the two subgenres, the generalized three factors of strategies and functions influencing hedging usage were discriminated, i.e., the expectations of the discourse community, intentions, and shared background knowledge. The comparative analysis of RA and PRA aims at investigating the use of the multifunctional hedging device, and at the end the corpus of nearly 90 000 words and 20 articles has been comprised as a research database. A normative use of hedges in academic texts is treated as appropriate nowadays. The research focuses on the analysis of hedging strategies and functions. It stretched the borders of one function and analyses hedging as a pragmatic, semantic, social, and cognitive phenomenon in the field of epistemic modality. The hedge is viewed from the semantic, pragmatic, cognitive, and social perspectives. This article reviews the role and legitimacy of hedging producing deliberate elusiveness in scientific texts, interprets the cases of hedge uses, infers their functions and meaning. It as well discusses the vector of movement direction from the "author-centred rhetoric" to the "object-centred rhetoric" and vice versa. Hedging is interpreted in the frame of epistemic modality.

KEY WORDS: hedge, epistemic modality, research, popular research article.

Hedging, a complex phenomenon, has always been treated diversely by the scholars due to its intricate nature; therefore, there is still no straightforward definition for this concept in linguistics. Hedges have been referred to by different names; however, Lakoff (1975: 221) was the first who provided the definition: hedges are the "words whose meaning implicitly involves fuzziness — words whose job is to make things fuzzier or less fuzzy".

The research focuses on the analysis of hedging variety, strategies, and functions. As it is next to impossible to delineate the exact limits between the overlapping multiple functions of

hedges, the present analysis outreaches the borders of one function and integrates the functional pragmatic, semantic, social, and cognitive aspects. The aim of this paper is to analyse the versatile usage and compare the genre peculiarities of hedging in the scientific research articles (RAs) and science popularization articles (PRAs). The comparing of two genres in the field of medicine, the generalized three factors influencing the use of strategies and functions were discriminated, i.e., the expectations of the discourse community, intentions, and shared background knowledge.

The study delineates the genre peculiarities, analyses the hedging strategies and functions in perspective of the genres' context. At the moment, a corpus of 90 000 words has been compiled of 20 selected articles on medicine (the popular science articles were taken from *Scientific American Magazine*). Analysing the research data, the following hedging strategies (Namsaraev 1997; Meyer 1997; Minna Riitta, Markkanen 1997) were singled out: the indetermination of utterance (giving structure a colouring of lesser semantic, qualitative, quantitative explicitness, uncertainty, vagueness, fuzziness, etc.); the depersonalisation of utterance (the usage of personal pronouns "I", "we", words "author", "researcher", or the like, various impersonal constructions in order to obscure authorship, to lessen the responsibility while deterring the truth or falsity of the proposition); the subjectivisation of utterance (this strategy is realized by using "I" along with the verb of thinking, such as, "suppose", "assume", etc., which can be interpreted as a warn that what has been said is "only my personal opinion, which can be wrong or subjective and that the reader and the writer might hold the different opinion"). The terms were proposed and used by the following authors: indetermination and subjectivisation by Namsaraev (1997), depersonalisation by Meyer (1997), Minna-Riitta and Markkanen (1997).

The concept of hedging has presently reached a state of definitional chaos due to the overlapping number of concepts. Thus, the working definition of hedging will include semantic, pragmatic, social, and cognitive aspects of the phenomenon.

The delimitation of semantic and pragmatic aspects of hedges is complicated, since they are intermingled. As the meaning and pragmatic functions comprise various areas of study, and theorists have difficulties to make a clear distinction between the semantics and pragmatics in it, they are categorized as semantic or pragmatic (Leech 1983; Frazer 2010). Some scholars have proposed a scheme of meaning consisting of two elements, which are semantics and pragmatics. Meaning to them is a sequence of propositions, which an interpreter can draw from an expression considering the context and background knowledge. Hence, in order to understand the statement, the readers must activate their linguistic and pragmatic background knowledge in relationship with the context.

The cognitive aspect of hedging involves such cognitive processes related to the hedging perception as attention, memory, perception, reading, reflective thinking, learning, and reasoning. The cognitive principles of categorisation, i.e., cognitive process in which the ideas and objects are recognized, are based on the writer's and the reader's shared background knowledge and the context understanding. It is essential for the interlocutors to share the common background knowledge in order to decode the meaning successfully. The very concept of hedging resides in an academic writer's mental corpus (Taylor 2007) among the vast interlocking networks, nodes of words, and various linguistic constructions. Thus, the hedges have an access to semantic conceptual and pragmatic representations. Chomsky (1986) states that language is a system of knowledge which resides in the mind of the individual speaker/hearer, and Taylor (2010) further implies that the external language is the linguistic product, and the internal language is the linguistic knowledge possessed by speakers. It is knowledge which enables people to participate in the linguistic life of the academic community. Writers produce utterances, and the common professional society can understand and interpret the utterances. Hence, a writer's internal language (the system of knowledge in his/her brain) is the product of his/her exposure to a set of external language events. A person's internal language is as it is because it was acquired through the exposure to external language. Conversely, the language that a speaker produces reflects his/her current internal language (Taylor 2007), and the choice of hedging devices lies in the writer's inner language that is gained from the external corpus, saved in personal mental corpus, and shared again with a reading society. Writer's choice of hedging devices is predetermined by the earlier usage of them in the academic discourse.

The definition of hedging, subscribing to Hyland's (2000) opinion, by all means should include a social aspect. It makes linguistic behaviour socially more acceptable, according to the social norms of the academic community. The social norms of professional academic culture mould the linguistic behaviour of this community in order to meet common expectations established by this community (Salager-Meyer 2000). Thus, the hedging competence of creation or interpretation, being a linguistic competence, determines the place of discourse participants in the community. Meyers (1989: 13) maintains that hedges reflect the relations between the writer and the reader, rather than the degree of probability of the statement. He as well states (Namsaraev 1997) that the frequency hedging depends on such social factors as writer's position in the scientific community, the readership, the writer's personality influencing how sure or unsure he/she feels about the taken position in the study field.

The last constituent of the hedging definition of this research is a pragmatic factor. Hedges are regularly validated with pragmatic principles, as they reflect the speakers' attitude towards the degree of the credibility, details, relevance, and clarity of the information provided

in the communication. Every member of any society has a face (Lakoff 1972; Leech 1983), and it is a public self-image. The speaker committing an act, which might cause the hearer to lose face, tends to use a politeness strategy seeking to mitigate the jeopardy. Thus, every member of the society claims a face for him/herself. Negative face refers to the want of a person not to be impeded by others, i.e., to the freedom of action and from imposition. Positive face refers to the want of a person and his/her wants to be desirable for the others. The negative face is threatened (cf. face-threatening in Leech 1983) by the acts that appear to impede the addressee's independence of movement and freedom of action. The positive face is threatened by the acts which emerge as disapproving of wants (Searle *et al.* 1985). The politeness in scientific writing is seen as a motivating factor of hedging. Meyers (1989) states that the most frequent factor of employing hedging is politeness. According to them, hedges are usually used for negative politeness for face-saving. However, according to Varttala (2001), hedging in RAs and PRAs might be used for positive politeness as well, depending on the discourse community. Thus, hedging is a device maintaining the author's and other researchers' faces as well as leaving the space for the readers' opinions.

Modality is another phenomenon that is vitally important in interpreting hedging. The analysis of hedging in the scientific discourse is interested in epistemic meaning as long as their semantic connotations help to distinguish between the two types of modalities (epistemic and non-epistemic).

The concept of modality next to the clear and unambiguous modality markers include the words possessing several modal connotations, which make difficulties to identify the exact meaning of the context. The variety of modality terms burdens its disambiguation; nevertheless, the two main axes of modal system can be defined, namely, the possibility and necessity. Palmer (2001) divides the propositional modality into **epistemic** and **evidential.** The meanings of epistemic modalities can range from the absolute certainty to the complete uncertainty. It is the space between **yes** and **no** with a certain degree of possibility, likelihood, or certainty. Modality, according to him, should not and cannot be limited only to modal verbs, as the subjectivity (Ibid) involves the author's "I", such as, desires, doubts, beliefs, and the like; consequently, the source of modality is the subject itself. Nonetheless, the truthfulness of any scientific statement has to be measured by the linguistic means of epistemic modality (Palmer 2001: 16). Modality can be treated as an umbrella term including hedging or vice versa (Namsaraev 1993). Hedging and epistemic modality are akin because they are both linked to the speakers' degree of confidence towards what is being stated (Varttala 2001: 27). A summary of all the mentioned aspects makes hedging a powerful multifunctional phenomenon.

Hedging in Research Articles (RA)

The stylistic peculiarities of RAs differ from the PRAs in many respects. RAs reflect a theoretical thinking and are presented in a conceptual, logical form. Conclusiveness and the logical arrangement of the facts are the key elements of a research work, which leaves little room for the authors face protection as a public self-image. The created sense of probability, truthfulness, or assertiveness, writer's intention to save reader's face, to share the common background knowledge, etc., helps the reader to go beyond the conventional thinking and to fulfil the **cognitive function** including memory, logic, and reasoning. Thus, hedges and the overall implicit or explicit proposition of all kinds of scientific literature must be interpreted.

The construction of RA is traditional Introduction-Methods-Results-Discussion structure. However, the modern researchers (Atkinson 1999: 141) underline significant changes in it. The **author-centred rhetoric** progresses into the increasing **object-centred,** which becomes more abstract and passive meaning that the authors of RAs keep aloof from the presented data or stated propositions. Focusing on the object, the authors seek to hedge and shade away from the direct responsibility; thus, the author is a target of hedging in RAs.

Hedges in RAs are employed to fulfil the community expectation, specific personal intentions or to share a common understanding of the context. The goal of any research is to communicate new knowledge; however, the expectations of scientific community usually are extremely high and, hence, are threatening the author's face. The academic community has the established culture with its social norms, and the hedges here serve as the links between linguistics and community expectations.

> Results using discriminant analysis ... **suggest** that differences in auditory
> cortical potentials **may** occur before ... cognitive domain is affected (RA 2007).

In the example above, a conventionalized structure, expected by the entire academic community, is witnessed. The proposition employing a double hedge presents results in an object-orientated manner and expresses a speculative judgment of a truth-value of the proposition. The author is distracted, the degree of truthfulness could be above the average; however, "suggest" together with "may" reduces it. The social norms of the discourse community require being less assertive; thus, the hedging is considered to be a norm in RAs.

Hedging is used not only to meet the academic community expectations, but also to fulfil certain specific or even personal intentions, such as, a desire to save personal face or appear modest.

> We have **long** recognized that expansion of cerebrospinal fluid (CSF)
> volume and intradural haemorrhages in affected infants **might** result from

haemodynamic rather than metabolic mechanisms and a ... tomography (CT) scans **suggest** that cerebral blood ... elevated in some children (RA 2010).

Presenting the results in this article, the desire to sound modest and at the same time implicitly indicate that the author's long-term research in this field is evident. The beginning of the sentence indicates certainty of the received results, though the earlier are not presented, and are only alluded by "long recognized" for the sake of modesty. The conventional requirements and the common author's and reading audience's background knowledge, as they are all equal professionals in the field, make the author distant from the results.

Forwarding the facts ahead and hedging them, the vector direction of hedging is pointed towards the author and his/hers inferences about "the analysis", not towards the reading audience. In the example bellow, the author's intentions to present the inference about "analysis" and the expectations that should be accredited force him to hedge. By hedging the statement, the author presents negative results, and the criticizing statistical power relies on the audience's shared background knowledge concerning the situation of statistics in the country.

This analysis supported the null hypothesis, which **could** in **principle** be due to statistical power … (RA 2010).

A communicative aim of any RA is a commitment of knowledge to the addressee in a convincing and accessible form. The main conventional feature of the RA is an abstraction, which comprises consistency, accuracy, objectivity, and clarity of presentation, a strict succession of arguments, logical assessment, and non-categoricity of presentation (Swales 2004); however, the requirement of the non-categoricity of presentation legitimates hedging. This exceptional stylistic feature of the research texts – non-categoricity of statements – facilitates the achievement of objectivity. The requirement of objectivity and the authoritativeness evokes expectation of bare facts, which employs hedging for politeness.

Hedging Strategies in RAs

The analysis revealed that the RAs employ mainly two strategies: depersonalisation and indetermination (Namsaraev 1997: 68). **Depersonalisation** strategy was determined as a typical strategy for the RAs and described as a formal objectivization of utterance when the writer uses various impersonal constructions. The RAs avoid personal pronouns "I" and "we" in constructions; however, such substitutional fillers as "research", "author's data", "sources" are quite often employed in the constructions. The aim of such constructions is to relieve authors of responsibility or vague his/her authorship. Such structures typically employ various hedges/combined hedges to state a degree of truthfulness or doubt. The bigger number of hedges

in one proposition protects the statements better and makes it less assertive to the reader. Only the extra-linguistic factors and the genre of an article determine the number of hedges and the degree of hedging.

> Further Poisson **models were estimated** to assess the relationship of deprivation with pneumococcal immunization and case fatality (RA 2008).

The strategy of indetermination of utterance includes grammatical negation either of one sentence or the entire proposition and provides the structure with a tint of lesser semantic explicitness, consequently, with uncertainty and vagueness. This strategy employs modal words (possibly, probably), adverbs of degree, adjectives, modal verbs, and grammatical negation.

> The <u>discrepancy</u> **may** have resulted from the increased working memory ... given that DLPFC activation is **probably** related to working memory load (RA 2008).

The following example is rather interesting, as it employs two strategies in one proposition alongside the epistemic modal verb.

> **<u>We</u>** recognize that the number of subjects in the DYT1 carrier and control groups is small and that the <u>results</u> **<u>may not necessarily</u>** be generalized to other cohorts (RA 2008).

Hedging in Popular Research Articles (PRA)

To compare PRAs with RAs, the former carry on the distinctive extra-linguistic functions, such as, purpose of communication, the nature of the relationship between the author and the reader, and the specific content of the message. The function of communication is realized by the means of "translation" of the specific scientific information to a non-scientific reading community.

The task of a PRA is to convey the true facts and knowledge of the RA to the readers in an appropriate form of the reliable scientific form. The readership of PRAs is a non-specialist scholars in a specific field, and the author in most cases is a scientist. The author of the popular science text tells about science without simplification of facts. Any simplification leads to a distortion of science and consequently to disorientation. Authors of PRAs try not to overload the readers with the complicated data risking losing the reader's attention. Thus, the key concept in PRAs is not the simplification, but popularization. Hedging helps to perform the task of popularisation and acts as a link between the two extremities: detailed scrutiny of facts and the popular presentation of them. The nature of scientific-popular discourse is stylistically contaminated. The PRA conveys scientific knowledge, uses the same terms and vocabulary, and presents the final results, however, deliberately omitting most of the logical arguments and

reasoning. The author of such article seeks for the adequate pragmatic effect and a positive feedback from the reader. The community expectations are completely different in comparison to the RAs. The author is expected to share or adapt readers' background knowledge for their own sake trying to protect the hearer's negative face.

> We do not even know how exactly it does this job. But once the ability to engage in crossmodal abstraction emerged, it might have paved the way for the more complex types of abstraction (PRA 2010).

The author saves the reader's face, shares, or even adapts the reader's background knowledge relieving of explicit or implicit scientific explanations about the types of synesthesia or the weight of idea. The likelihood is hedged exceptionally for the reader's sake. Positive politeness expressing solidarity with the reader aims to mitigate the threat to the reader's positive face and makes an amateur reader feel good.

PRAs create a stronger **imitation of a dialogue** between the author and the reader. The example bellow suggests the indirect dialogic relations helping to share the feedback and activate the reader's attention. In the following example, the repeatedly used "you" imitates communication by directly addressing the reader.

> You might think of cold ... but you **probably** do not feel cold, no matter how many encounters you **may have had** with ice and snow during your youth (PRA 2008).

The **narrative manner** employing the first person pronoun "I" creates a sense of private communication and invites for further reading.

> Thus, **there** what began as an inquiry into seemingly simple aberrations ... revealed that ... are obstacles to treatment in even more ways than **I** had initially imagined (PRA 2008).

Figurative elements along with the speculative possibility facilitate the reader's attention. "Provided seeds" in the example below alludes to the idiom "to plant seeds".

> Beyond metaphor and abstract thinking, crossmodal abstraction might even have provided seeds for language (PRA 2003).

PRAs employ hedging less than in RAs. However, hedges in PRAs are employed as a means to stimulate the reader's perception of a scientific popular text. The writing intention is different than in RAs. The amateur reader indirectly influences the use of linguistic means. Thus, the hedging in PRAs has an opposite vector direction. In RAs, the authors seek to protect themselves speculating the degree of truthfulness, probability, speculative necessity, or certain

recommendations having the purpose to hedge and save the their own positive face. In PRAs, the authors care about the readers' feelings pursuing the purpose to capture the reader's interest and attention. PRAs demonstrate the "author-centred" direction of rhetoric which becomes more personal.

Another idiosyncratic feature of PRAs is the use of the first person pronouns. The pronoun facilitates stating individual thoughts, beliefs, and judgments in a PRA. The hedge in the example bellow is based on the subjective cognitive activity ('we believe'). The two first person pronouns realize the intention to be closer to the reader and invite to start an indirect dialogue about someone "he".

We also observed one case in which we believe cross activation enables a colorblind synesthete … with hues he otherwise cannot perceive; charmingly, he refers to these as "Martian colors" (PRA 2008).

Finally, it is necessary to emphasize the degree of **author's modality** of PRAs. Author's modality expresses the author's attitude towards the subject of the text message; his communicative intentions.

I personally **think** there is a good chance they will accept the pattern (PRA 2010).

The degree of emotional imagery and sometimes the emotional narrative is higher in PRAs. However, it should be noted that the emotional background never foregrounds and does not interfere with the cognitive perception. The effect of hedging is face saving for both the author and the reader, i.e., directed to either direction and, consequently, relevant to RAs and PRAs.

Allocating the reader's attention towards the other researchers, the writer seeks to protect his face by means of hedges. The anticipatory it-clause with epistemic "might" reduces probability, thus, prevents the negative reaction of the academic reader. The hedges provide free guesses for the reader and create a non-assertive atmosphere. "Indicates" as well as the epistemic modal "might" performs the strengthening semantic function.

A study by James and Brooks (2004) **indicates** that by rendering persistently infected cells ... it **might** be possible to eliminate the bacteria ... (PRA 2010).

In the example bellow, the author speculates about the future employing "hope" and expressing the indefinite probability of future results. "Hope" performs the strengthening semantic function.

Ultimately, <u>researchers **hope**</u> to produce iPSCs without using any type of virus … (PRA 2010).

In the following example, the generalized agent "biologists", the indefinite time "have long known" fulfils the requirement of the non-categoricity of the presentation in PRAs. They together with the adverb "normally" create a certain imprecision protecting readers face and adjusting to the reader's background knowledge.

<u>Biologists have long known that killer T cells normally</u> destroy infected cells by inducing a type of cell death ... (PRA 2010).

Hedging Strategies in PRAs

The analysis of PRAs revealed that this genre applies three strategies. The hedging concentration in PRAs is lower than in RAs due to the mentioned extra-linguistic factors. Besides, the author's social status can be influencing the factor for using hedges. Presumably, young researchers or scientists without a scientific degree tend to use more hedging devices; however, the opposite extreme can be noticed, i.e., the beginners do not use hedging devices at all. This could be explained by the lack of conventional knowledge in research writing rules. The scholars with expertise do not avoid using depersonalisation strategies, when the young researchers hide behind the double and triple hedges.

Depersonalisation strategy is not typical for the PRAs; however, it is not occasional. The genre of PRAs allows using personal pronouns "I" and "we" in constructions as well as the substitutional fillers, such as, "research", "author's data", "sources", etc. The introduction of personal pronouns and the author-centred structure allows authors to present their opinion and start a dialogue. This strategy lets the author achieve a higher degree of objectivity and enhance a degree of persuasion closer to the reader. All these structures typically employ various hedges or combined hedges to state a degree of truthfulness or doubt. This example illustrates the merger of hedging strategies of personalization, depersonalisation and indetermination employing a modal word, verb, and grammatical negation.

In addition to ... synesthesia, **our research suggests** that **we** all have some capacity for it and that this trait **may** have set the stage for the evolution of abstraction. … Finally, **we** found that if **we** showed synesthetes ... **which might suggest** that **it is not** the numerical concept of a number ... (PRA 2003).

The third hedging strategy of subjectivisation is realized by using the singular personal pronoun "I" with the verb of thinking and meaning, such as, "assume", "suppose", "think", etc. This structure must be interpreted as the author's saying that the content of the message is

subjective, personal, or even mistaken. Besides, the structure allows more freedom, as it suggests that the reader and the writer might have different opinions about the subject matter.

Fortunately, I **think** we can manage their care in ways that protect them from unnecessary treatment (PRA 2012).

Conclusions

Hedging is a scientific rhetorical device which does not occur in the text by chance. It is a phenomenon rather predictably depending on the socio-cognitive aspects and pragmatic competence. Differences and similarities in hedging and its strategies depend on scientific community's expectations, author's specific intentions, and the reader's and writer's common degree of shared background knowledge bringing a proper understanding of the context.

The hedging in PRAs is a link between the two extremities: detailed scrutiny of facts and popular presentation of them. The hedging in RAs is directed to protect the writer and results, while the hedging in PRAs can be a two direction movement, i.e., it is used to protect both the reader and the writer sharing common background knowledge and considering the social factors, readers' expectations, and writer's intentions.

Writers of RAs and PRAs, despite of different reasons, use hedges in order to add a degree of uncertainty and non-commitment to an utterance. RAs remain to be an object-centred rhetoric becoming more abstract and passive, while PRAs become more author-centred ones.

The analysis revealed that RAs employ two strategies; i.e., depersonalisation and indetermination, while there were detected three strategies of depersonalisation, indetermination, and subjectivisation in the PRAs.

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