

The modal verb *galėti* ‘can/could/may/might’ in academic Lithuanian: distribution, frequency and semantic properties¹

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Abstract

The aim of the present paper is to investigate the frequency and distribution patterns as well as the spectrum of modal meanings conveyed by the Lithuanian modal verb of possibility *galėti* ‘can/could/may/might’ in academic Lithuanian. The study is based on Corpus Academicum Lithuanicum (www.coralit.lt), a specialized synchronic corpus of written academic Lithuanian (roughly 9 million words). In order to allow a disciplinary comparison, the paper analyses the use of this modal verb in academic texts from three science fields: the humanities, the biomedical sciences and the technological sciences. Quantitative and qualitative approaches are employed alongside corpus-based analysis to reveal the ways in which this modal verb of possibility is used in academic language. The first part of the paper investigates the frequency patterns of various forms of *galėti* ‘can/could/may/might’ in the three science fields. The second part looks at the variety of meanings this modal verb can convey in Lithuanian specialised language. The results show that there is a fairly similar distribution of this modal verb across different science fields. In terms of its semantic functional capacities, *galėti* ‘can/could/may/might’ is used to convey all three types of modality (epistemic, deontic and dynamic), however, the most frequent use in Lithuanian academic discourse seems to be that of dynamic modality.

Keywords: modality, academic discourse, corpus-based analysis, cross-disciplinary analysis, modal verbs

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1 Introduction

Modality is one of the areas of linguistic inquiry that seems to enjoy a continuous interest of scholars throughout the years. In particular, studies on epistemic modality have been very prolific, especially in the past several decades when the debates on the relationship between epistemic modality and evidentiality generated a new wave of linguistic interest. Non-epistemic modality or root modality, on the other hand, seems to have received less attention, at least as far as empirical studies are concerned.

The distinction between epistemic modality and non-epistemic modality is generally clear. As Palmer notes in his seminal book of 1990, “[i]t is easy to show, especially with *MAY* and *MUST*, that there are potentially two very different uses of the modals. Consider:

(1) *John may be there now.*

John must be there now.

John may come in now.

John must come in now.” (Palmer 1990, 5)

Palmer explains that the first use lies in the evaluation of the truth of the proposition (the first two sentences in (1)), while the second use involves permission and obligation (the last two sentences in (1)). Building on the work by the philosopher von Wright (1951), Palmer (1990) labels these two categories as epistemic and deontic. In his discussion of the modal verbs *can* and *will*, Palmer (1990, 36) further notes that there is a certain type of modality expressed by these two modal verbs that does not fit under epistemic and deontic categories and calls it *dynamic* again borrowing von Wright’s (1951) terminology. This type of modality, according to Palmer (1990, 36), is “concerned with the ability or volition of the subject of the sentence rather than the opinions (epistemic) or attitudes (deontic) of the speaker (and addressee)”. The examples of dynamic modality that Palmer (2003, 7) provides are the following:

(2) *They can run very fast.*

I will help you.

While many frameworks and classification schemes share a fairly similar understanding of epistemic modality and its scope, the only major debate being its relationship with evidentiality (see Cornillie 2009 for a discussion), there is less consensus on the category of non-epistemic modality. Some scholars call the second category *root* (Coates 1983) or *non-epistemic* (Hoye 1997), some are in favour of the internal divide into *deontic* and *dynamic modality* (Palmer 1990, *inter alia*), yet others come up with even more variation in terminology (for an overview of different modality types distinguished in

literature see Facchinetti (2003, 302)). The existing terminological variety confirms a great interest which the field of modality has been generating.

One area in which empirical studies on modality have been thriving is that of academic discourse. Epistemic modality markers have been central in author stance studies especially those concerned with hedging in research writing (see Hyland 1998; Varttala 2001; Rezzano 2004; Vold 2006, among many others). Deontic modality markers have been analysed in the context of obligation and directivity in research writing as they may strengthen the sense of community or serve as a powerful rhetorical trigger to mobilize readers for a certain action (Hyland 2002, 2005, 2008; Giltrow 2005). The type of modality that seems to have attracted less attention in empirical corpus-based studies on academic discourse is dynamic modality.

Palmer (1990, 107) writes about existential² modality which seems to be a specific sub-type of dynamic modality and which is particularly characteristic of technical or scientific writing. It deals with quantification rather than with any of the other kinds of modality typically distinguished. To illustrate this sub-type of modality, Palmer uses the example from Leech (1969, 223) (*Lions can be dangerous*) paraphrasing it ‘Some lions are dangerous’ or ‘Some lions are sometimes dangerous’. This use of modal verbs does not involve evaluation of the likelihood of the proposition, but refers to the theoretical possibility that under certain circumstances the proposition may become true. This particular use has been mainly attributed to *can* and *may*.

In his analysis of modal verbs in academic language, Huddleston (1971, 297) notes one of the most frequent meanings of *may*, which he labels *qualified generalization*. He provides the following example to illustrate this meaning:

(3) *The cells do not necessarily form a continuous layer and are frequently restricted to the basal region where they **may** develop rhizoids, whilst in other species they are nearer to the apex where they **may** give rise to proliferations.*

In his discussion of (3), Huddleston emphasizes that the meaning of *may* here does not show the evaluation of the speaker, i.e. the speaker does not doubt whether cells develop rhizoids or not, but only states that it is sometimes the case based on the previous experiences or knowledge. This meaning of *may* in Huddleston’s data is the most frequent, especially if a subtype of the *qualified generalization* category, which Huddleston calls

² The term again derives from von Wright’s (1951) classification of types of modality. Alongside alethic, epistemic and deontic modality, the scholar also distinguished the so-called existential modality which he linked to quantificational logic.

exhaustive disjunction, is added to the counts. The *exhaustive disjunction* meaning is conveyed when the author enumerates all theoretically possible alternatives as in ‘*these anemones may be blue or dull green in colour*’. It is interesting that the epistemic meaning of *may*, which is considered to be one of the prototypical meanings of this modal verb, is only second in terms of frequency in Huddleston’s data (Huddleston 1971, 298, 304). This result points to the tendency for a roughly equal distribution of both epistemic and theoretical possibility realizations in academic language.

Following Palmer (1979), Butler (1990, 149) also distinguishes dynamic existential uses of *may* in scientific texts. One of the examples that Butler calls quite common use of *may* in scientific texts is (4):

- (4) *A single cell **may** have as many as five hundred mitochondria.*
(a) ***Some** single cells have as many as five hundred mitochondria.*
(b) *Single cells **sometimes** have as many as five hundred mitochondria.*

Butler explains this non-epistemic meaning of *may* in scientific texts by providing paraphrases of *may* with *some* (4a) and *sometimes* (4b), and links this particular use of *may* found in his data with Huddleston’s *qualified generalization* meaning of *may*, which is characteristic of scientific texts.

A more recent empirical study that also addresses the question of realizations of dynamic modality within the semantic profile of *may* is that of Facchinetti (2003). Facchinetti (2003) considers existential modality to be a subtype of dynamic modality in her analysis of *may*. Propositions with existential *may* can be checked in various sources of information since they are based on some prior established knowledge. Therefore, subjective author stance does not apply to those cases of use as there is no evaluation of the truth of the proposition on the part of the speaker. The key semantic element in those cases of *may* is the statement of facts. Facchinetti provides the following example:

- (5) *In summer, the coastal regions of the West Country **may** still be hit by damp weather especially on high ground.*

Employing *may* in (5), the author does not show lack of commitment so far as his/her statement about weather conditions in the West Country is concerned, but rather indicates an existing theoretical possibility for such climatic conditions in the area.

Giltrow (2005, 171) touches upon “pragmatic blends of deontic and dynamic modality” and their impact on research writing thus returning to the problem of the so-called

merger or “contextual neutralisation” discussed by Coates (1983, 17). Coates talks about those cases when both an epistemic and non-epistemic interpretation of a modal verb is possible, as in (6):

(6) *The quality of the final product must be influenced by the quality of the raw material of the industry, and the methods of processing **may** influence its nutritional quality.*
(Coates 1983, 145)

Coates (1983, 1995) claims that merger occurs in typically formal, often academic contexts. The same observation is also made by Hyland (1998) who investigates academic texts for various realizations of author stance used to create persuasive and bonding discourse. Hyland (1998, 111) notes that in those cases, when both epistemic and non-epistemic interpretations of modal verbs are possible, a certain ambiguity appears and this can result in “additional security for the writers by enabling them to establish greater distance from their propositions”. It seems therefore that mergers of both epistemic/non-epistemic and dynamic/deontic meanings constitute an important element of academic rhetoric at least in English.

Most of the studies on modality in academic discourse focus on the English language data. The present paper will investigate the frequency and distribution patterns as well as the spectrum of modal meanings conveyed by the Lithuanian modal verb of possibility *galėti* ‘can/could/may/might’ in academic Lithuanian. It will also investigate whether there are any differences in the use of this modal verb across different science fields. While there are undoubtedly extensive studies on the modality system in Lithuanian including the semantic profile of *galėti* ‘can/could/may/might’ (see, for example, Holvoet 2007, 2009; Usonienė & Šolienė 2010; Šolienė 2013), they are primarily based on general Lithuanian or on corpora of fiction texts and do not focus on specialized discourses, such as academic discourse. There are some studies on hedging in Lithuanian academic discourse (Šinkūnienė 2008, 2011) but they only address the epistemic realizations of *galėti* ‘can/could/may/might’ in small scale self-compiled corpora of research articles. Therefore, frequency patterns and semantic properties of *galėti* ‘can/could/may/might’, especially its non-epistemic properties, remain largely unresearched in Lithuanian academic discourse, and it is important to fill this gap. Placed within the context of studies on modality in research writing in other languages, especially English, the analysis of the key modal verb expressing possibility in Lithuanian would allow to see cross-linguistic variation in the expression of modality in specialized discourses.

There are two multifunctional modal verbs in Lithuanian which can express both epistemic and non-epistemic modality and thus “cover the whole domain of modality from dynamic to epistemic” (Holvoet 2009, 206). The verb *galėti* ‘can/could/may/might’ expresses all types of modal possibility, the verb *turėti* ‘have to’ covers all types of modal necessity. Unlike the modal auxiliaries in English, the two Lithuanian modal verbs display all the properties of regular verbs. Therefore, the distinction is more of semantic than of grammatical nature. Despite the fact that there are only two modal verbs which can cover the whole range of epistemic and non-epistemic possibility/necessity, different semantic values can be conveyed by their different forms; thus, for example, *galėtų* (3_{SUBJ}), which is the subjunctive form of *galėti*, is a rough equivalent of *might* and *could*.

As it has been mentioned, the paper concentrates on *galėti* ‘can/could/may/might’, which is the key modal verb to express modal possibility in Lithuanian. Due to a very high frequency of this verb in the Lithuanian language the study will only focus on personal forms of the verb. In the quantitative part of the analysis, general frequencies of *galėti* ‘can/could/may/might’ in three science fields of academic Lithuanian are investigated. The qualitative part of the analysis looks at how different types of modality that *galėti* ‘can/could/may/might’ can convey are realized in the three distinct science fields under study. The paper follows what Nuyts (2006, 2) calls the “traditional version” of the classification of modality into three dimensions: dynamic, deontic and epistemic.

2 Data and methods

In order to explore frequency and usage patterns of *galėti* ‘can/could/may/might’ in academic Lithuanian, the study employs Corpus Academicum Lithuanicum (CorALit³). With over 9 million words, CorALit is a large and representative corpus of written Lithuanian academic language. It covers texts published in 1999–2009 in five broad science areas (the humanities, the social sciences, the biomedical sciences, the technological sciences and the physical sciences). A variety of different genres is represented in every science area including research articles, monographs, textbooks, reviews, etc. (for a more detailed description of the main features of the CorALit compilation and design see Usonienė *et al.* (2011)).

The humanities, the biomedical sciences and the technological sciences are three science fields that represent the most conspicuous disciplinary contrast and have therefore been selected for the analysis of the frequency patterns and semantic properties of *galėti* ‘can/could/may/might’. The humanities sub-corpus includes texts from such disciplines as arts, philosophy, linguistics, history, theology, literary science. The sub-corpus of

³ <http://www.coralit.lt/>

the biomedical sciences includes texts mainly from agriculture, medicine, veterinary medicine, zootechnics and ecology, whereas the bulk of the texts in the sub-corpus of the technological sciences comes from mechanical engineering, civil engineering, thermal and power engineering and environmental engineering. Table 1 shows data on the size of each of the sub-corpora used for this study.

Sub-corpus	Number of words
CorALit: Biomedicine	1 638 444
CorALit: Humanities	2 028 906
CorALit: Technology	1 964 827
Total:	5 632 177

Table 1. The size of the sub-corpora used for the analysis

The study employs quantitative and qualitative corpus-based analysis as the key methodological framework. All personal forms of the verb *galèti* ‘can/could/may/might’ were extracted automatically from the three sub-corpora. Since all the sub-corpora are of very different sizes, the raw numbers were normalized to 10 000 words to enable comparison of the quantitative distribution of the markers under study in different science areas. In order to evaluate whether the frequency data are statistically significant, the log-likelihood test (LL) was occasionally used with the critical value of 3.84 or higher at the level of $p < 0.05$.

WordSmith Tools 5.0 (Scott 2008) was used for quantitative searches and the identification of the most frequent collocations. The quoted examples are coded with the first letter of the science field and the title of the corpus, thus the humanities field is coded as H-CorALit, the biomedical sciences as B-CorALit and the technological sciences respectively as T-CorALit.

3 Results and discussion

Table 2 provides quantitative data of all personal forms (both positive and negative) of *galèti* ‘can/could/may/might’ automatically retrieved from the three sub-corpora under analysis.

Sub-corpus	<i>galèti</i> ‘can/could/may/might’	
	# n	f/10 000
CorALit: Biomedicine	5 346	32.63
CorALit: Humanities	6 407	31.58
CorALit: Technology	8 757	44.57
Total:	20 510	36.42

Table 2. Frequency of all personal forms of *galèti* ‘can/could/may/might’ in the analysed sub-corpora

While there are no statistical differences in the distribution of *galėti* in the fields of biomedicine and humanities (LL ratio is +3.11), the use of *galėti* ‘can/could/may/might’ in those two science areas differs markedly from the field of technology where this modal verb is the most frequent. Table 3 shows frequency patterns of 1st, 2nd and 3rd-person forms in the analysed sub-corpora.

<i>galėti</i> ‘can/could/may/might’	1st-person forms		2nd-person forms		3rd-person forms	
	# n	f/10 000	# n	f/10 000	# n	f/10 000
CorALit: Biomedicine	193	1.18	7	0.04	5 146	31.41
CorALit: Humanities	733	3.61	25	0.12	5 649	27.84
CorALit: Technology	575	2.93	106	0.54	8 076	41.10
Total:	1 501	2.67	138	0.25	18 871	33.51

Table 3. Frequency of personal forms of *galėti* ‘can/could/may/might’ in the analysed sub-corpora

We can immediately see from Table 3 that in all the three sub-corpora of academic language the most frequent form is the 3rd-person form. This is in line with the frequency patterns of another Lithuanian modal verb *turėti* ‘have to’ in Lithuanian academic discourse (Šinkūnienė & Van Olmen 2012; Šinkūnienė 2015). While 2nd-person forms are more or less equally rare in all three science fields, the distribution of 1st-person forms shows interesting trends. The highest frequency of 1st-person forms can be observed in the humanities (3.61, f/10 000). As confirmed by many studies of English academic discourse, scholars in the soft fields tend to construct their discourse in a more dialogic manner than in the hard sciences. Hyland (2008, 12) notes that “writers in different disciplines represent themselves, their work and their readers in different ways, with those in the humanities and social sciences taking far more explicitly involved and personal positions than those in the science and engineering fields”. As can be expected, one of the ways to express a personal position is to use *I* and *we*. What comes as a surprise though is that Lithuanian texts in the field of technology also to a certain extent use 1st-person forms. It has to be noted that 91% of all cases of 1st-person forms in the sub-corpus of the technological sciences is the first person plural form *galime* (‘we can/may’.PRS). A closer look at the data sources reveals that 77% of *galime* (‘we can/may’.PRS) occurs in textbooks. A typical example is (7):

- (7) *Pagal Furjè dėsni galime apskaičiuoti šilumos laidumo koeficientą.* (T-CorALit)
 ‘According to Fourier’s law we **can** calculate the thermal conduction coefficient.’

Textbooks constitute a specific genre in academic discourse and as such display a number of features that distinguish them from other genres (for an overview of textbook

features see Hyland 2009, 112–122). It seems that the use of the inclusive *galime* ('we can/may'.PRS) in Lithuanian technology textbooks is an interactional feature used by the authors of the textbooks to create a closer link with the reader audience.

As it has been mentioned, the most frequent form in all three sub-corpora is that of 3rd-person. Table 4 shows how various 3rd-person forms are distributed in the three science fields under analysis.

3rd-person forms of <i>galėti</i> 'can/could/may/might'	Biomedicine			Humanities			Technology		
	# n	f/ 10 000	%	# n	f/ 10 000	%	# n	f/ 10 000	%
<i>ne-gal-i</i> (3PRS)	4 558	27.82	89%	4 098	20.20	73%	7 541	38.38	93%
<i>ne-gal-ėjo</i> (3PST)	322	1.97	6%	1 021	5.03	18%	63	0.32	1%
<i>ne-gal-édavo</i> (3FRQ)	13	0.08	0.2%	10	0.05	0.2%	4	0.02	0.1%
<i>ne-gal-ėtų</i> (3SUBJ)	236	1.44	4.5%	471	2.32	8%	396	2.02	4.9%
<i>ne-gal-ės</i> (3FUT)	17	0.10	0.3%	49	0.24	0.8%	72	0.37	1%
Total:	5 146	31.41	100%	5 649	27.84	100%	8 076	41.10	100%

Table 4. Frequency of various 3rd-person forms of *galėti* 'can/could/may/might'

We can see from Table 4 that there is only slight variation among the three science fields so far as the distribution of various 3rd-person forms of *galėti* 'can/could/may/might' is concerned. The present tense form is overwhelmingly frequent in all three science fields, the frequentative and future forms are practically non-existent in academic discourse, and subjunctive is also quite rare. This is an intriguing finding because the frequency analysis of the Lithuanian modal verb *turėti* 'have to' which is used to express necessity has a markedly different distribution of the subjunctive form. In the humanities the 3rd-person subjunctive of *turėti* 'have to' takes up to 21% of all 3rd-person forms and in the biomedical field this form constitutes 32% (Šinkūnienė 2015). If we look at the distribution of the 3rd-person subjunctive of *galėti* 'can/could/may/might', we can see that it takes up only 4.5% and 4.9% in the biomedical and technological sciences fields respectively, and 8% in the humanities. The subjunctive form of the two Lithuanian modal verbs corresponds to *might/could* for *galėti* 'can/could/may/might' and *should/ought* for *turėti* 'have to' and thus in the specific domain of academic discourse can represent the hedged form of possibility or necessity. These comparative findings are interesting in a sense that the frequency trends might point towards a more expressed tendency for Lithuanian scholars to hedge necessity rather than express a hedged possibility, at least so far as the use of modal verbs is concerned.

One more difference obvious from Table 4 is that it is only the humanities that display a certain division of labour between the present and the past forms of *galėti* ‘can/could/may/might’ (73% and 18% respectively). In other science fields the past tense form is quite rare. The humanities behave differently in the employment of the past tense form because of the disciplinary composition of its texts. The sub-corpus of humanities has a substantial percentage of texts from such disciplines as history and archeology; therefore, it is not surprising that the percentage of the past tense forms is higher in the humanities as there are numerous references to the events in the past.

Finally, one more interesting aspect of the comparative quantitative analysis is the ratio between positive and negative forms of *galėti* ‘can/could/may/might’ in different science fields (Table 5).

forms of <i>galėti</i> ‘can/could/may/ might’	Biomedicine		Humanities		Technology	
	# n	%	# n	%	# n	%
Positive forms	5 015	94%	5 515	86%	8 278	95%
Negative forms	331	6%	892	14%	479	5%
Total:	5 346	100%	6 407	100%	8 757	100%

Table 5. Frequency of all personal positive and negative forms of *galėti* ‘can/could/may/might’

Table 5 shows that there is a very small variation between different science fields with positive forms clearly dominating. The same tendency can again be observed in the behaviour of the necessitive modal verb *turėti* ‘have to’. In both the humanities and biomedical sciences negative forms occupy just 13% and 16% respectively (Šinkūnienė 2015). The aspect of negation is an interesting issue in modality, but it does not fall under the scope of this study, therefore it is not analysed in more detail.

A further analysis of the collocations of the most frequent 3rd-person present tense form *gali* (‘can/may’.3PRS) shows that the predominant collocation of this form (both positive and negative) is with the infinitive of the verb *būti* ‘be’. In the humanities such collocations constitute as many as 2 057 cases out of the total of 4 098, thus accounting for exactly 50% of all of its usage. In the biomedical field the phrase *gali būti* ‘can/may be’ makes up 47% of all *gali* (‘can/may’.3PRS) cases and 61% of them in the technological field.

The quantitative analysis thus reveals that there are quite similar disciplinary trends in the use of *galėti* ‘can/could/may/might’, with only slight differences in its distribution patterns.

The second part of the analysis looks at how modal meanings are realized in the use of *galėti* ‘can/could/may/might’. In order to answer this question, a pilot study of 300 random occurrences of the most frequent 3rd-person present tense form *gali* (‘can/may’.3PRS) was carried out. 100 random examples from each science area were extracted and analysed manually for the meaning of *gali* (‘can/may’.3PRS). The results are presented in Table 6.

Meaning	Biomedicine	Humanities	Technology
Epistemic	4%	14%	2%
Deontic	2%	10%	3%
Dynamic	90%	69%	91%
Merger	4%	7%	4%

Table 6. The range and distribution of the modal meanings of *gali* (‘can/may’.3PRS)

We can see from Table 6 that the Lithuanian *galėti* ‘can/could/may/might’ is used in academic discourse in all of its meanings (there is no 0% value). Examples (8) to (10) represent epistemic, deontic and dynamic uses of *gali* (‘can/may’.3PRS):

- (8) *Ateityje gali būti įsteigta viena jungtinė komercinės televizijos kompanija ITV <...>*. (H-CorALit)
 ‘In the future one joint commercial TV company ITV **may** be established <...>.’
- (9) *Puslapyje gali būti ne daugiau kaip 5 korektūros taisymai.* (H-CorALit)
 ‘There **may/can** be no more than 5 revisions of the proofs on one page.’
- (10) *Tačiau netinkama žmogaus ir mašinos sąsaja arba per menka vartotojo kvalifikacija gali atnešti nesėkmę ir dar didesnių problemų.* (T-CorALit)
 ‘However, an improper link of a man and machinery or too low qualifications of the user **may/can** bring bad luck or even more significant problems.’

Example (8) shows the prediction of the future event and therefore the use of *gali* (‘can/may’.3PRS) is epistemic. The epistemic use of *gali* (‘can/may’.3PRS) seems to be only typical of the humanities where it was conveyed by 14% of the examples. There were just a few cases of this use in biomedical and technological texts. This finding is hardly surprising as it is the humanities and social sciences that tend to display more of the interpretative observations and tentative suggestions. Since hard sciences are more experiment based, less tentativeness expressed by epistemic modality markers can be expected there. The same results are observed in Facchinetti’s (2003) analysis of various uses of *may* in English. What is different, however, is the fact that in the English written humanities texts that Facchinetti analysed, epistemic meaning was the predominant semantic value of *may*.

The comparatively rare epistemic use of *gali* ('can/may'.3PRS) in Lithuanian humanities could be attributed to the general pattern of behaviour that Lithuanian modal verbs employ; there is a tendency for epistemic modality in Lithuanian to be expressed by means other than modal verbs (Usonienė & Šolienė 2010; Holvoet & Judžentis 2004). This claim is also confirmed by the studies that use parallel corpora. For instance, Usonienė (2006, 2007) found that in the Lithuanian translations of English texts epistemic English modal verbs tend to be translated by modal words and modal particles.

It was also quite interesting to observe some uses of the deontic *gali* ('can/may'.3PRS), which is typically associated with permission, i.e. the use one can hardly expect in academic texts. The frequencies of this use are not high, especially in biomedical and technology texts. The deontic *gali* ('can/may'.3PRS) is typically used with an animate subject in situations when somebody is allowed to do something institutionally or, in other words, when somebody is regulated to do something institutionally. (11) is a good illustrative example of this use:

(11) *Istatymu turi būti nustatyta, kiek daugiausia žemės vienas asmuo gali valdyti.*
(B-CorALit)

'The law should determine how much land at most one individual **can/may** possess.'

Here *gali* ('can/may'.3PRS) clearly conveys the meaning of 'is allowed to' institutionally.

We can see from Table 6 that all three science fields show a clear preference for the dynamic meaning in the use of the analysed *gali* ('can/may'.3PRS). Facchinetti (2003) observes the same trend in the use of *may* but only in two science fields. In her data, dynamic existential use is most frequently exploited in academic writing of natural sciences and technology, the science fields where "the need for objectivity accounts for the prevalence of existential modality" (Facchinetti 2003, 316).

In example (10) *gali* ('can/may'.3PRS) conveys the dynamic existential meaning because it refers to the theoretical possibility for the situation described to happen and is apparently based on the previous experience or knowledge. There is no doubt or hesitation on the part of the speaker. Here *gali* ('can/may'.3PRS) can also be paraphrased using *sometimes*⁴ (see (10a) below) as noted by Butler (1990) (cf. example (4b)) and Palmer (1990) for the dynamic existential *may* and *can*:

⁴ With reference to *can*, Palmer (1990, 7) notes that it "is used in an existential sense to mean 'some' (though more commonly 'sometimes')".

(10a) *Tačiau netinkama žmogaus ir mašinos sąsaja arba per menka vartotojo kvalifikacija kartais atneša nesėkmę ir dar didesnių problemų.*

‘However, an improper link of a man and machinery or too low qualifications of the user **sometimes** bring bad luck or even more significant problems.’

Typical examples that employ dynamic existential *gali* (‘can/may’ .3PRS) also frequently display adverbs of frequency such as *sometimes*, *occasionally*, *in some cases* in the context. (12) and (13) are cases in point:

(12) <...> *kai kuriais atvejais organizmas gali būti angioinvasyvnis, bet kitais atvejais uždegiminės reakcijos gali atsirasti dėl pablogėjusių apsauginių reakcijų <...>.* (B-CorALit)

‘In some cases the organism can/may be angioinvasive, but in other cases inflammatory reactions can/may appear due to worsened protective reactions.’

(13) *Kartais svarbiausi veiksniai diagramoje gali būti įvardijami ir išdėstomi mažėjančia tvarka.* (T-CorALit)

‘Sometimes the most important factors in the diagram can/may be named and presented in the descending order.’

Adverbs of frequency used in (12) and (13) leave no doubt that the author refers to the theoretical possibility for the proposition to happen and this possibility is based on the previous experience.

A variation of exhaustive disjunction, a classificational category of *may* under which Huddleston (1971) places the enumeration of all theoretically possible alternatives, is also well attested in the Lithuanian data:

(14) *Ligą gali pernešti vabzdžiai: musės (Stomoxys calcitrans), kambarinės musės (Musca domestica), galvijų sparvos (Tabanus bromicus) ir erkės (Blobei, Schließer, 1994).* (B-CorALit)

‘The disease can/may be transferred by insects: flies (*Stomoxys calcitrans*), houseflies (*Musca domestica*), horseflies (*Tabanus bromicus*) and ticks (Blobei, Schließer, 1994).’

(15) *Neetiškų poelgių reguliavimo priemonės gali sudaryti [295]: kontrolės stiprinimas, etinis darbuotojų lavinimas, etiškas vadovų elgesys, teisinių aktų keitimas, organizacinės permainos įstaigoje.* (T-CorALit)

‘Means of the control of unethical behaviour can/may include the following [295]: control enforcement, ethical education of employees, ethical behaviour of the leaders, change of legislature, organizational changes in the company.’

Examples like (14) and (15) where the dynamic *gali* ('can/may'.3PRS) is used in the context of exhaustive enumeration of the possibilities are quite frequent in both biomedical and technology texts.

One more interesting contextual use of the dynamic existential *gali* ('can/may'.3PRS) occurs when explicit evidence indicates that the possibility derives from data/study/observations, etc. In (16) below, there is a combination of both reference to the previous studies on the basis of which the claim is made as well as a reference to *some*:

(16) *Pastebėta, kad kakavos baltymai kai kam gali sukelti alergiją.* (B-CorALit)

'It has been noted that cacao proteins **can/may** cause allergy for **some** people.'

Since natural and technological sciences often discuss tendencies, that explains the popularity of this particular meaning of *gali* ('can/may'.3PRS), which frequently co-occurs with the above described contextual features.

Even though the dynamic existential interpretation of *gali* ('can/may'.3PRS) is frequently possible, there are also cases attested in the data when the dynamic use relates to the physical or mental ability of the subject, as in (17):

(17) *Bėgama tol, kol tiriamasis gali 200 m bėgti nurodytu greičiu.* (H-CorALit)

'The running continues until the subject under study **can/may** run a distance of 200 m at the speed indicated.'

The final aspect to be discussed in this study are the cases when several meanings are possible and they are not mutually exclusive, i.e. the cases of merger that were described in the introductory part of the paper. Merger cases constitute only 4% in both biomedical sciences and technology discourse, and as many as 7% in the analysed humanities texts. An example is provided in (18):

(18) *Šiuo būdu įmanoma prognozuoti, kokie reiškiniai gali turėti įtakos viešojo administravimo institucijų ir įstaigų <...> veiklai <...>.* (H-CorALit)

'In this way it is possible to make predictions which phenomena **may** have influence on the activities of public administration institutions and enterprises.'

In (18), *gali* ('can/may'.3PRS) may be interpreted in two ways. On the one hand, it might indicate that the author makes a tentative assumption, hence an epistemic use of *gali* ('can/may'.3PRS). On the other hand, it is also possible that based on the previous knowledge the author refers to a theoretically existing possibility.

The merger cases found in the data are primarily between epistemic/non-epistemic interpretations of *gali* ('can/may'.3PRS). The fact that merger cases of *gali* ('can/may'.3PRS) are not really frequent in Lithuanian academic discourse might be linked to the general tendency of Lithuanian scholars to avoid hedging to a certain extent (Šinkūnienė 2011) and thus to avoid creating semantically ambiguous contexts.

4 Concluding observations

The study of the Lithuanian modal verb *galėti* 'can/may/could/might' in academic discourse of the humanities, biomedical sciences and technological sciences revealed interesting trends in the way this modal verb is used. It is fairly frequent in all three science areas, with the texts in technological sciences employing it to the biggest extent. 3rd-person forms are the dominating forms in all three analysed science fields. The technological sciences provide interesting data because texts in this field also employ 1st-person forms which seem to be less usual in hard sciences. This could be due to the fact that the major bulk of the texts in the sub-corpus of technology comes from textbooks rather than other genres. Out of 3rd-person forms, the dominating form in the technological and biomedical texts is the 3rd-person present tense form. In the humanities a certain labour division occurs between 3rd-person present tense and past tense forms. This is mainly because of the composition of the humanities sub-corpus. It includes texts from archeology and history, therefore reference to the past is more frequent there than in the other two science fields. Finally, the quantitative analysis revealed that negative forms of the verb are very rare in all the three sub-corpora.

The qualitative analysis of the realization of modal meanings of *gali* ('can/may'.3PRS) in the three science fields revealed that the dynamic meaning is the predominant semantic realization of this modal verb in the texts of the three analysed science fields. This is in line with other scholars' observations on the use of *may* in academic written texts (cf. Facchinetti 2003) of technological and biomedical sciences. In the Lithuanian humanities the dominating use of *gali* ('can/may'.3PRS) also conveys the dynamic meaning, but there is more variation compared to the other two science fields so far as epistemic and deontic values of *gali* ('can/may'.3PRS) are concerned. The dynamic existential sub-type of dynamic modality observed in the use of English modal verbs is also evident in the semantic profile of the Lithuanian *gali* ('can/may'.3PRS).

Finally, unlike the English *may* which is predominantly epistemic in the field of the humanities, the Lithuanian *gali* ('can/may'.3PRS) does not have a very frequent epistemic use. This is in line with observations in literature that in the Lithuanian language modal verbs are not the preferred means for the expression of epistemic values.

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