Conciliation of Knowledge through Hedging in Turkish Scientific Articles

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Abstract

This paper aims at determining the role of hedges in Turkish scientific articles by identifying the purposes, distribution and major forms of hedges. The field of geological engineering and linguistics are chosen as the representatives of scientific endeavor and these two fields will be compared in terms of hedging devices. The data for this study consists of a corpus of published research articles from the fields of geological engineering and linguistics. The corpus consists of 10 research articles from each discipline. First of all, hedges are identified by means of contextual analysis and their frequency is recorded. Although hedging can be achieved with various linguistic devices, this study is limited to the following linguistic forms which are associated with hedging in Turkish research articles: Epistemic modals, inferential modals, epistemic reporting verbs, adverbials, abstract rhetors. In addition to these forms, three discourse based hedging strategies (Hyland 1996:271) are included in the analysis; "reference to limited experimental conditions," "reference to a model, theory" and "admission to a lack of knowledge". The number of hedges per category is computed for each article and the number of hedges proportionated to the number of running words. It is predicted that there will be disciplinary differences in the rhetorical preferences of researchers. The data will be analyzed by hand, since there is not a computerized text analysis program developed specifically for Turkish. When compared, the number of hedges in linguistics corpus (12.346) is 275 and in geological engineering corpus (10.859) is 196. It appears that the number of hedges in linguistic papers are 1.4 times more than those in geological engineering. However, since the genre is scientific in both disciplines, writers use hedging devices in seeking acceptance for knowledge claims. In both disciplines, hedges are the ways of strengthening arguments by admitting limitations and uncertainties. As members of different disciplines, the discourse of researchers seem to be affected by the conventions of their discipline.

Keywords: hedges, discourse analysis, academic writing

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Öz

Bu çalışma, Türkçe bilimsel araştırma makalelerinde önlem alma yapılarının amaçları, dağılımları ve başlıca biçimlerini belirlemeyi amaçlamaktadır. Jeoloji mühendisliği ve dilbilim konulu makaleler, mühendislik ve sosyal bilimler alanlarını temsilen seçilmiştir. Araştırma verileri her iki disiplinden onar araştırma makalesinden oluşturulan bütünceden elde edilmştir. Öncelikle, bağlam incelemesi yoluyla bütüncedeki önlem alma yapıları belirlenmiş ve sıklıkları hesaplanmıştır. Önlem alma yapıları farklı dilsel yapılardan oluşmakla birlikte bu çalışmada Türkçe önlem alma yapısı olarak bilgisellik kipleri, çıkarım kipleri, bilgisel aktarım eylemleri, belirteçler ve anlam zayıflatıcılar kullanılmıştır. Bu biçimlere ek olarak üç tane de söyleme dayalı önlem alma stratejileri incelenmiştir. Sınırlı deney şartlarına gönderme yapmak, modele ya da kurama gönderme yapmak ve bilgi sınırlılığına gönderme yapmak. Araştırma makalelerinde her tür önlem yapısı sayılarak hesaplanmış ve bütüncenin sözcük sayısına oranlanmıştır. 12.346 sözcükten oluşan dilbilim makalelerinde 275 adet önlem alma yapısı 10.859 sözcükten oluşan jeoloji mühendisliği bütüncesinde ise 196 adet önlem alma yapısı yer almaktadır. Dilbilim bütüncesinde kullanılan önlem alma yapıları 1.4 oranında olup, jeoloji mühendisliğinde saptanan orandan daha fazladır. Türkçe için geliştirilmiş özel bir bilgisayar programı olmadığı için veriler elle sayılmıştır. Sonuçlar hesaplandığında jeoloji mühendisliğinde daha az önlem alma yapısı kullanılmakla birlikte, metinler tür olarak bilimsel makale türünde olduğundan önlem alma yapılarının her iki bilim alanında da kullanıldığı, yazarların bu yapıları kullanarak sınırlılıklarını belirttikleri, aynı zamanda yazar olarak varlıklarını azaltarak savlarını güçlendirdikleri ve ulaştıkları bulgular için okuyucudan kabul görme arayışında oldukları sonucuna varılmıştır.

Anahtar sözcükler: önlem alma yapıları, söylem çözümlemesi, bilimsel yazı

Introduction

'Hedge' as a linguistic concept was introduced by Lakoff (1972 cited in Crompton 1997:271). This linguistic phenomenon understood by linguists differently, especially in the arena of academic discourse there is not a common understanding or a clear definition of the concept. Hedges are seen as pragmalinguistic communicative features of academic language and have been studied in English, French, German, Russian, Spanish and Bulgarian academic discourse. Lakoff (1972:462) asserts that "natural language sentences are neither true nor false nor sensical but true to a certain extent and false to a certain extent, true in certain respects and false in others". Therefore, from a functional viewpoint he explains hedges as "words or phrases whose job is to make things fuzzy". Hyland (1998) defines hedges as devices used to convey tentativeness to reflect uncertainty. Hedges draw attention to the fact that statements do not just communicate ideas, but also the writer's attitude to them and to readers (Halliday 1978 cited in Hyland 1998). Following Lakoff, Brown and Levinson (1987) developed a different perspective basing their discussion on speech act theory and considered hedges as strategies for minimizing the threat to face. Myers (1989), along the same line with Brown and Levinson argues that hedging can be explained by positive and negative "politeness strategies". Myers (1989:12) argues that social variables like social distance and power difference exist in academic writing. Academic writers have to use the same linguistic strategies because

an academic knowledge claim is a threat or Face Threatening Act for other researchers in the field. This is the approach of hedging as an interpersonal negative politeness phenomenon.

Hedging has also been approached as a textual precision tool adjusting propositions to the shared knowledge of senders and addressees. The supporters of this view argue that association of hedging with fuzziness or vagueness might obscure the important function of hedges (Salager -Meyer 1993). Rounds (1981) asserts that hedges are not used simply to make things fuzzy but on the contrary to make scientific claims more precise. Skelton (1988) supports this view by saying that hedges are not always a problem or a cover up tactic but also a resource to express scientific uncertainty and doubt. "Science has always oscillated between the desire to be precise and the impossibility of quantifying accurately the world" (Gilbert and Mulkay 1984 in Salager- Mayer 1994:151). Conceptual fuzziness in the form of hedges can be thought to serve the textual function of language. According to Salager - Meyer (1994), Lakoff is talking about purposive vagueness and tentativeness to make statements more acceptable to the reader/hearer. By hedging, one can adjust the proposition to the assumed knowledge and expectations of the intended audience. Hedges provide ways of being more precise in reporting results (Salager Meyer 1994:154). In fact, it is difficult to interpret the meaning of hedges in one way only, so they are polypragmatic (Hyland 1996:437). In other words, hedging is a multi faceted linguistic phenomenon. It is a well known fact that "argumental arrogance" is not well regarded by the scientific community (Blisset 1972:141 in Hyland 1996). Scientists usually tone down their claims in order to protect themselves from certain attacks. One of the important linguistic devices to tone down the statements is use of hedges.

Another possibililily of interpreting the term is that hedges express the extent to which the writers commit themselves to the truth value of their statements. Crompton (1997:252) defines hedge as "an item of language which speaker uses to explicitly qualify his\her lack of commitment to the truth of a proposition". This view excludes the author reader axis. Hyland (1996) summarizes the definition as follows: "A hedge is any linguistic means used to indicate either a) a lack of complete commitment to the truth of a proposition or b) desire not to express a perspective on their statements."

The applied linguists can not agree on the definition of a hedge, since they have different viewpoints and different theoretical assumptions. Salager- Meyer (1998) argues that the different definitions of hedge represent the various developments of this concept. She claims that insisting on objectivity and absolute precision is not applicable to social sciences including linguistics because hedge is "cultural inherent" to language and it is a "mental phenomenon". Since hedges may take different forms (Hyland 1994), it is the researcher who is going to decide what a hedge is: there is no objective, precise form of it. "Introspection" (Salager –Meyer 1998) and detailed contextual analysis are what a researcher needs to make a discourse analysis. On the contrary, Crompton (1997) assumes that science as a term presupposes objectivity. It has to be systematic and precise as well. Therefore, the concept of hedge must be restricted to the issue of speaker commitment, which is in principle quantifiable rather than an attempt to tackle

unquantifiable, metaphysical, psychological and ethical issues. His analysis depends on grammar, because as Halliday (1994: xvi-xvii) states, 'a discourse analysis that is not based on grammar is not an analysis at all, but simply running commentary on a text". The major interest of a linguist should be to describe relationships between forms and meanings of language. This study adopts an eclectic approach to hedges because hedges involve pragmatic, rhetorical and cognitive issues, therefore they should be examined in context to ensure that they express a hedging function.

Use of hedges is vital for both oral and written types of academic texts, because they express doubt and tentativeness which are central to the interactive character of academic discourse. Hedges are one of the most studied features of scientific articles written in English: Adam-Smith (1983, 1984) on medical research papers, Rounds (1981), (1982) on social sciences, Myers (1989) on a corpus of molecular genetics, Salager-Meyer (1994) on Medical English written discourse, Hyland (1996b, 1997, 1998a).in science research articles, Vartalla 1999 on EAP (English for Academic Purposes) texts. The general aim of these studies is to identify the functions of hedges as means by which academics modify their statements. Furthermore, Yarar (2001) also studied the use of adverbs functioning as approximators to create probability and fuzzy expressions in scientific discourse in Turkish. In her study, the communicative functions of approximators are explained through examples. The results of her study show that there are differences as well as similarities in the distribution of approximators in the different sections of the articles; however, in terms of communicative functions no difference is observed.

It is believed that the use of these devices in academic writing is one of the systematic means by which academics create knowledge (Hyland 1998:352). In his study Hyland (1998: 353) claims that "academics construct knowledge as members of particular linguistic communities and their decisions are influenced by their disciplines." Hedges also "represent the writers' efforts to persuade readers of the correctness of their claims, helping them to gain acceptance for their work" (Hyland 1998). Therefore, hedges soften the overstatement of a claim. In other words, they imply that "a statement is based on plausible reasoning rather than certain knowledge and they have a conciliatory role" (Hyland 1988: 354). In sum, hedges balance objective information and subjective evaluation as stated in Hyland (1988). They can be a powerful persuasive factor in gaining acceptance for claims. Instead of saying "I know", members of academia should rather "assume" or "suggest" even when addressing other scholars (Hyland 1996:434). Hedges are a major contribution to the negotiation of social knowledge, because "writers must socially mediate their arguments, shaping their evidence, observations, data and knowledge valued by their community" (Hyland 1996:252). Hyland calls them 'disciplinary gate keepers. Skelton (1988a: 40 in Crompton 1997) suggests that hedging language seems to be a "subset of commentative language which serves the function of modulating propositions: By means of hedging, a user distinguishes between what s/he says and what s/he thinks about what s/he says. The general role of hedges in a scientific article is to signal a writer's anticipation of the negatibility of claims (Hyland 1996).

Method

Epistemic modality is the most useful expression of hedge. Crismore and Fansworth (1990:118) state that "it is a very dangerous myth that sees professional scientific writing as impersonal statements of fact that all add up to the truth". They argue that scientific texts consist of two layers, primary discourse and metadiscourse. Primary discourse functions on a referential, informational plane and metadiscourse functions on an expressive, attitudinal plane; that is, it indicates how to understand the author's perspective or stance towards the context or structure. Metadiscourse is divided into two functions; textual and interpersonal. The textual function consists of text connectives and code glosses. The interpersonal function consists of modality markers e.g. hedges, emphatics, attributers, attitude markers and commentary. Therefore, modals and hedges are used to assess certainty and uncertainty of propositional content and the degree of commitment to that proposition. Palmer's (1988) categorization of modals includes hedges. His classification consists of dynamic, deontic and epistemic categories. The epistemic category is the one relevant here because this type of modal includes hedges. His classification for possibility is adapted to Turkish by Kerslake (1996). Epistemic modals express the writer's or speaker's subjective evaluation. In her articl, it is stated that –(y)Ebil-ir is used to express epistemic possibility in Turkish, but still it may cause ambiguity because –(y)Ebil-ir is also used to express deontic and dynamic modality as well.

Hedges can be achieved in various forms. In order to identify a form, a functionally based definition is desirable. For Salager – Meyers' (1994) categorization of hedge forms is both a functional and a formal categorization. According to it "Hedges are the product of mental attitude which looks for prototypical linguistic forms such as modals' epistemic verbs' approximators, etc. Her taxonomy, which has been widely adopted by other researchers, includes shields (modals and semi-auxiliaries), approximators (adjectives and adverbs), compound hedges (assume, suggest etc.) and author's personal doubt ('I believe" to our knowledge etc.).

Myers (1989) taxonomy includes modal expressions, if clauses, question forms, passivisation, impersonal phrases and time references, copulas other than 'be', modal auxilaries, lexical verbs like believing arguing and adjectivals and adverbials. Hyland (1994:240) identifies hedging with epistemic modality. Hyland's taxonomy omits approximators but includes epistemic modals, if clauses, question forms and passivisation, impersonal phrases and time reference. Crompton (1997:284) proposes taxonomy parallel to his definition of the concept of hedge based originally on Lyons (1977:792 in Crompton 1997). According to him, a hedge is an item of language which a speaker uses to explicitly qualify his\her lack of commitment to the truth of a proposition he\she utters. Crompton argues that to count all uses of certain linguistic tokens as hedges is to run the risk of misinterpreting the discourse. He gives the verb 'believe' as an example: although 'believe' in the following sentence is a lexical verb expressing epistemic modality there is not an expression of tentativeness: "The Egyptians believed that the people had immortal souls". From this example, it is clear that identification of hedges as individual words seems inappropriate: listing types with some examples is more suitable. Crompton's (1997:284) taxonomy proposes that hedged propositions contain at least one of the following.

1. Copulas other than be e.g. appear, seem etc.

2. epistemic modals e.g. might, may, etc.

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 relate to the probability of the proposition being true. e.g. probably, possibly, apparently etc

5. (sentences containing reported propositions with) non use of factive reporting verbs such as 'show', 'demonstrate', 'prove' etc.

   a. where authors are responsible for the proposition being reported. e.g. I 'suggest' that…

   b. where authors use an impersonal subject, but the agent is intended to be understood as 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 taken to be responsible for making the hypothesis. e.g these findings suggest that…

Compound hedging is also possible and, as Crompton (1997) states, quite common as in the following sentence "The results would seem to suggest that…"

There is one objection to 5 b above. As Varttala (1999:185) states during the analysis of authentic articles, it is difficult to determine the origin of verbs, there are cases in which the source of the reported proposition is unknown because of passivized general statements. Most of the time it is difficult to decide whether the author is responsible for the proposition or not. Furthermore, if the reported proposition is tentative, it means that the author as well, has the same tentative viewpoint, therefore, although being reported, it may count as a hedging device.

This paper aims at determining the role of hedges in Turkish scientific articles by identifying the purposes, distribution and major forms of hedges . The field of geological engineering and linguistics are chosen as the representatives of scientific endeavor and these two fields will be compared in terms of hedging devices. The data for this study consists of a corpus of published research articles from the fields of geological engineering and linguistics. The corpus consists of 10 research articles from each discipline. First of all, hedges will be identified by means of contextual analysis and then their frequency will be recorded.

The taxonomy adopted in the study is rather eclectic; it considers Crompton's taxonomy (1997) as a starting point. However, passives and epistemic verbs which are not included in Crampton, are accepted as means of hedging in Turkish corpus under investigation. Although hedging can be achieved with various linguistic devices, this study is limited to the following linguistic forms which are associated with hedging in Turkish research articles.

Epistemic modals (the combination of the suffix *–Ebil* with the aorist *–Ir* (e.g…. olduğu sonucuna varılabilir) and inferential modal must (*mAlı+dır e.g olmalıdır*),

epistemic reporting verbs ('*iddia etmek', 'önerme', 'öne sürmek', 'ileri sürmek'* and copulas ('*görünmek', 'gözükmek', 'belirmek', 'ortaya çıkma'* passives forms epistemic verbs (–*IL* e.g, '*düşünülmektedi*r'), and adverbials ('*tamamen*' '*oldukça*', '*büyük* ölçüde' '*hemen hemen*', '*neredeyse*', '*kısmen*'), sentences with clauses relating to the probability of the subsequent proposition being true. (e.g. '*muhtemeldir ki*' , '*öyle görünüyor ki*', '*olasıdır*', '*ihtimali var*', etc.,), 'abstract rhetors' or as in Crompton's taxonomy, sentences containing a reported proposition that a hypothesized entity x exists and the author can be taken to be responsible for making the hypothesis (e.g. '*bu sismik veriler …..gösteriyor*'). Since this study is in Turkish, as a first step, all the linguistic devices in Turkish research articles are identified in the corpus and then analyzed contextually to determine whether they have the function of hedging in that particular context. In addition to these forms, three discourse based hedging strategies (Hyland 1996:271) are included in the analysis, because 'they offer a measure of propositional certainty" (Hyland 1996 271). These are "reference to limiting experimental conditions", "reference to a modal, theory" and "admission to a lack of knowledge".

In order to find out how hedging conventions are distributed in the two fields under study, the number of hedges per category is computed for each article as a percentage of the total number of hedges per category. It is predicted that there will be disciplinary differences in the rhetorical preferences of academic writers. Since the fields are representatives of social sciences and engineering there might be a distinction, because the discourse conventions embody the particular sets of values, practices and beliefs which are held by these very different academic disciplines. On the other hand, studying these structures will provide us with information on the functions of the specific hedge forms.

The data will be analyzed by hand, since there is not a text analysis program developed specifically for Turkish.

Findings

Quantitative Findings

In this study the number of hedging devices was recorded in each article separately and the percentage of hedges with respect to the total number of running words was computed. For geological engineering articles the total number of words is 10.859 and for linguistics 12.346, the total corpus is 23.208. The most frequently occurring ones are epistemic verbs. The results are displayed in the following table.

Table 1: Hedging Categories in Research Articles (n=23,205)

Category	Frequency	Percentage	Items Per 1,000 Words
Epistemic verbs	112	23.78%	4.83
Epistemic modals	27	5.73%	1.16
Inferential modals	39	8.28%	1.68
Adverbials	96	20.38%	4.14
Clauses relating to the probability of the subsequent proposition being true	17	3.61%	0.73
Passives	74	15.71%	3.19
Abstract rhetors	41	8.70%	1.77
Reference to a model or theory	25	5.31%	1.08
Admission to a lack of knowledge	12	2.55%	0.52
Reference to limiting experimental conditions	28	5.94%	1.21
Total	471	100.00%	

As can be observed from the table, the most frequent hedging devices in research articles are epistemic modals. The percentage of epistemic modals is 23.78% in the corpus. The following common hedging device in the research articles is adverbials (20.38%), which creates fuzziness in academic writing. Another common device is passives. Both geological engineers and linguists use passives to diminish their presence as a writer in their articles. Their percentage is 15.71%. The frequency of 'abstract rhetors' follows passives in the corpus. The percentage of 'abstract rhetors' is 8.70%. Other devices are not as common as those devices however; they are also preferred by researchers. The least preferred device is admission to a lack of knowledge (2.55%). This result is consistent with Hyland's (1996) results. Also, 'reference to a model or theory' can not be considered one of the favorite hedging devices (5.31%). The percentage of reference to limiting experimental conditions in the corpus is 5.94%. This type of hedging is frequently used especially by engineers.

Qualitative Findings

This study sets out to characterize the role of hedging in Turkish research articles. Quantitatively and qualitatively, relating the use of hedges to the communicative purpose of the different sections of each field, namely, engineering and linguistics, is the general aim of this study. The chosen fields are the representatives of the hard and soft sciences. The "hard" and "soft" distinction offers a convenient way of examining general similarities and differences between fields. Furthermore, this study also tests the popular belief that scientists and engineers tend to produce more impersonal texts whereas soft areas are more interpretative and less abstract. During the analysis process, it has been observed

that hedges in Turkish academic discourse make the proposition less categorical both in the engineering and the linguistics fields and they are procedures of argumentation and claiming acceptance. Hedges have various forms in Turkish. When analyzing the corpus, it is not always easy to identify hedges without a detailed contextual analysis.

The field of geological engineering shows the characteristics of typical detached texts marked by agentless passives. There are frequent occurrences of passives and nominalizations which might be called impersonalization strategies. Biber (1988) asserts that passives are the most important surface markers of de-contextualized or detached style. Dropping the agent results in an abstract presentation of information. In addition, agentless passives are used when the agent does not have the important role (Biber 1988:228). In Turkish, passive constructions have similar roles, they are used to present propositions with reduced emphasis on the agent (Leckie-Terry 1995). In Turkish, the primary passive suffix is –ıL. If a verb stem ends in a vowel or a consonant *l*, then the suffix –*In* serves as passive suffix (Özsoy,1999). As in English, in Turkish, passive constructions are divided into two; agentless passives and by passives. The by passive in Turkish is expressed by the post positional phrase *tarafından* or the adverbial suffix –*CE e.g.(toplantı bakanıkça iptal edildi)*. As Özsoy (1999: 42) argues, the suffix –CE is used when the agent of the verb is an institution. The use of passive voice in research articles diminishes the author's presence in the text, it minimizes the writer's involvement and in a way reduces the probability of refutation. The following are examples from the articles:

> Ex 1: Bu etkenler … kitle hareketleri olarak izlenen birikim ve faylanma olarak gözlenmektedir. (These factors …are observed as broad erosion along the strait floor, deposition, which is mainly observed as the sediment drifting and fault activity.)

> Ex 2: … hesaplanmıştır (…is estimated…)

> Ex 3: … konu edilmiştir. (…is subject to)

> Ex 4: … sonucuna varılmıştır. (…is concluded…)

> Ex 5: … bulgulara rastlanılmıştır. (…evidences are found)

Furthermore, hedges realized through passives, imply that a statement is based on logical reasoning rather than certain knowledge. It is possible to say that geological engineers use hedges to balance objective information and subjective evaluation. It might be interpreted that engineers accept less responsibility in their writing. The following are the examples,

> Ex 1: … havza dolgusu olarak yorumlanmıştır. (Interpreted as basin deposition.)

> Ex 2: … yaşlı birimlerin denizdeki devamı olarak düşünülmüştür. (It is thought as seaward continuation of older units)

> Ex 3: … çökel birikim ile doldurulmaya başlamiş olabileceğini işaret eder. (points out deposition of sediments).

Ex 4: … deniz tabanı üstündeki etkileri olarak yorumlanmıştır. (interpreted as the effects of the seafloor.)

Another way of reducing the author's responsibility is using 'abstract rhetors' (Hyland1996:444). In Crompton's taxonomy, it is explained as (sentences) containing a reported proposition that a hypothesized entity x exists and the author can be taken to be responsible for making the hypothesis. Through this type of hedging, writers share the responsibility with the data. The following are the examples.

Ex 1: … Tüm bu sonuçlar, Istanbul Boğazı'nın çok evreli bir gelişime sahip olduğunu göstermektedir. (All these findings suggest the Bosphorus has multiple forces of development.)

Ex 2: … sismik veriler, Boğaz tabanının morfolojisini denetleyen etkenlerin başında Marmara'dan Karadenize; doğru gerçekleşen akıntı sisteminin geldiğini göstermektedir. (Seismic evidences suggest factors controlling the basement morphology of Bosphorus, is the current system directed from the sea of Marmara to the Black Sea.)

The use of lexical epistemic verbs is striking especially for the geological engineering corpus. They are the markers of tentativeness. Particularly, by using tentative reporting verbs the writers can signal to the readers that what is said should not be perceived as the only possible interpretation. They form the largest group and greatest range of items. They mark less than full comittment to the truth of a proposition. In this study, both epistemic main verbs like clai*m, suggest, hypothesize, propose*, etc and copulas are interpreted as hedges. In Turkish, reporting epistemic verbs are *iddia etmek, önermek, öne sürmek, ileri sürmek* and copulas are görü*nmek, gözükmek, belirmek, ortaya çıkmak*. In contrast to other studies in English, in the corpus of this current study, there are not many copulas it might suggest that in Turkish research articles, copulas are not common hedging devices. Examples:

Ex 1: … son dönemde yapılan sismik çalışmalar sonucu iddia edilmiştir. (it is claimed based on the results of recent seismic surveys)

Ex 2: … Nuh Tufanı efsanesi ile ilişkisi olabileceği öne sürülmüştür. (it is proposed that it is related with Noah's catacylsm)

Ex 3: … sismik kesitlerde belirlenen bir fayın deniz tabanındaki izi olduğu sonucuna varılmıştır. (It is concluded that it corresponds to the trace of a fault identified from seismic sections.)

Ex 4: …akıntının yavaşlaması sonucu Çengelköy açıklarında biriktirmesi yolu ile olduğu düşünülmektedir. It is thought that the deposition off Çengelköy have been due to sudden decline of flaw velocity.)

Ex 5: … İstanbul Boğazının KD GB yönünde uzanan doğrusal yapı kazanmış olduğu gözlenir. (It is observed that İstanbul staright has gained a NE- SW trending linear structure)

Ex 6: … çökellerin bu yüzey üzerine yukarı ve aşağı doğru geliştirmiş oldukları sonlanmalarından dolayı temel olarak yorumlanmıştır. (upward and downward termination of sediments on this surface is interpreted as basement deposits)

Hyland (1996) claims that 'must', which is the modal of inferential confidence, is not a significant hedging device for science articles in English. It is mentioned by Hyland (1996) that it serves hedging function by weakening confident assertion. He explains that (1996: 264) "its relative infrequency in scientific discourse suggests that writers are reluctant to express even weak convictions when making deductions" (Hyland 1996, '*must*' is replaced by epistemic *could*". However, the use of 'must have' seems cultural specific and is not viable for Turkish corpus. In Turkish the suffix *mElI* is attached to the verb stem (Kornfilt 1997, Özsoy 1999 for expressing necessity and obligation. "The use of –*DIr* after *mElI* emphasizes the force of obligation/necessity" (Kocaman 1996:106), *mElI(–DIr)* appears as a common form of hedging especially for engineering discourse. There is obvious evidential reasoning in engineering discourse and this contributes to the reasoning between data and hypotheses. It has been observed that in engineering discourse, hedged judgements are from inferential reasoning or calculation rather than speculation. They are presented as deductions. This form is particularly preferred by engineers, because in engineering, writers are conscious of experimental limitations and alternative explanations. The results of geological research are inevitably the product of incompelete information, therefore, they use hedges to balance the strength of claims. Furthermore, the corpus revealed that this form is also used to encourage the reader to participate as an intelligent equal in the reasoning process. In the following examples, the writer makes some inferences and encourages the reader to participate in the reasoning process.

Ex 1: … herhangi bir aşınım meydana gelmiş olmalıdır. (any erosion must have occured)

Ex 2: … çökelmeye başlamış olmalıdır. (must have started to be deposited)

Ex 3: … kanal niteliğine bürünmüş olmalıdır. (must have a channel function)

Ex 4: … asınım yüzeyinin bu akis sırasında gelişmiş olması gerektiği düşünülmektedir. (It is assumed that the erosion surface must have been developed during this low.)

Epistemic modals are one of the most frequently used forms of hedges, especially in the conclusion and discussion sections of the texts of both fields. Their function is to tone down the proposition and to adjust the degree of certainty on the author's part (Adam- Smith 1984, Tarantino 1991). The use of epistemic modality is common in communication between specialists (Vartalla 1999). In Turkish, the morpheme –*(y)Abil* or the combination of the suffix –*Abil* with the aorist –*Ir* refer to possibility (Erguvanlı Taylan and Özsoy 1993; Özsoy 1999). Kerslake (1996: 85) defines epistemic possibility as a kind of possibility "which is a subjective judgment concerning the possibility of a proposition (rather than an event or state). It is expressed in English by 'may', and can

be paraphrased by 'It is possible that…'". In Turkish it might be difficult to identify epistemic modals "because –(y)Abil is fully integrated into the Turkish verbal system and capable of such a wide range of morphosyntactic combinations" (Kerslake 1996:87). The following are examples from the articles:

> Ex 1: … örnek olarak verebiliriz...(may be given as an example)

> Ex 2: … betimleyici eklemler şu şekilde sınıflandırılabilir. (might be classified as…)

> Ex 3: … anahtar rol oynayabileceği gündeme gelmiştir.

> Ex 4: … bir çökel birikimi ile doldurulmaya başlamış olabileceğini işaret eder.(might have been filled by sediment deposition.)

Amplifiers are a class of adverbials which indicate the degree of certainty towards a proposition (Biber 1988). Ouirk et al.(1987: 590) define amplifier as a word that boosts the force of a verb. They indicate the reliability of propositions e.g. *totally, completely, entirely* etc. In Turkish amplifiers have the same role e.g. *'tamamen' 'oldukça', 'büyük ölçüde'* etc. Although amplifiers in Turkish increase the reliability of a proposition, they are also used to increase fuzziness when used with a negative verb; e.g. "bu görüşün tamamen doğru olduğu söylenemez", or "oldukça sınırlı veri ile yapılan bu deney…" Especially in the discussion sections of each article adverbials might take the form of downtoners or content disjuncts. Downtoners are the opposite of amplifiers and have a lowering effect on the force of the verb (Quirk et al.1987), and diminish, minimize the propositions. Downtoners in Turkish are *'hemen hemen', 'neredeyse', 'kısmen'* etc. In both fields, adverbials have similar functions. They prevent generalizations in the sentences. They are specifically used when giving background information and to make inferences and presuppositions. They are used to present judgments and conclusions accurately enough for the purpose required. Moreover, in a few cases they guide the reader as to how the proposition can be mentally perceived. The following are examples;

> Ex 1: … Oldukça sınırlı olduğunu göstermektedir. (…exhibits that it is fairly limited)

> Ex 2: … Oldukça karmaşık bir yapıya sahiptir. (It has a quite complex structure)

> Ex 3: … Belirgin bir biçimde izlenebilmektedir. (…can be observed clearly)

> Ex 4: … Göreceli olarak daha az…(…relatively less than…)

> Ex 5: … Açıkça izlenebilmektedir. (…can be observed clearly)

> Ex 6: … Bu konuda bilinenler oldukça sınırlıdır. (…little is known pertaining to this topic)

It is possible to argue that there is authorial caution, humility and conceptual precision in the style of scientific articles and hedges are one of the strongest devices to obtain these textual functions.

In addition to these, there are also discourse based strategies which provide a means of scientific hedging. They usually take place in the Results and Discussion sections of research articles. They are used to specify the limits of the study and the knowledge of the writer. Writers use such devices to protect themselves. Researchers sometimes refer to the insufficiencies in the research model or theory that may risk the accuracy of their results. To talk about circumstances dependent on one another, conditionals are used frequently (Hyland 1996). As Hyland (1996) states commenting on doubts and experimental conditions is also a common strategy for hedging. They are used, in a way, to guarantee the precision of experimental results in the data in this particular study they were usually found in the geological engineering discourse. The following are examples:

Ex 1: … Örnek Nilüfer Çayından beslenen drenaj ağından alınsaydı, volfram değerinin daha yüksek çıkması beklenebilirdi. (If the sample had been collected from drainage web fed by Nilüfer Creek, the value of wolfram would have been expected to be higher.)

Ex 2: … Sonuç olarak, incelenen bütünce çerçevesinde bu dilin diğer dil kesitlerinden farklı bir kesit oluşturduğu söylenebilir. (As a result, in the frame of this particular corpus, it is possible to say that this type of language has a distinct register among others).

Discussion

As can be observed, both qualitative and quantitavive results display the importance of hedging in Turkish academic language. When the disciplinary results are considered, there are not really substantial differences as expected. The use of hedges is nearly as frequent in linguistics as in geological engineering. The results show disciplinary differences in the rhetorical preferences of academic writers. However, since the genre is scientific in both disciplines, writers use hedging devices in seeking acceptance for knowledge claims. In both disciplines hedges are the ways of strengtening arguments by admitting limitations and uncertainities.

The presence or absence of hedges in a text is the discoursal choice of individual reserachers deciding to "represent themselves more or less explicitly in their writing" (Hyland1998:358). In Turkish scintific discourse, it has been observed that hedges are the linguistic way of suppressing the authorial presence. Hedges in a way, repair potential threats by emphasizing that the statements are temporary. Therefore, in both disciplines, namely engineering and linguistics, making an appropriate level of claim for one's findings is a critical aspect of research. In fact, objectivity and exactitude is often seen as a virtue of engineering; however, it is found out in this corpus that geolgical engineers are always cautious in their discourse and they can never guarantee certainty, therefore they use hedging devices.

When compared the number of hedges in linguistics corpus (12.346) is 275 and 196 in geological engineering corpus (10.859), which means that the number of hedges

in linguistic papers are 1.4 times more than in geological engineering; but still there is the fact that hedges occured in all the papers in the corpus. The result coincides with the popular intutions that scientists tend to produce more objective texts, but there is more to it. Academic writing is a form of knowledge making, the ways writers modify the strength of their statements reflect their types of inquiry and knowledge structures peculiar to their discipline. On the one hand, social sciences in general is more interpretative; there is less control of variables, therefore, research can not be reported with confidence. It has to be expressed more cautiously and this means using more hedges. On the other hand, when the discourse of geological engineering is considered it can be observed that there are various hedges as well; for example there are a lot of attribute hedges like 'yakla*sik*', *'genel olarak', 'sıklıkla'* because engineers are seeking to restrict the generalizability of their claim. Scientists gain credibility by stating strongest claims but they also need to insure against overstatement. In other words, by using hedges egnineer researchers express their claims with humility. As a result, it is possible to say that in Turkish resrach articles, the use of hedges play a crucial role in the arrangement of scientific arguments. In order to develop Turkish as a scientific language, the writers'awareness should be raised about the significance of the appropriate use of hedging, since they play a key role in academic genre.

Conclusion

As a summary, by identifying the purposes, distribution, and major forms of hedges in the data, this study has sought to increase the understanding of this important feature of academic dicourse in a limited corpus. It is concluded that hedging is a remarkable resource in Turkish scientific discourse. Writing as an engineer or as a linguist means to be able to talk to your readers in ways they are likely to find convincing . On the basis of present results, it can be argued that by using hedges writers signal to the readers that what is said should not be perceived as the only possibble interpretation. It is clear that the use of hedges in acadmic discourse regulated norms and general rules of communication of particular disciplines and it is not possibl to understand the hedge phenomenon in isolation from institutional context. The findings reval that in research articals there are various hedging expressions and they are polypragmatic. In order to interpret the role of hedges a pragmatic framework should be taken into consideration. Since research articles are vehicles for new knowledge, hedges are the essential elements of presenting new claims and the analysis underlines the intersective nature of scientific writing. Throughout the paper a broad characterization of hedges in Turkish research articles is examined and it is clear that hedges are complex devices with various functions but they, in a way, regulate the rules of scientific communication. Furthermore, hedges are not specific to scientific research article genre; they are used in textbooks or conference presentations, because in all these types of communication, writers need gaining acceptance of knowledge claims. Therefore, further resrach is needed to extend this study into other disciplines and genres.

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