

When *must not* is not *forbidden*

Leszek Szymański

University of Zielona Góra, Poland

Abstract

The present paper describes an empirical investigation into an English modal predicate with the auxiliary verb *must*, the negative particle *not* and the bare infinitive of the main verb. Typically, the negator *not* changes the meaning of *must* from *obligation* or *strong recommendation* to *forbiddance*. This, however, takes place only with the root flavor of *must*. Epistemic *must* does not interact with *not* in this way. The study uses authentic language samples retrieved from the online version of *The Corpus of Contemporary American English*. The analysis adapts the model of *the semantic field of modal expressions* developed by Kratzer (1991), and it attempts to find what lies behind the said lack of interaction between *must* and *not*. After a scrutiny of the conversational backgrounds influencing the studied modal meanings, the study found that the meaning expressed by a speaker with *must not* depends on whether the speaker evaluates the propositional circumstances directly or infers from them. Moreover, the study proposes patterns of *must-not* interfaces with regard to the modal flavor.

Keywords: modality, modality-negation interfaces, semantic field of modality, conversational backgrounds, possible worlds

1. Introduction

Saying that modal verbs are ambiguous is not a revealing statement. It has already been established that they receive their specific meanings in particular contexts (Hacquard 2006, 2010, 2011, Kratzer 1991, 2012). This paper offers a possible solution to the issue of contextual identifying a modal meaning with regard to negated *must*.

It is commonly known that negated root *must* – *must not* or *mustn't* – does not express the meaning of *not obliged*. The negator triggers the meaning of *forbiddance*, and, for example: *You mustn't smoke in my office* expresses the speaker's lack of consent, which is not the same as the lack of obligation or commitment. However, the meaning of *forbiddance* is still root modality. On the other hand, in the sentence: *She mustn't know the address*, *mustn't* expresses speaker's certainty that she does not know the address, and hence the epistemic flavor. The present study takes a modular approach to the analysis of the semantics of negated *must* by looking at possible worlds that influence its modal interpretation.

More specifically, the aim of the study described in the present paper is to empirically disambiguate the semantics of negated *must* followed by the bare infinitive of the main verb. In

order to do this, the study examines the contexts of *must not* + V and employs the model of *the semantic field of modal expressions* developed by Kratzer (1991). The study also investigates the potential pattern of modality-negation interplay. It attempts to determine when *must not* (*mustn't*) does not express the prototypical meaning of *forbiddance*. It adapts the concept of *possible worlds*, widely-acknowledged in philosophy and logic, to a linguistic analysis, which uses language data drawn from *The Corpus of Contemporary American English* (COCA) (Davies 2008-), which is a collection of authentic language use recorded in the United States of America.

This paper has been divided into five sections. The present Introduction is followed by a description of the concept of *modality* in section 2. After defining modality, section 2 discusses the model of *the semantic field of modal expressions* (Kratzer 1991), which makes the theoretical basis for a further-described analysis. It also overviews the interaction of modality with aspect and negation. Section 3 provides an account of the semantics of the English modal *must*. Section 4 discusses the analysis, beginning with a description of the material. The paper closes with Conclusions in section 5.

2. Modality

Modality is a broad concept which has to deal with modifications people make to the facts of the world that surrounds them (Perzanowski 2006). With its origin in philosophy, modality has also gained interest among logicians and linguists.

In the present study, we will follow Kratzer (1991) in viewing *modality* as a semantic notion dealing with possibility and necessity. On the basis of the model of *the semantic field of modal expressions*, a modal meaning can be perceived as emerging from a combination of its three domains: *the modal force*, *the modal base* and *the ordering source(s)*. They are discussed below.

The modal force relates to how strong the connection between the uttered proposition and a set of other propositions is. It ranges from *possibility* to *necessity*, with various degrees of each (see Kratzer 1991: 649). The modal force can be exemplified as follows:

- (1) She **can** see her sister.
- (2) She **must** see her sister.

In (1), the speaker expresses that it is possible for her to see her sister, thus the modal force of *possibility*; whereas in (2), the speaker states that it is necessary for her to see her sister, hence the modal force of *necessity*.

The modal force comes out as a result of the evaluation of a *modal base* made by a speaker, which supplies all the accessible information for the modal judgment. In this way it forms a *conversational background* for the modal judgment.

There are two types of the modal base. When the speaker evaluates the spatio-temporal characteristics that they refer to in the proposition, then they evaluate a *circumstantial modal base*. However, when the speaker takes into account what they know, think or believe to base their modal judgment on, then they evaluate an *epistemic modal base*. The difference between a circumstantial and epistemic modal base can be exemplified with (2). When the necessity stems from an obligation that someone has imposed on her, then the obligation depends on the

situation, which entails a *circumstantial* modal base. However, when the necessity derives from what the speaker concludes on the basis of what they know or think, then the modal base is *epistemic*, since it is thought-based.

The obligation and speaker's conclusion mentioned above are examples of ordering sources. An *ordering source* is another conversational background that the speaker evaluates which determines the sequence of possible worlds. A *possible world*, which is an underlying concept in the Kratzerian model (see Hacquard 2011, Portner 2009), is what the world could have possibly been like in the given circumstances (see e.g. Carnap 1956, Hintikka 1961 or Kripke 1963). In fact, each conversational background is a possible world that a speaker evaluates in their modal judgment.

The present study employs the Kratzerian (1991) proposal as a theoretical framework for the distinction between *root* and *epistemic* modal flavors. This logic-oriented model has been adapted to our linguistic analysis due to the fact that its underlying aim is to account for the ambiguity of modals. Thus, it is expected to allow us to examine certain extra-systemic factors which have a bearing on the type of modality expressed by negated *must*. Kratzer (1991: 650) states that modals which take circumstantial modal bases express *root modality*, while those that take epistemic modal bases express *epistemic modality*. This dichotomous division is widely acknowledged by Anglicists dealing with modality (Nuyts 2006: 7).

Modality has been recognized to interact with other verb-related categories, such as aspect or negation (e.g. Abraham 1997, 1999, 2008, 2020, Hacquard 2006, 2009, 2010, 2011, 2016, Kotin 2012, 2014, Leiss 2008 or Szymański 2019, 2021, 2022). Regarding the former, root modality has been identified to converge with the perfective, while epistemic modality with the imperfective (see Abraham 2008). A classic example is provided by Abraham (1999: 66):

(3)

- a. He must **die**.
- b. He must **be dying**.

In (3a), the verb *die* denotes a perfective event, while its progressive form *be dying* in (3b) denotes an imperfective event. As for the modal *must*, in (3a) it denotes an obligation, thus root modality; while in (3b) it denotes speaker's certainty, thus epistemic modality. Consequently, there is a correspondence between the perfective and root modality, as well as between the imperfective and epistemic modality.

It is also now well established that modality interacts with negation (e.g. de Haan 1997, Iatridou and Zeijlstra 2013, Morante and Sporleder 2012, Palmer 2003, Radden 2007, Szymański 2016, 2017, 2021, Tottie 1991). *Negation* is understood as "an operator that reverses the truth value of a proposition" (Miestamo 2007: 552). Its influence on modality can take one of two ways. It can either negate the modality or the event in the proposition. Consider the example (taken from Szymański 2021: 291):

(4)

- a. Sarah **can't** ride a bike.
- b. She **may not** be at home.

(4a) exemplifies negated modality, because it expresses what is not possible for Sarah. (4b) exemplifies negation of the event, because it is possible that she is not at home.

The present study will consider the analytic clausal negation with the employment of the negative particle *not*, which “asserts that some event, situation, or state of affairs does not hold” (Payne 1997: 282).

3. A note on the semantics of *must*

As the study described below deals with the English modal *must*, there needs to be an introduction to the semantics of this verb. Grammar books (e.g. Biber et al. 1999/2007, Eastwood 2002, Greenbaum 1996, Huddleston and Pullum 2002, Quirk et al. 1985 or Swan 2002) provide the meanings of *strong obligation* or *necessity*, for example:

- (5) Your seatbelt **must** be fastened.
- (6) Children **must** go to school.

Also, one can find the meaning of *recommendation* or *encouragement*, for example:

- (7) You **must** visit the new mall next time! You’ll love it!

The above meanings of *must* belong to the root category. An important remark must be made concerning negated root *must*, which does not mean the opposite to any of the above modal meanings, but it means *forbiddance*, for example:

- (8) You **mustn’t** smoke in the office. [It is forbidden to smoke in the office.]

In addition, *must* can express the meaning of *speaker’s certainty*, *conclusion* or *deduction*, thus the epistemic flavor, for instance:

- (9) She knows the plot very well, so she **must** have read the book!

A number of empirical investigations have found that there is a decrease in the frequencies of the root flavor of *must* in favor of an increase in the frequencies of its epistemic flavor. Corpus studies have reported that the former are being substituted by *have to* and *need to* (see e.g. Millar 2009, Williams 2009, Johansson 2013).

4. The study

4.1. The material

The present study uses samples of authentic language excerpted from *The Corpus of Contemporary American English* (COCA) (Davies 2008-), which is available online at www.english-corpora.org/coca/. Counting over one billion words (as of February 2023), COCA is the largest available corpus of contemporary American English. It includes language samples collected between 1990 and 2019 in the United States of America. The COCA material is

subdivided into eight genre-based subcorpora: *spoken* (SPOK), *fiction* (FIC), *popular magazines* (MAG), *newspapers* (NEWS), *academic texts* (ACAD), *TV and movies subtitles* (TV), *blogs* (BLOG), and other *web pages* (WEB). TV, BLOG and WEB were added to the already existing database in March 2020.

For this study, an online query was run with the following query string: *must [x] [vvi]*, in which *[x]* stands for negation (both with *not* and the contraction *n't*) and *[vvi]* for the bare infinitive of the main verb. It brought about a random sample of 200 occurrences (which was the set limit) of negated *must* with the bare infinitive of the main verb. 45 of the examples date to the 1990s, 48 to the 2000s, and 107 to the 2010s. This uneven diachronic distribution does not impact the study, though. Regarding the distribution of *must not + V*, the excerpted material included the data presented in Table 1.

Table 1: *Genre distribution of the studied material*

genre	frequency
ACAD	21
BLOG	35
FIC	36
MAG	15
MOV	15
NEWS	16
SPOK	11
TV	10
WEB	41
TOTAL	200

As Table 1 shows, the genre distribution of the research material is not equally balanced, which may result from the random selection of examples by the online software. Nevertheless, this should have no bearing on our results. Moreover, as the data in Table 1 show, *must not + V* occurs in all genre types, in both speech and writing, as well as at various levels of formality.

4.2. *The analysis*

Let us begin the analysis with the meanings expressed by negated *must + V* in the researched sample. The study reported on the following modal meanings: *forbiddance of an event*, *recommendation that an event is not actualized* and *speaker's certainty that an event does not exist*. Let us exemplify this with the following sentences:

- (10) A woman **must not show** any part but her face to strangers. [NEWS, 2003, *In freer Iraq, new curbs on women's wear*].
- (11) You **mustn't worry** about that photograph. It will blow over. [TV, 2015, *Miss Fisher's Murder Mysteries*]
- (12) Whoever thinks this sucks just **must not know** good punk rock if it weren't for these guys the grunge scene probably wouldn't have truly happened yea everyone says that Nirvana started but really they just made it big. [WEB, 2012, *Green River – Ain't Nothing To Do – Listening and stats at Last.fm*]

In (10), the speaker states what a woman is forbidden to do in Iraq. This ban is imposed by a local law. In (11), the speaker recommends to the listener not to worry, which may be attributed

to the speaker's volition, that is, what the speaker wants the listener not to do. It is important to notice that the meaning of recommendation arises above the sentential level (see Portner 2009) from the semantics of forbiddance. We can propose an interpretation that the speaker does not allow the agent to worry about that photograph. Next, example (12) comes from a music fan's comment on other people's music tastes. Thus, it expresses what the speaker thinks, that is, the speaker is certain that people who do not like this [the music discussed in the thread] do not know good punk rock.

Taking the expressed modal meanings into account, (10) and (11) typify the *root* and (12) represents *epistemic* modal flavors. Altogether, the studied sample included: 190 (95%) instances of *root* and 10 (5%) instances of epistemic *must not* + V. The low frequency of epistemic *must not* makes it even a more intriguing issue to discuss.

Let us now verify whether the spelling of the negator *not* in its full (*not*) or contracted (*n't*) form corresponds to the modal flavor expressed by negated *must*. The study found that:

- i. 149 instances of the full form and 41 instances of the contracted form for the *root* flavor, while
- ii. all the 10 instances with the full form of the negator for the *epistemic* flavor.

We may thus propose that, in the studied sample, the contracted form of the negator is characteristic of negative *root must*, i.e. of the meaning of *forbiddance*. Moreover, the sample showed that negated epistemic *must* co-occurs only with the full form of the negator.

Let us now turn to the domains of the semantic field of modality expressed by *must not* + V. Regarding the modal force, as shown by (10) – (12), negated *must* expresses the modal force of *necessity*. So, (10) can be paraphrased as: “it is (logically) necessary for a woman not to show any part but her face to strangers”. (11) can be paraphrased as: “it is (logically) necessary for you not to worry about that photograph”. (12) can be paraphrased as: “it is (logically) necessary for people who do not like this music not to know good punk rock”.

With regard to the modal base, the reported dichotomy of the modal flavor points to its two types. The *root* flavor comes from the evaluation of the circumstances that the speaker refers to in the proposition, thus a *circumstantial modal base*. Consider the examples below:

- (13) But whether we honor our heroes or not, in order to keep the government from growing beyond its Constitutionally allocated limits, the government **must not spend** the People's money on former government personnel – the money does not belong to government. [WEB, 2012, “Obama: America 'Would Not be a Great Country' Without All Our”, <http://www.theblaze.com/stories/obama-america-would-not-be-a-great-country-without-all-our-entitlements/>]

In (13), the speaker refers to circumstances in which the government's rights are regulated by the constitution, which is the supreme law. Thus, in this situation, a constitutional law allocates some limitations to the government and in this way it does not allow the government to “spend the People's money on former government personnel”. Consequently, this law is the *forbidden* ordering source in this situation.

- (14) The body of the letter **must not exceed** 350 words.
[WEB, 2012, “Rules”, <http://www.ca7.uscourts.gov/rules/rules.htm>]

Similarly in (14), the word limit of the letter is imposed by law. In this particular case it is “Federal Rules of Appellate Procedure and Circuit Rules of the United States Court of Appeals for the Seventh Circuit”. This document imposes the code of conduct on parties that intend to make an appeal. Thus, the law that puts a ban on letters longer than 350 words is a *forbidden* ordering source.

- (15) You **must not use** the power for selfish gain. You **must not abuse** it. Not once. Do you hear? [FIC, 2004, Menger-Anderson, Kirsten, “The Baquet (Short story)”. *Southwest Review* Vol. 89 Issue 2/3, p. 395-413].

In (15), we can observe two instances of *must not* + V. Both express the meaning of *forbiddance*. In each of them, it is the speaker that imposes the prohibition on the agent. Thus, the ordering source is *forbidden*. Moreover, this forbiddance may stem from the speaker’s desire not to have the agent “use the power for selfish gain” or “abuse it”. This is a *boulomaic* ordering source. It may also be so that the speaker does not want the agent to behave in such ways in order to prevent some unwanted behaviors. This entails a *teleological* ordering source.

Furthermore, the study found instances in which a ban was imposed by a speaker on themselves, i.e. *self-imposed forbiddance*. Consider the examples below:

- (16) I **mustn’t wake** Philip. And if I do, I **mustn’t let** him see me like this. [FIC, 2001, Armstrong, Kelley, Bitten.]
 (17) We **must not** let extremists control the political or religious discourse.
 [BLOG, 2012, Major religions should be able to shrug off minor slights,
http://blogs.chicagotribune.com/news_columnists_ezorn/2012/09/easydoesit.html]

Example (16) presents two instances of root *must not* + V. In each, the speaker self-imposes the necessity not to wake Philip and not to let Philip see the speaker. Thus, the primary, so to say, ordering source is the *imposition* by the speaker. Moreover, we can identify two further ordering sources. When the necessity comes from what the speaker does not want to do, then the ordering source is *boulomaic*. When the necessity comes from a purpose, e.g. not to make Philip angry or laugh at the speaker, then the ordering source is *teleological*. Next, in (17), by using the inclusive pronoun *we*, the speaker includes themselves in the imposed prohibition. Thus, the ordering source in (17) is the *forbiddance* of allowing “extremists [to] control the political or religious discourse” inflicted by the speaker. Again, it may be driven by the speaker’s desire not to have extremists seize control over the discourses, which, in turn, may result from the aim of depriving them of any type of power. Thus, *boulomaic* and *teleological* ordering sources can be identified.

The above meanings of *forbiddance* seem to derive from similar ordering sources. Let us now look at the meaning of *recommendation* in (18):

- (18) "If you haven't been to the Corcoran Gallery yet, Orpha, you **mustn't miss** it."
 [FIC, 2017, Anna Loan-Wilsey, A march to remember]

In (18), the speaker recommends the Corcoran Gallery to Orpha, i.e., the speaker wants her to visit this place. Thus, the ordering source is *boulomaic*. It can be further supported with a reason, for example, to see a particular exhibition, which entails a *teleological* ordering source.

Thus, a difference comes out: the meaning of *recommendation* does not include the *forbidden* ordering source, in which an authoritative body does not allow for an event to take place.

Turning now to the epistemic flavor of *must not* + V, let us consider the following examples:

- (19) Wow, cockboy, please teach me to be as funny as you someday. Sorry you **must not get** much attention and playful human interaction at this time in your life. [BLOG, 2012, "Suicide Silence Vocalist Mitch Lucker Passes Away In Motorcycle Accident", <http://www.theprp.com/2012/11/01/news/suicide-silence-vocalist-mitch-lucker-passes-away-in-motorcycle-accident/>].
- (20) Therefore, your instructor will take the time to point out, or at least consider, SG and P errors, assuming that if you didn't correct them yourself, you **must not know** how. [ACAD, 2009, Kurland, Michael, "Get the MOST from a writing course", *Writer* Vol. 122, Issue 4, pp. 36-37].

In (19), the speaker makes their modal judgment on the basis of what they think the receiver (here: cockboy) experiences. In other words: the speaker deduces that cockboy does not "get much attention and playful human interaction". This reasoning comes from the speaker's observations of cockboy's posts on the internet site and the discussion cockboy is engaged in on the Internet. Thus, the ordering source is *deductive*. Next, in (20), the speaker expresses an instructor's assumption that it cannot be otherwise than that a student does not know how to correct the "SG and P errors" themselves. The expressed instructor's conclusion is based on the lack of these errors' corrections introduced by a student themselves. Thus, a *deductive* ordering source.

The final issue to discuss in the present study is the influence of negation on *must*. First of all, root *must not* + V shows that modality interacts with negation because the root meaning changes from *obligation* to *forbiddance*. Thus, negation does not perform here its prototypical function of reversing the meaning to the opposite, yet it produces a new meaning of *the lack of consent*. With regard to the meaning of recommendation, which arises above the sentential level (see Portner 2009), it is also the lack of consent for not doing the opposite to what the speaker recommends.

We can find further support in logic. Following Palmer (2003: 9), "there is logical equivalence between "not possible" and "necessary not" and between "possible not" and "not necessary"". Therefore, we can say that, for example, (10) can be paraphrased as: "it is (logically) not possible for a woman to show any part but her face to strangers", and (11) can be paraphrased as: "it is (logically) not possible for you to worry about that photograph".

We can thus propose the following pattern of interaction (cf. Szymański 2016: 255):

- (21) ROOT *must* + *not* → neg MODALITY → FORBIDDEN.event

Secondly, with epistemic *must not* + V negation affects the event, which is the prototypical function of a negator that *not* performs (cf. Payne 1985). Hence, we can propose that (cf. Szymański 2016: 255):

- (22) EPIST *must* + *not* → neg EVENT → SPEAKER'S CERTAINTY

5. Conclusions

The study described in this paper was set up to investigate the semantic field of modality expressed by *must not + V*. Using authentic language samples from COCA, the analysis established that *must not + V* expresses typically three modal meanings: *forbiddance* of an event, *recommendation* that an event is not actualized, or *speaker's certainty* that an event does not take place. The first two meanings belong to root modality, while the third one is epistemic modality.

Let us now juxtapose the study results in Table 2.

Table 2: *The semantic field of must not + V.*

	modal force	modal base	ordering source
<i>must not + V</i>	necessity	circumstantial	forbidden
			boulomaic
			teleological
		epistemic	deductive

The study confirmed that *must not + V* expresses the modal force of *necessity*. It can take either a *circumstantial* or *epistemic* modal base. The former comes from a *forbidden* ordering source, which may be further founded on *boulomaic* or *teleological* ordering sources.

An important remark must be made concerning the root flavor of *must not + V*. The study found that the *forbidden* ordering source is present only when *must not* expresses the meaning of *forbiddance*. This ordering source features an authoritative body, for example: a law, a regulation or a person, including the speaker, and this authoritative body is the primary source of the expressed prohibition. The *forbidden* ordering source is absent, however, from the meaning of *recommendation* that an event is not actualized; it can be identified only in the meaning of *forbiddance*. Both the remaining circumstantial ordering sources, i.e. *boulomaic* and *teleological*, can be present in both root meanings of *must not + V*.

The epistemic modal base results from a *deductive* ordering source, i.e., it is based on the evaluation of available facts. Thus, the meaning of *speaker's certainty* that an event is non-existent, or *speaker's certainty* of a negative proposition, comes out as a result of speaker's *deduction*. The modal judgment the speaker makes is based on observable evidence; however, this evidence is not the direct conversational background that leads to the expressed modal force. This evidence leads to speaker's reasoning, and it is this reasoning that forms the basis for the modal force and the modal evaluation.

Concluding, we can say that *must not + V* expresses *forbiddance* or *recommendation not to do something* when the speaker expresses the necessity of the event based on the circumstances to which they refer in the proposition; while the meaning of *speaker's certainty that an event does not occur* emerges when the speaker infers the necessity of the event from the circumstances. This is when *must not* is not *forbidden*.

References

- Abraham, W. 1997. The interdependence of case, aspect, and referentiality in the history of German: The case of the genitive. In A. van Kemenade, and N. Vincent (eds.), *Parameters of morphosyntactic change*, 29–61. Cambridge: Cambridge University Press.
- Abraham, W. 1999. On the syntax and semantics of modal verbs in German. *Groninger Arbeiten zur Germanistischen Linguistik* 43: 61–94.
- Abraham, W. 2008. On the logic of generalizations about cross-linguistic aspect-modality links. In W. Abraham, and E. Leiss (eds.), *Modality–aspect interfaces: Implications and typological solutions*, 3–13. Amsterdam, Philadelphia: John Benjamins.
- Abraham, W. 2020. *Modality in syntax, semantics and pragmatics*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/9781139108676>.
- Biber, D., Johansson, S., Leech, G., Conrad, S., and E. Finegan. 1999/2007. *Longman grammar of spoken and written English*. Harlow: Pearson Education Limited.
- Carnap, R. 1956. *Meaning and necessity: A study in semantics and modal logic*. Chicago: University of Chicago Press.
- Davies, M. 2008-. *The corpus of contemporary American English (COCA)*. Available online at <https://www.english-corpora.org/coca/>.
- De Haan, F. 1997. *The interaction of modality and negation. A typological study*. New York, London: Garland Publishing, Inc.
- Eastwood, J. 2002. *Oxford guide to English grammar*. Oxford, New York: Oxford University Press.
- Greenbaum, S. 1996. *The Oxford English grammar*. Oxford, New York: Oxford University Press.
- Hacquard, V. 2006. *Aspects of modality*. (Ph.D. dissertation). Cambridge, MA: Massachusetts Institute of Technology. <https://dspace.mit.edu/handle/1721.1/37421>.
- Hacquard, V. 2009. On the interaction of aspect and modal auxiliaries. *Linguistics and Philosophy* 32: 279–312. <https://link.springer.com/article/10.1007/s10988-009-9061-6>.
- Hacquard, V. 2010. On the event relativity of modal auxiliaries. *Natural Language Semantics* 18 (1): 79–114. <https://link.springer.com/article/10.1007/s11050-010-9056-4>.
- Hacquard, V. 2011. Modality. In K. von Stechow, C. Maienborn, and P. Portner (eds.), *Semantics. An international handbook of natural language meaning*, vol. 2, 1484–1515. Berlin, Boston: Walter de Gruyter.
- Hacquard, V. 2016. Modals: Meaning categories?. In J. Błaszczak, A. Giannakidou, D. Klimek-Jankowska, and K. Migdalski (eds.), *Mood, aspect, modality revisited: New answers to old questions*, 45–74. Chicago: University of Chicago Press.
- Hintikka, J. 1961. Modality and quantification. *Theoria* 27: 119–128.
- Huddleston, R. D., and G. K. Pullum. 2002. *The Cambridge grammar of the English language*. Cambridge: Cambridge University Press.
- Iatridou, S., and H. Zeijlstra. 2013. Negation, polarity and deontic modals. *Linguistic Inquiry* 44: 529–568. https://doi.org/10.1162/LING_a_00138.
- Johansson, S. 2013. Modals and semi-modals of obligation in American English: Some aspects of developments from 1990 until the present day (2013). In B. Aarts, J. Close, G. Leech, and S. Wallis (eds), *The verb phrase in English. Investigating recent language change with corpora*, 372-380. Cambridge: Cambridge University Press.
- Kotin, Michail L. 2012. Modalitäten. In G. Pawłowski, M. Olpińska-Szkiełko, and S. Bonacchi (eds.), *Mensch – Sprachen – Kulturen: Beiträge und Materialien der internationalen wissenschaftlichen Jahrestagung des Verbandes Polnischer Germanisten 25.-27. Mai 2012, Warszawa*, 140–158. Warszawa: Euro-Edukacja.
- Kotin, Michail L. 2014. Modalitäten im Sprachkontrast: Nochmals zu der Aspektualität-Modalität-Schnittstelle. In K. Lukas, and I. (eds.), *Deutsch im Kontakt und im Kontrast: Festschrift für Prof. Andrzej Kątny zum 65. Geburtstag*, 105–117. Frankfurt am Main: Peter Lang.
- Kratzer, A. 1991. Modality. In A. von Stechow, and D. Wunderlich (eds.), *Semantics: An international handbook of contemporary research*, 639–650. Berlin: de Gruyter.
- Kratzer, A. 2012. *Modals and conditionals: New and revised perspectives*. Oxford, New York: Oxford University Press.

- Kripke, S. A. 1963. Semantical analysis of Modal Logic I, Normal Propositional Calculi. *Zeitschrift für Mathematische Logik und Grundlagen der Mathematik* 9: 67–96.
- Leiss, E. 2008. The silent and aspect-driven patterns of deonticity and epistemicity: A chapter in diachronic typology. In W. Abraham, and E. Leiss (eds.), *Modality–aspect interfaces: Implications and typological solutions*, 15–41. Amsterdam, Philadelphia: John Benjamins.
- Miestamo, M. 2007. Negation – An overview of typological research. *Language and Linguistics Compass* 1(5): 552–570. <https://doi.org/10.1111/j.1749-818X.2007.00026.x>.
- Millar, N. 2009. Modal verbs in TIME: frequency changes 1923-2006. *International Journal of Corpus Linguistics* 14(2): 191-220. <https://benjamins.com/catalog/ijcl.14.2.03mil>.
- Morante, R., and C. Sporleder. 2012. Modality and negation: An introduction to the special issue. *Computational Linguistics* 38 (2): 223–260. <https://direct.mit.edu/coli/article/38/2/223/2142/Modality-and-Negation-An-Introduction-to-the>.
- Nuyts, J. 2006. Modality: Overview and linguistic issues. In W. Frawley (ed.), *The expression of modality*, 1–26. Berlin: Mouton de Gruyter.
- Palmer, F. R. 2003. Modality in English: Theoretical, descriptive and typological issues. In R. Facchinetti, M. G. Krug, and F. R. Palmer (eds.) *Modality in contemporary English*, 1–17. Berlin: Mouton De Gruyter.
- Payne, T. E. 1997. *Describing morphosyntax*. Cambridge: Cambridge University Press.
- Perzanowski, J. 2006. Ontyka modalności. In W. Strawński, M. Grygianiec, and A. Brożek (eds.), *Myśli o języku, nauce i wartościach*, 281–297. Warszawa: Wydawnictwo Naukowe Semper.
- Portner, P. 2009. *Modality*. Oxford: Oxford University Press.
- Quirk, R., Greenbaum, S., Leech, G., and J. Svartvik. 1985. *A comprehensive grammar of the English language*. London, New York: Longman Group Limited.
- Radden, G. 2007. Interaction of modality with negation. In W. Chłopicki, A. Pawelec, and A. Pokojska, (eds.), *Cognition in language. Volume in honour of Professor Elżbieta Tabakowska*, 224–254. Kraków: Tertium.
- Swan, M. 2002. *Practical English Usage*. Oxford: Oxford University Press.
- Szymański, L. 2016. Towards a transboundary approach to the analysis of linguistic modality – Elements of an empirical investigation of the modal auxiliary *must* in contemporary American English. *Biuletyn Polskiego Towarzystwa Językoznawczego* 71: 211–230.
- Szymański, L. 2017. An empirical investigation of the allegedly non-normative modal predicate with *must*, *not*, and the perfect infinitive of the main verb. *Biuletyn Polskiego Towarzystwa Językoznawczego* 73: 247–258.
- Szymański, L. 2019. *Modal auxiliaries and aspect in contemporary American English – A corpus-based study*. Zielona Góra: Oficyna Wydawnicza Uniwersytetu Zielonogórskiego.
- Szymański, L. 2021. A corpus-based analysis of the modal *can* with the perfect in American English from a synchronic and diachronic perspective. *Studia Neophilologica* 93 (3): 287–313. <https://doi.org/10.1080/00393274.2020.1846613>.
- Szymański, L. 2022. The Furdalian concept of 'open linguistics' exemplified with an investigation into the semantic field of English possibility modals. *Biuletyn Polskiego Towarzystwa Językoznawczego* 78: 237–258. DOI: 10.5604/01.3001.0016.2022
- Tottie, G. 1991. *Negation in English speech and writing*. San Diego, New York, London: Academic Press.
- Williams, C. 2009. Legal English and the 'modal revolution'. In R. Salkie, P. Basuttill, and J. van der Auwera (eds.), *Modality in English: Theory and description*, 199–210. Berlin: Walter de Gruyter.