

Affirmative and negated modality Günter Radden, Hamburg

0 Introduction¹

0.1 Stating the problem

Descriptions of modality in English often give the impression that the behaviour of modal verbs is erratic when they occur with negation. A particularly intriguing case is the behaviour of the modal verb *must* under negation. In its deontic sense, *must* is used both in affirmative and negated sentences, expressing obligation (1a) and prohibition (1b), respectively. In its epistemic sense, however, *must* is only used in affirmative sentences expressing necessity (2a). The modal verb that expresses the corresponding negated epistemic modality, i.e. impossibility, is *can't* (2b).

- | | | | |
|-----|----|--|-----------------|
| (1) | a. | You <i>must</i> switch off your mobile phone. | [obligation] |
| | b. | You <i>mustn't</i> switch off your mobile phone. | [prohibition] |
| (2) | a. | Your mobile phone <i>must</i> be switched off. | [necessity] |
| | b. | Your mobile phone <i>can't</i> be switched off. | [impossibility] |

Explanations that have been offered for the use of epistemic *can't* are not very helpful. Palmer (1990: 61) argues that *mustn't* is not used for the negation of epistemic necessity because *can't* is supplied, and Coates (1983: 20) suggests that *can't* is used because *mustn't* is unavailable. Both “explanations” beg the question: why should *can't* be used to denote negated necessity and why should *mustn't* be unavailable? Such questions have apparently not been asked for two interrelated reasons: first, the study of modality and negation has been dominated by logic and, secondly, since the modal verbs apparently do not follow principles of logic when they co-occur with negation, their irregular behaviour seems to be unmotivated.

0.2 The logic of modality and negation

The negation of a modal sentence can affect the modality or the proposition. The negator *not* does not reveal which expression(s) are negated. The scope of negation is only visible in the paraphrases of negated modal sentences. Thus, sentence (1b) can be paraphrased as ‘it is necessary for you NOT to switch off your mobile phone’, i.e. the proposition is negated, while sentence (2b) can be paraphrased as ‘it is NOT possible that your mobile phone is switched off’, i.e. the modality is negated.

The negations of a modality and a proposition are inversely equivalent. Negating a possibility is logically equivalent to stating a necessity that something is not the case and, conversely, negating a necessity is logically equivalent to stating a possibility that something is not the case. These inverse relationships between necessity and possibility can be represented by using the following logical notations, where “ \equiv ” stands for logical equivalence, “p” for proposition, and “ \sim ” for negation.

¹ An earlier version of this paper was published in Władysław Chłopicki, Andrzej Pawelec, and Agnieszka Pokojńska (eds.), 2007, *Cognition in Language: Volume in Honour of Professor Elżbieta Tabakowska*, 224-254. Kraków: Tertium.

- | | | | |
|-----|----|---|--|
| (3) | a. | $\text{poss } p \equiv \sim \text{nec } \sim p$ | It is possible that this is true. =
It is not necessarily the case this is not true. |
| | b. | $\text{nec } p \equiv \sim \text{poss } \sim p$ | It is necessarily the case that this is true. =
It is not possible that this is not true. |
| | c. | $\sim \text{poss } p \equiv \text{nec } \sim p$ | It is not possible that this is true. =
It is necessarily the case that this is not true. |
| | d. | $\sim \text{nec } p \equiv \text{poss } \sim p$ | It is not necessarily the case that this is true. =
It is possible that this is not true. |

These four pairs of equivalence relations provide the basic system of modal concepts, and we might ideally expect to find each of these modal concepts coded by a modal verb of its own. That is, if language was built on logic, we should expect to find eight modal verbs neatly corresponding to each of these eight modal concepts. Human language is, however, structured by its own principles, and it shouldn't come as a surprise that linguistic distinctions do not match those of logic.

0.3 Motivational principles of language use

A number of communicative and cognitive principles, most of which derive from the overriding *principle of relevance*, motivate the use of language. According to the principle of relevance, the hearer assumes that the wording chosen by the speaker optimally expresses her communicative intention and does not require any unnecessary processing effort. In the case of modals and negations, this principle accounts for our preference for the non-negated modal expressions in (3a) and (3b), i.e. 'poss p' and 'nec p', over the doubly negated ones, i.e. ' $\sim \text{nec } \sim p$ ' and ' $\sim \text{poss } \sim p$ ', which require complex processing efforts. Compare the following sentences, which correspond to the logical equivalence stated under (3a):

- (4)
- | | |
|----|---|
| a. | <i>It is possible</i> that Noam Chomsky has developed a new linguistic theory. |
| b. | Noam Chomsky <i>may</i> have developed a new linguistic theory. |
| c. | <i>It is not necessarily the case</i> that Noam Chomsky has <i>not</i> developed a new linguistic theory. |

Sentences (4a) and (4b) involve affirmative modal statements. Interpreting an affirmative sentence requires less processing effort than interpreting its negated equivalent, as in (4c). As convincingly argued in blending theory (see Fauconnier & Turner 2002: Ch. 11 "The construction of the unreal"), a negation requires the activation of its corresponding counterfactual space. In processing the meaning of two negations as in sentence (4c), the hearer needs to activate two counterfactual spaces: a space in which Noam Chomsky has developed a new theory and a space in which this is necessarily the case. The meanings conveyed by the affirmative sentences (4a) and (4b) are not only more transparent than that of the doubly negated sentence (4c), but the wordings used in them are also considerably shorter. The use of affirmative sentences as opposed to doubly negated sentences is thus also motivated by the *principle of clarity* and the *principle of economy*.

The affirmative concept 'possible that p' is in (4a) expressed by the modal clause *it is possible that* and in (4b) by the modal verb *may*. The modal verb *may* represents a unitary linguistic category. Categories that are lexicalised express collections of particularly meaningful and relevant experiences. According to the *principle of meaningfulness*, the modal verb *may* has thus been formed because it expresses a meaningful and relevant modal concept. The concept 'not necessary that not' does not represent a similarly meaningful and relevant

concept: hence there is no modal verb available to express this notion. Although such doubly negated modal concepts are rarely coded as simple lexicalised categories they convey distinct meanings of their own and occupy their specific ecological niches within the system of modality. While affirmative modalities only express the potentiality that a state of affairs holds, their negated counterparts involve further assumptions underlying the modal statements. Thus, sentence (4c) carries the assumption that Noam Chomsky has developed, or has the potential to develop, new linguistic theories.

A cognitive principle that has tacitly been adduced in explaining the distribution of modal forms is the *principle of isomorphism*. According to this principle, there is a close connection between a form and its meaning. Ideally, one form is matched by one meaning and the same or similar meanings are expressed by the same form. The “explanations” for the irregular behaviour of *mustn’t* and *can’t* cited above tacitly assume that their use is (solely) governed by the principle of isomorphism: if a modal verb is available to express a particular modal concept, it pre-empts the use of another modal verb and, conversely, if no modal verb is available to express a particular modal concept, another modal verb may be used. The principle of isomorphism is certainly a motivating factor in language, but it is in conflict with another, and probably more powerful, motivating factor: the *principle of polysemy*. Polysemy is the most economic solution to deal with the infinity of concepts while keeping the stock of lexical expressions at a minimum. Polysemy is also a pervasive phenomenon in modality: all modal verbs are polysemous, and the challenge for cognitive linguists working on modality is to account for motivated links between their senses.

Probably the most important cognitive contribution to our understanding of modality is its characterisation in terms of *force dynamics*, i.e. the opposition of forces and counterforces or barriers. We experience force dynamics in the physical world when the wind blows our precious manuscript off the table, when we lift a suitcase (which the force of gravity pulls down), and when we bang our head against the door frame of an old cottage. Force-dynamic situations are not only ubiquitous in the physical world but, as has been shown by Johnson (1987), Talmy (1988), Sweetser (1990) and other cognitive linguists, also apply to the sociophysical world of root modality and the epistemic world of reasoning. The force constellations that characterise kinds of modality are thus experientially motivated.²

Studies of modality in terms of force dynamics have mainly been concerned with affirmative uses of modals. Their force-dynamic constellations are based on forces, counterforces and barriers that are lifted. As will be shown below, the force-dynamic notion that is central to negated modality is that of blockage. The following force-dynamic analysis of negated modals will always depart from their affirmative uses. It will, however, only be concerned with simple negations. Moreover, the analysis will be restricted to deontic modality³ and epistemic modality.

0.4 Affirmative and negated deontic and epistemic modality

Deontic modality is concerned with the speaker’s directive attitude towards an action to be carried out and mainly includes obligations and permissions, as in (5a). *Epistemic modality* is

² For types of motivation see Radden & Panther (2004).

³ Deontic modality is one type of root modality, which also comprises intrinsic and disposition modality (Radden & Dirven 2007). Intrinsic modality is concerned with potentialities arising from speaker-external sources, as in *The job must/can be done*, which can be paraphrased as ‘It is necessary/possible for the job to be done’. Epistemic modality, by contrast, is paraphrasable by ‘It is necessarily/possibly the case that X’, as in *It is necessarily the case that this is true*. Disposition modality includes the notions of ‘ability’ or ‘propensity’ and ‘willingness’. These notions are also expressed by modal verbs, as in *I can play the guitar*, but are, strictly speaking, not modalities since they do not *refer* to potential situations but only *evoke* them, i.e. if I can play the guitar I am likely to do so.

concerned with the speaker's inferred assessment of the potentiality of a state of affairs and mainly includes epistemic necessities and possibilities, as in (5b).

- (5) a. You must / may go. [deontic modality]
b. This must / may be true. [epistemic modality]

The comparison between deontic and epistemic modality will be restricted to the basic modal verbs expressing these modalities, i.e. *must*, *have (got) to*, *need to*, *may* and *can*. These are also the modal verbs which display the most striking irregularities under negation. In their affirmative uses, the same modal verbs are used to denote the same types of deontic and epistemic modality, as illustrated in Table 1. In both types of modality, *must* and *may* denote subjective, or speaker-internal, attitudes and assessments, while *have (got) to*, *need to* and *can* denote attitudes and assessments that are based on objective, or speaker-external, sources. These two uses of modality and the modals expressing them will be described as 'subjective' and 'external'. In their negated uses, the negation may affect the proposition or the modality. The theoretically possible slots for negated modals are listed in Tables 2 and 3. The numbering of the types of modality corresponds to the section in which they are discussed.

Table 1: Affirmative basic deontic and epistemic modals

1 Deontic modality		Subjective	External
1.1 obligation	obl p	<i>must</i>	<i>have to, need to</i>
1.2 permission, enablement	perm p	<i>may</i>	<i>can</i>
2 Epistemic modality		Subjective	External
2.1 necessity	nec p	<i>must</i>	<i>have to</i>
2.2 possibility	poss p	<i>may</i>	

Table 2: Negation of basic deontic modals

Negated deontic modality		Subjective	External
1.1.1 prohibition	obl ~p	<i>mustn't</i>	
1.1.2 exemption from obligation	~obl p		<i>don't have to, need not</i>
1.2.1 permission not to act	perm ~p	<i>may not</i>	
1.2.2 refusal of permission	~perm p	<i>may not</i>	<i>can't</i>

Table 3: Negation of basic epistemic modals

Negated epistemic modality		Subjective	External
2.1.1 necessity that not	nec ~p		
2.1.2 exemption from necessity	~nec p		<i>don't have to, need not</i>
2.2.1 possibility that not	poss ~p	<i>may not</i>	
2.2.2 impossibility	~poss p		<i>can't</i>

The distribution of the modals and their negation raises a number of questions which are in need of explanation. For example, why is the modal *mustn't* used to describe subjective prohibition (1.1.1) but not a subjective necessity that something is not the case (2.1.1)?; why is the modal *can* used to denote external permission/enablement (1.2) but not external possibility (2.2)?; why is the modal *may not* used to denote subjective refusal of permission (1.2.2) but not subjective impossibility (2.2.2)? These specific questions will be dealt with in the discussion of the individual modals below.

Tables 2 and 3 also reveal a general pattern in the distribution of negated modals: with the exception of deontic *may not* in the sense of refusal of permission (1.2.2), subjective

modals are used to negate the proposition while external modals are used to negate the modality. Why should this be? An explanation for this striking division of labour between subjective and external modals will be offered in the conclusion of this paper.

1 Deontic modals and their negations

1.1 Obligations and their negations

Obligations are binding forces that are seen as compelling a person to carry out a certain action. The binding force may be a person, typically the speaker, or external circumstances. This distinction is reflected in the use of *must* for subjective obligations and *have (got) to* and *need to* for external obligations. Obligations involve the force-dynamic constellation of compulsion.

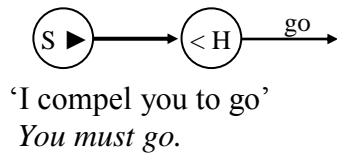
1.1.1 Subjective obligation (*must*) and prohibition (*mustn't*)

In subjective obligations, a person in authority (typically the speaker) compels a weaker person (typically the hearer) to carry out an action (p) against his will. The speaker's motivation for imposing an obligation may be rational or irrational, and to the hearer an obligation may appear to be comprehensible or incomprehensible, expected or unexpected, etc. All that counts in an obligation is the asymmetric force relationship.

In the figures representing force-dynamic constellations the following symbols are used: a stronger force is indicated by the bold “►” sign and a weaker counterforce by the “<” sign, the direction of a force is represented as a straight arrow and an intended but not realised direction as a broken arrow, a barrier blocking a force is represented by a vertical line, entities that are crucially involved in a force-dynamic constellation are, together with their force tendencies, indicated by circles, and speaker and hearer are abbreviated as “S” and “H”, respectively.

Figure 1(a) represents the force-dynamic constellation underlying an obligation, as in *You must go*. Here, the speaker is the source of the obligation, hence the obligation is subjective. The meaning of a subjective obligation might be read as ‘the force of my (the speaker's) authority compels you (the hearer) to do X’, i.e. the speaker's force is stronger than that of the hearer so that the hearer will have to perform the action demanded of him (i.e. to go).

(a) Obligation (obl p)



(b) Prohibition (obl ~p)

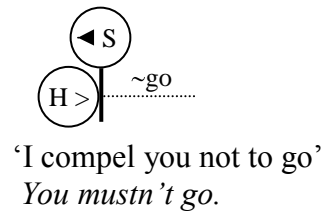


Figure 1: Subjective obligation and (subjective) prohibition

Figure 1(b) represents the force-dynamic constellation underlying a subjective prohibition, as in *You mustn't go*. A prohibition is an obligation imposed upon a person not to carry out an action. The speaker assumes that the hearer wants to, or may want to, perform a particular action and, due to his greater authority, blocks him from doing so. The bold vertical line in the figure indicates that the speaker (S) bars the hearer (H) from performing his own intended action, which is indicated by the dotted line. The prohibition expressed by *You mustn't go* might thus be read as ‘the force of my authority compels you not to do X’ or ‘bars you from doing X’. The negation in the modal *mustn't* applies to the proposition and not to the

modality, which is indicated by \sim go. *Mustn't* thus expresses the concept 'obl \sim p'. An explanation for this use of *mustn't* is given in Section 1.1.3.

Subjective obligations and prohibitions may be imposed irrespective of the hearer's intention to perform or not to perform the action, i.e. the speaker may impose them for purely precautionary reasons. Prohibitions are always imposed by people, not by external circumstances (see Section 1.1.3). External modals like *don't have to* do not describe prohibitions but exemptions from an obligation (see below).

1.1.2 External obligation (*have to*) and exemption from obligation (*don't have to*)

Externally imposed obligations arise from circumstances such as rules, norms, or the intrinsic disposition of people or things. In social interactions, external obligations are generally felt to be less compelling and hence less face-threatening than obligations imposed by the speaker.⁴ External obligations are expressed by *have (got) to* and, for weaker obligations, *need to*. Thus, the subjective obligation expressed by *must* in sentence (6a) is felt to be more compelling than the external obligation expressed by *have to* in sentence (6b), which invokes external norms set for exams. An even less compelling obligation would be expressed by *need to* in sentence (6c), which invokes a person's internal disposition and sounds more like a well-meant piece of advice.⁵

- (6) a. This is what you *must* know to pass your exam.
 b. This is what you *have to* know to pass your exam.
 c. This is what you *need to* know to pass your exam.

Figure 2(a) represents the force-dynamic constellation underlying external obligations, as in *You have to go/ need to go*. The compelling forces of external obligations are lasting and unalterable circumstances and hence accepted as facts of the way the world is structured. Unalterable circumstances would be the coldness in the winter so that we *have to* wear a coat or our feeling of hunger so that we *need to* eat. Their expression by the stative verbs *have* and *need* is thus well-motivated. The source of external obligations as well as external exemptions is typically indeterminate, which is indicated by the force signs " \blacktriangleright " and " $<$ " without circles.

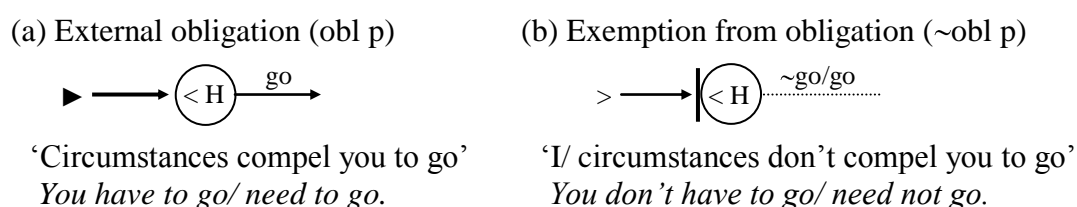


Figure 2: External obligation and exemption from obligation

Figure 2(b) represents the force-dynamic constellation of an exemption from an obligation, as in *You don't have to go/ need not go*. An exemption presupposes the existence of an obligation which, however, does not apply in a particular case. Thus, *You don't have to pay*

⁴ The system of compelling modals has undergone dramatic changes in the last 200 years, especially in American English. Up to the early 19th century, the only strong obligation marker was *must*. By now the semi-modals (*have*) *got to* (53%) and *have to* (39%) have almost completely ousted *must*, which now only accounts for 8% of the compelling modals. These shifts have been attributed to two major factors in American English: "colloquialisation" and "democratisation", i.e. emphasis on equality of power (see Myhill 1996).

⁵ Cf. Sweetser (1990: 53f), who, following Talmy, points out that *have to* "has more of a meaning of being obliged by extrinsically imposed authority", while "*need* implies that the obligation is imposed by something internal to the doer." Hence, *You have to stay home, because I say so* can be said, whereas **You need to stay home, because I say so* sounds odd.

income tax presupposes that you are obliged to pay income taxes like everybody else but that, due to a person's authority or fortunate circumstances, you are exempted from this general obligation. As a result, you no longer have to perform the action of paying taxes, which you would have been compelled to perform. We may, of course, feel that we owe the state a share of our income and nevertheless pay income tax. In the figure, the vertical line indicates that the circumstances block the compelling force of the obligation, giving the hearer the freedom to act or not to act. Exemptions from an obligation as described by the external modals *don't have to*, *haven't got to* and *need not* thus affect the modality and not the proposition.

1.1.3 Summary of deontic compelling situations

It may be helpful at this point of discussion to summarise the interim findings on deontic compelling situations within the force-dynamic framework. *Obligations* were characterised as modal situations in which a person in authority or external circumstances compel another person to perform an action against his will, i.e. the force of an obligation can be subjective (*must*) or external (*have to*). The force-dynamic counterpart of an obligation is a prohibition. *Prohibitions* are modal situations in which a person in authority, or rules or regulations compel another person *not* to perform an action. Unlike obligations, however, prohibitions are always imposed by humans and not by external circumstances. This also applies to rules and regulations which state prohibitions at a more generalised level. Rules and regulations are set by persons in authority in order to prescribe people's conduct and thereby delimit their actions. For example, a highway code specifies a rule that *You **must not** drive with a blood alcohol level of more than 80 mg/100ml*. Prohibitions are thus goal-directed and always subjective; hence they are expressed by *mustn't*, not by *don't have to*. The preceding section has shown that we may be exempted from an obligation. *Exemptions* are modal situations in which a person in authority or external circumstances exempts another person from being subjected to an obligation, i.e. the compelling force of an obligation is blocked. Both subjective and external exemptions are expressed by *don't have to*; the use of *must not* for subjective exemptions is pre-empted because it is already reserved for prohibitions. These three deontic compelling situations and the modals expressing them are listed in Table 4.

Table 4: Obligations, prohibitions and exemptions

	obligation obl p	prohibition obl ~p	exemption ~obl p
subjective	<i>must</i>	<i>mustn't</i>	<i>don't have to</i>
external	<i>have to</i>	∅	<i>don't have to</i>

The lexical distinction made between the sources of an obligation reflects the social impact an act of obligation is felt to have. It may be of paramount importance to communicate whether an obligation is imposed by a person or is due to external circumstances; hence the two modal forms *must* and *have to* in English. Prohibitions, by contrast, can only be set by humans, be it directly or via rules; hence there is no need for a modal denoting external prohibition. The concept of an externally determined prohibition does, however, exist. This meaning may be implicated when external circumstances are said to prevent a person from doing something, as in *You can't come in*, which may be interpreted as meaning 'external circumstances compel me not to let you in'. The prevention of an enablement (see Section 1.2.2) may thus have the illocutionary force of a prohibition, so that *can't* fills the conceptual gap of external prohibition. Lastly, English does not distinguish between exemptions granted by humans and exemptions inherent in the circumstances. The modal forms used for both, i.e. *don't have to*, *haven't got to* and *need not*, suggest external circumstances as their sources. The distinction

between subjective and external sources may, of course, be relevant in communication. Imagine the following fictitious dialogue:

- (7) Mother to her daughter: “Billy, you *must* visit your grandma on her birthday.”
Grandmother to Billy: “It would be very kind of you, Billy, but you *don’t have to*.”

The mother invokes her parental authority and states her obligation by using the subjective modal *must*. Grandmother, however, would prefer to see her grandson visit her of his own free will and therefore “exempts” him from the obligation laid by his mother. Her exemption is expressed by the external modal *don’t have to*, which, however, may also be understood subjectively. This meaning can also be expressed explicitly by saying “You don’t have to visit me, *not because of me*” or “*not for my sake*”, etc. The sense of subjective exemption is thus included in the overall use of the external modal *don’t have to*.

1.2 Permissions and their negations

Permissions refer to the speaker’s attitude towards a person’s potential action, which the speaker does not prevent the person from performing. As with obligations, the source of a permission may be subjective or external to the speaker. For example, an applicant’s inquiry about the possibility of still submitting a paper for a conference may be answered by personally granting permission, using *may* as in (8a), or by hinting at external circumstances, using *can* as in (8b).

- (8) a. You *may* still submit a paper.
b. You *can* still submit a paper.

In sentence (8a), a person in authority, for example the organizer of the conference, relinquishes his power to turn down the request and thus gives a promising young scholar the chance to present her research on palatal glides in Old Georgian. This is the type of situation we normally associate with permission-granting. In situation (8b), external circumstances such as an extended deadline enable scholars interested in attending the conference to submit their papers at a later point in time. The organizer merely informs the applicant that external circumstances apply but does not strictly grant permission herself. In terms of force dynamics, this situation represents an enablement. As pointed out by Sweetser (1990: 53), both aspects exert similar influences on a situation and tend to overlap.⁶ Thus, *may* of permission may also be thought of as enabling a person, and *can* of enablement may also be thought of as removing a restriction. Since enabling a person is less face-threatening than imposing a restriction, the use of *can* has become a more casual and politer form of expressing permissions than *may*. In their use with negations, however, the conceptual distinction between permissive *may* and enabling *can* is still preserved.

1.2.1 Permission (*may*), permission not to act (*may not*), and refusal of permission (*may not*)

Permissions which are based on the speaker’s authority involve his removal of a potential barrier restraining the hearer’s action, as sketched in Figure 3(a).

⁶ Sweetser (1990: 53) illustrates the difference in meaning between *can* expressing ‘positive enablement’ and *may* expressing ‘removal of restriction’ by analogy to a car. A positive enablement is comparable to a full gas tank, and a negated restriction is comparable to an open garage door. Both aspects are normally present in permissions.

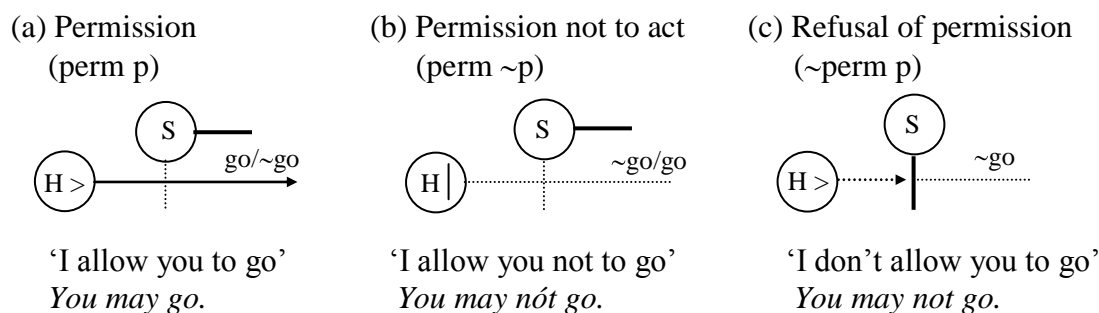


Figure 3: Permission, permission not to act, and refusal of permission

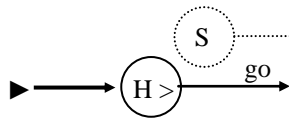
May is the only modal that allows the two scopes of negation: negation of the proposition, i.e. permission not to act, and negation of the modality, i.e. refusal of permission. Normally people ask for permission when they want to do something rather than when they want to refrain from doing something. Permitting a person not to act is therefore a rare situation. There is, in fact, no need to code this notion because an act of permission-granting includes the possibility of not carrying out the act permitted. Figure 3(b) represents the force-dynamic constellation underlying a ‘permission not to act’. With respect to its result, this constellation is identical to that of a ‘permission to act’; they only differ with respect to the permission-seeker’s wish to act or not to act, which is indicated in Figure 3(b) by the vertical line in the hearer’s circle. The concept ‘be permitted not to act’ is therefore not lexicalised by a modal verb of its own. Yet, this concept has its ecological niche in its contrast to ‘be permitted to act’. For example, a smoking area might be designated as *You may not smoke here*, where *nót* would be stressed in speech. Needless to say, such situations have an ironic ring.

A permission may be refused on the basis of a person’s authority, by using *may not*, or on the basis of external circumstances, by using *can’t*. The subjective refusal of permission, diagrammed in Figure 3(c), is the exact counterpart of an act of permission-granting. In terms of force-dynamics, the speaker closes a barrier and thus blocks the weaker force of the permission-seeker. This authoritarian use of *may* in permission refusals is pragmatically motivated. The inherent asymmetric power relationship between permission-seeker and permission-granter may, in certain contextual situations, be understood in a directive sense. For example, a judge who announces that “The next witness *may* come in” does, of course, not leave it up to the witness to come in or not to come in; nor does the teacher who says to a student “You may go on reading” intend to give him the option to decline.

1.2.2 Enablement (*can*) and prevention of enablement (*can’t*)

As observed in Section 1.2.1 above, situations such as *You can go* involve a person’s enablement due to external circumstances and do not, or not primarily, depend on the speaker’s granting permission. In its force-dynamic constellation in Figure 4(a), the hearer’s force of enablement is not barred and the speaker only plays a marginal role: he may report or endorse the state of affairs but does not strictly permit the enabling event. In the figures below, the speaker’s marginal role is indicated by a dotted circle.

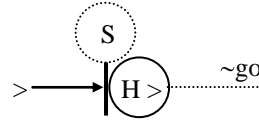
(a) Enablement (perm p)



‘Circumstances enable you to go’

You can go.

(b) Prevention of enablement (\sim perm p)



‘Circumstances don’t allow you to go’

You can’t go.

Figure 4: Enablement and prevention of enablement

Figure 4(b) represents the force-dynamic constellation of the prevention of an enablement, as in *You can’t go*. The stronger force of external circumstances and/or possibly the speaker’s authority bar a person’s enablement to act. Being prevented from carrying out one’s plans due to adverse circumstances is a very common situation, whereas situations in which circumstances enable us not to act are rather unusual. It therefore does not come as a surprise that *can’t*, just like the negated obligation modals *don’t have to* and *need not*, only affects the modality and is not used to negate the proposition, i.e. it does not mean ‘enable a person not to act’.

The prevention of an enablement (*can’t*) is close in meaning to a refusal of permission (*may not*) and, due to the equivalence relation ‘ \sim perm p \equiv obl \sim p’, to a prohibition (*mustn’t*). In all three situations, a person’s desired act is blocked from taking effect. As should be expected, each of the three negated modals presents the situations in its own force-dynamic way. Consider the following sentences:

- (9) a. You *can’t* come in. Not with that dog.
 b. You *may not* come in. I have nothing to say to you.
 c. You *mustn’t* come in. We mustn’t disturb my parents.

In using *can’t* in (9a), the speaker refuses permission by appealing to external circumstances such as rules of the house that prevent her from admitting the visitor into the house; in using *may not* in (9b), the speaker’s denial of permission rests on her own decision; and in using *mustn’t* in (9c), the speaker intimates that there is a strong compelling force prohibiting her from letting the person come in.

2 Epistemic modals and their negations

Cognitive-linguistic studies of modality have shown that epistemic and deontic modality are based on similar force-dynamic constellations. It is, therefore, not surprising that modal verbs systematically display deontic/epistemic polysemy. The controversial issue of the nature of the motivated link between the two types of modality shall be of no concern here.

2.1 Necessities and their negations

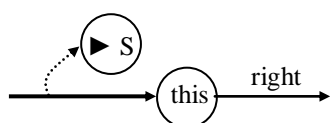
An assessment of epistemic necessity comes close to factual reality but still involves an inferential process: the speaker infers from available evidence that only one possible conclusion can be drawn. As argued by Langacker (1991: 273-81), epistemic judgements are typically based on what he describes as an “evolutionary momentum”. In conclusions which are assumed to be necessarily the case, the evolutionary momentum is very powerful. For example, confronted with the task of hooking up a DVD-player to a TV set, we will carefully follow the instructions step by step, and when all the cables are connected, the evolutionary momentum of our work allows us to proudly announce: “This must be right now”—maybe

with a little tinge of uncertainty left. As has been shown by Sweetser (1990), the force-dynamic constellation of epistemic necessity corresponds to that of obligation: the evolutionary momentum corresponds to the imposer's force, the tinge of uncertainty left corresponds to the hearer's unwillingness to act, and the conclusion reached corresponds to the enforced action. Like deontic attitudes, epistemic assessments may be based on subjective or external sources.

2.1.1 Subjective necessity (*must*)

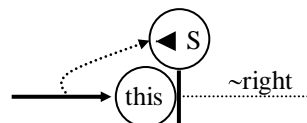
The notion 'subjective necessity' is understood in the sense of the only possible conclusion a speaker is compelled to draw from available evidence. This epistemic situation is expressed by using *must*, as in the sentence *This must be right*. This force-dynamic constellation is sketched in Figure 5(a), where the bold arrow indicates an evolutionary momentum which serves as evidence for the speaker's assessment, indicated by the broken arrow. The evolutionary momentum is thought of as evolving of its own and not as being propelled by an external force; hence the drawing of this constellation does not include an external force sign.

(a) Necessity (nec p)



'Evidence compels me to conclude that this is right'
This must be right.

(b) Necessity that not (nec ~p)



'Evidence compels me to conclude that this is not right'
(**This mustn't be right.*)

Figure 5: Subjective necessity and necessity that not

The epistemic concept ' \sim nec p' is, like the deontic concept ' \sim obl p', not expressed by *mustn't* but by one of the external modals (see Section 2.1.2 below). Surprisingly, however, the epistemic concept ' $\text{nec } \sim$ p' is not expressed by *mustn't* either, although the corresponding deontic concept ' $\text{obl } \sim$ p' is coded by *mustn't* and describes a prohibition. Figure 5(b) represents the force-dynamic constellation of the concept of a necessity that something is not the case, as in *It is necessarily the case that Jack isn't back home*. Why should *mustn't* not be available to express this epistemic situation, i.e. why don't we normally say **This mustn't be right* or **Jack mustn't be back home*?⁷ Like affirmative *must*, negative *mustn't* would invoke an inferential process in which evidence compels the speaker to draw the only possible conclusion. Evidence normally allows us to draw positive conclusions, i.e. that something is the case. For example, when Jack's car is parked in front of his house we will normally infer that *he* parked it there, and when the lights in the living-room have been turned on we will infer that *he* (or some member of his family) did so. Negative conclusions, i.e. that something is not the case, are normally drawn, not from positive evidence, but from negative evidence, i.e. lack of evidence. Thus, when Jack's car is *not* parked in front of his house or the lights in the living-room are *not* on, we may infer that Jack is not home. However, missing evidence does usually not lead to one possible conclusion only: the car may not be parked in front of Jack's house because it is at a car repair shop, and the lights may not be on because Jack is taking a nap. Since lack of evidence is rarely conclusive, the use of epistemic *mustn't* is not licensed. It is probably for this reason that the notion ' $\text{nec } \sim$ p' is commonly rendered by its

⁷ Palmer (1990: 61) concedes that *mustn't* may be used instead of *can't* where it is important to make a judgement in terms of necessity rather than possibility, as in *He mustn't be there after all* in the sense of 'The only possible conclusion is that he is not there'.

logically equivalent concept ‘ \sim poss p’, as in *Jack can’t be back home*, i.e. as the negation of a possibility (see Section 2.2.2 below).

2.1.2 External necessity (*have to*) and exemption from necessity (*don’t have to*)

Like obligations, necessities may be based on the force of speaker-external circumstances and are then expressed by *have (got) to*. Leech (1971: 77) describes the difference in meaning between epistemic *must* and *have (got) to* as that of ‘factual necessity’ versus ‘theoretical necessity’. These two types of necessity may be illustrated with the answers given to a multiple-choice question. In picking the answer we are almost certain to be the correct one we stick to facts as we know them, while by excluding the answers that appear to be incorrect we deduce the correct answer as the only one left. A person using the “factual” method might say *This must be the correct answer*, while a person adopting the “theoretical” method might say *This has (got) to be the correct answer*.⁸ The compelling force leading to a theoretical necessity as expressed by *have to* is stronger than that leading to a factual necessity, as expressed by *must*. In terms of force dynamics, a factual necessity is based on evidence, while a theoretical necessity is arrived at by deduction from external circumstances which may be seen as having an internal power of logic. The force constellation of an affirmative external necessity is diagrammed in Figure 6(a).

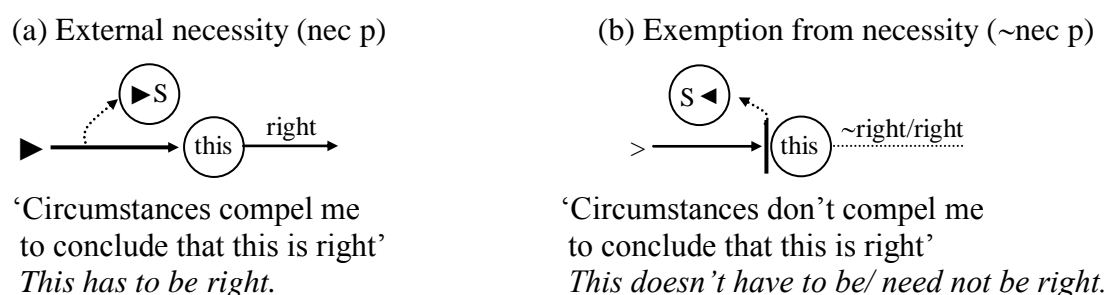


Figure 6: Subjective necessity and necessity that not

Figure 6(b) represents the force-dynamic constellation of an exemption from necessity. The negation of a modal of external necessity affects the modality. Thus, *This doesn’t have to be right* means that ‘it is not necessarily the case that this is right’, i.e. the speaker may conclude that this is right, as assumed before, or wrong. The epistemic concept ‘ \sim nec p’ corresponds to the deontic concept ‘ \sim obl p’, i.e. an exemption from an obligation. The concept ‘ \sim nec p’ may be seen as an exemption from a necessity established by rules, beliefs or conditions that normally hold but do not necessarily apply to this particular case. For example, a student taking a course on Cognitive Grammar may be surprised to discover that *grammar doesn’t have to be boring*. The student thus exempts the cognitive approach to grammar from the general belief that grammar is necessarily boring.

⁸ The following problem and answer taken from a Yahoo site on Words and Wordplay may serve as an illustration of the method of arriving at a solution by exclusion.

Choose the sentence in which the italicized pronoun agrees in number with its italicized antecedent.

A. Maureen called the children for his meal.
B. The boys want their dessert now.
C. Mary and Jill won’t eat her vegetables.
D. The waiter refilled their glasses as they emptied it.

Best Answer - Chosen by Voters

The answer is B. The italics didn’t show, but the other sentences aren’t correct so **that has to be the correct answer**. [bold print G.R.]

Modals of necessity do not negate the proposition. In Section 2.1.1 we saw that the subjective modal *mustn't* is hardly used to express the concept ‘nec $\sim p$ ’, and the external modals *don't have to* or *need not* are even less suited to describe the meaning ‘circumstances compel me to draw the conclusion that this is not the case’, since these modals are already pre-empted to express the meaning of “epistemic exemption”. In the same way that, as argued in Section 1.1.3, we do not think of circumstances compelling us not to act (‘obl $\sim p$ ’), we do not think of external circumstances compelling us to conclude that something is not the case. Here the logical equivalent ‘ \sim poss p ’, i.e. rejecting a possibility, and its expression by *can* provide a viable alternative for both the subjective and external versions of the concept ‘nec $\sim p$ ’—although their meanings are, of course, not identical.

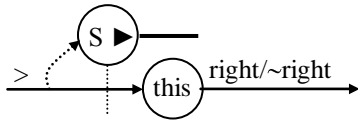
2.2 Possibilities and their negations

Epistemic possibilities correspond to deontic permissions. However, the behaviour of both affirmative and negated modals reveals fundamental differences between the world of social interaction and the world of reasoning.

2.2.1 Subjective possibility (*may*) and possibility that something is not the case (*may not*)

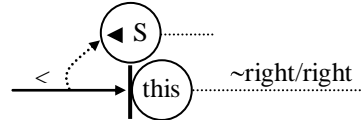
The force-dynamic constellation of subjective possibility corresponds to that of subjective permission: the permission-seeker’s force corresponds to the force of the evolutionary momentum, and the permission-granter’s authority in relinquishing his force corresponds to the speaker’s relinquishing of potential counter-evidence in his reasoning. This force-dynamic constellation, in which the speaker lifts a barrier in reasoning, is sketched in Figure 7(a).

(a) Subjective possibility (poss p)



‘Evidence makes me deem it possible that this is right’
This may be right.

(b) Subjective possibility that not (poss $\sim p$)



‘Evidence makes me deem it possible that this is not right’
This may not be right.

Figure 7: Subjective possibility and ‘possibility that not’

The negated modal of a subjective possibility only negates the proposition, i.e. it describes a possibility that a speaker deems not to be the case. In Figure 7(b) this meaning is indicated by the barrier closed by the speaker. This force-dynamic constellation is comparable to that of a permission not to act. However, while granting a person permission not to do something is a rather anomalous situation, thinking of the possibility that a state of affairs does not hold is a perfectly common situation. It applies to situations where the speaker feels that contradictory evidence outweighs confirming evidence. It is thus only natural for epistemic *may* and *may not* to denote different things: *may* conveys a higher degree of assessed likelihood than *may not*. This can be seen from the contexts in which each form may occur. *May*, but not *may not*, readily co-occurs with *yes*, as in *Yes, that may be true*, while *may not* is more likely to co-occur with *no*, as in *No, that may not be true*.

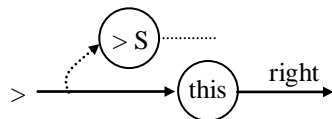
May not is not used to negate a possibility, i.e. it does not express the idea that ‘evidence does not make me deem it possible that this is the case’. In this respect its epistemic use differs from its deontic use, where *may not* is used to express a refusal of permission. What makes the deontic concept ‘ \sim perm p ’ more appropriate to be expressed by a modal verb than

its corresponding concept ‘ \sim poss p’? In Section 1.2.1 we conjectured that the motivation for using *may not* in a directive sense might be the asymmetric power relationship between the permission-seeker and the permission-granter. There is, of course, no inherent asymmetry between a state of affairs that is deemed possible and another one that is deemed not possible: both are balanced against each other in the speaker’s assessment. The subjective notion of ‘not deeming something possible’ is, therefore, like that of ‘not concluding that something is the case’, covered by its corresponding external notion and expressed by *can’t*, as in *This can’t be true*.

2.2.2 External possibility (*can*) and its negation (*can’t*)

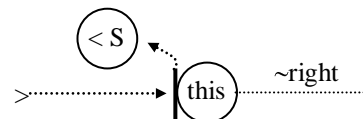
External possibilities correspond to external permissions, which involve the notion of enablement. Here, however, social interaction and reasoning differ markedly. In the deontic world, a distinction between (subjective) permission as in *You may go* and (external) enablement as in *You can go* is experientially well motivated: in situations of permission the speaker has the authority to bar the hearer from acting, whereas in situations of enablement the speaker cannot bar the hearer from acting but is still somehow involved as a kind of permission-giver (see Section 1.2.2). In the epistemic world, we may, as seen above, bar potential counter-evidence in our assessment of a possibility in sentences like *It may not be right*, but once a thought is accepted by us as valid it is valid. This especially applies to circumstances which are seen as unalterable and absolute. For example, a friend may advise you not to eat fast food because there is a high probability that it will make you fat. She may express her piece of advice as a possibility by using *can* (*Fast food can make you fat*) but, since she has already internalised this idea as valid, she may as well describe it as a downright assertion: *Fast food makes you fat*. The sense of external possibility which *can* expresses, or would express if it were commonly used, comes very close to the compelling meaning of external necessity or asserted truth. The use of *can* of possibility is therefore conceptually not required, but it is not excluded either: it is mainly used in generic statements such as *Smoking can be hazardous to your health*. Its force-dynamic constellation is represented in Figure 8(a).

(a) External possibility (poss p)



‘Circumstances make me deem it possible to be right’
(*³This can be right.*)

(b) Impossibility (\sim poss p)



‘Circumstances bar me from deeming this to be right’
This can’t be right.

Figure 8: External possibility and impossibility

The sense of ‘external possibility’ of the modal *can* is almost exclusively restricted to its negated form *can’t*. Its negation only affects the modality (‘ \sim poss p’), i.e. *can’t* describes an impossibility. Deeming something impossible is extremely common in our reasoning. Epistemic *can’t* is not only used in opposition to external possibility, but also in opposition to subjective possibility and to subjective and external necessity, as demonstrated in Table 5.

Table 5: Uses of epistemic *can't*

	Affirmative		Negative	' \sim poss p'
external	'poss p':	<i>?This can be right.</i>	' \sim poss p':	<i>This can't be right.</i>
subjective	'poss p':	<i>This may be right.</i>	' \sim poss p':	<i>This can't be right.</i>
external	'nec p':	<i>This has to be right.</i>	'neg \sim p':	<i>This can't be right.</i>
subjective	'nec p':	<i>This must be right.</i>	'neg \sim p':	<i>This can't be right.</i>

The notion 'impossibility' invokes assumptions about the way the world is, or rather is not, structured. In conversation, a negated utterance is normally used in response to an affirmative utterance. This means that when a speech participant wants to refute another participant's assessment, she invariably invokes the structure of the world when she uses a negated modal verb, which can only be *can't*. In its ubiquitous use of *can't* epistemic modality differs most markedly from deontic modality, where *can't* is only used to negate external modalities, i.e. prevention of an enablement (1.2.2) and, as a suppletive form, external prohibition (1.1.1).

3 Conclusions

The force-dynamic analysis of the negated basic modals of English allowed us to see that most of their seemingly erratic uses are motivated. We should now also be in the position to answer the question posed in Section 0.4: why are subjective modals (*mustn't* and *may not*) used to negate the proposition while external modals (*don't have to*, *haven't got to*, *need not* and *can't*) are used to negate the modality?

Conceptually, a modal situation consists of the modality component and the proposition, and an affirmation or negation affects both the modality and the proposition. The function of modality is to locate a situation in potential reality. The modality of a situation is, therefore, external to the proposition and most directly affected by an affirmation or negation.⁹ The proposition, by contrast, is dependent on the modality; it is therefore normally only indirectly affected by an affirmation or negation, but may also be directly affected. In affirmative modal situations, the affirmation directly affects the modality positively and indirectly affects the proposition positively as well. Thus, in the obligation *You must go*, we expect you to go, and in the permission *You may go*, you are more likely to go than to stay.

Negated modal situations are more complex. In negations of the modality, the negation directly affects the modality and indirectly the proposition. Thus, in the refusal of permission *You can't go*, we expect you not to go, and in the exemption of an obligation *You don't have to go*, we expect you not to go without excluding the possibility that you may go. In negations of the proposition, the overall affirmation of the situation affects the modality positively but does not affect the proposition—the proposition is directly affected by the negation. Thus, the prohibition *You must not go* represents an obligation in which we expect you not to go, and a permission not to act as in *You may not go* represents a permission in which you are more likely to stay than to go.

These three types of situations are represented in Table 6. It may be a coincidence that the negator and the unit affected by it are ordered iconically: in the negation of the modality as in *don't have to*, *not* precedes the modal verb, and in the negation of the proposition as in *must not*, *not* precedes the verb of the proposition.

⁹ This view also applies to the structure of language. Thus, in the tradition of Generative Semantics, modals have been treated as higher predicates dominating the embedded sentence.

Table 5: Affirmation and negation in modal situations

	situation	modal verb	modality	proposition	example
(a)	affirmation	non-negated	positive	positive/negative	permission <i>may</i>
(b)	negation	negated	negative	negative/positive	exemption: <i>don't have to</i>
(c)	negation	negated	positive	negative	prohibition: <i>must not</i>

(a) Non-negated modals (*must, have to, may, can*) directly affect the modality and indirectly the proposition. The modality is always positive, and the proposition is, as a rule, also positively affected but does not exclude a negative outcome in human acts of permission-granting and assessments of possibility. External circumstances, on the other hand, are subject to physical laws or social rules and hence are only thought of as having a positive outcome.

(b) Negated modals that directly affect the modality describe exemptions from an obligation or necessity (*don't have to, need not*), refusals of permission (*may not, can't*), and impossibilities (*can't*). Their negative modality typically leads to a negative proposition, without excluding a positive outcome in exemptions that involve humans. Thus, a person who is advised that he doesn't have to take a taxi may follow your advice and walk to his hotel or may take a taxi anyway.

(c) Negated modals that directly affect the proposition describe prohibitions (*mustn't*), permissions not to act (*may not*), and possibilities that something is not the case (*may not*). These modal situations necessarily involve the goal-directed power of humans, who are able to direct a person to a negative goal or allow their reasoning to come to a negative conclusion.

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