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MODAL VERBS AND NEGATION IN ENGLISH: A COGNITIVE PERSPECTIVE

ABSTRACT

This paper is a preliminary report of my research project to reveal syntactic structures of English sentences from theoretical perspectives: Generative Grammar and Cognitive Grammar. Towards this research goal, the aim of this paper is two-fold: to provide a descriptive analysis of modal verbs, may, can, must, and negation in English; to provide a theoretical analysis of these constructions by virtue of metaphorical extension and Force dynamics and Subjectification in the cognitive framework.

First, scrutinizing descriptive and theoretical studies concerning these constructions in past literature, this paper examines the interactions between modal verbs and negation in English. A brief overview of the distributions and two usages of modal verbs, i.e., root and epistemic, along with the distributions of negation, are provided. Relative scope between modal verbs and negation, are given emphasis. May scopes either over negation or below negation. Can mostly scopes below negation, while must mostly scopes over negation. Then, by presenting two past studies of English modals, theoretical analyses of the phenomena are provided. In one way, the diverse applications of modals can be formalized through metaphorical extensions in the framework of Force Dynamics. Namely, epistemic meaning is metaphorically derived from root meaning.

Meanwhile, from the cognitive perspectives, the root-to-epistemic extension can be explained as a process of subjectification, a process where the reference point is subjectified and separated from the event. After pointing out issues arisen against the former analysis, it is instead shown that

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INGLIZ TILIDAGI MODAL FE'LLAR VA INKOR: KOGNITIV YONDASHUV

ANNOTATSIYA

Mazkur tadqiqot ishi ingliz tilidagi gaplarning sintaktik tuzilmalarini generativ va kognitiv grammatika nazariy qarashlaridan kelib chiqqan holda o'rganishga bag'ishlangan ilmiy loyihaning dastlabki natijalari hisoblanadi. Tadqiqot ikki asosiy maqsadni ko'zlaydi: birinchidan, ingliz tilidagi modal fe'llar (may, can, must) va inkor hodisasining tavsifiy tahlilini yoritish; ikkinchidan, kognitiv doirada metaforik kengayish, "kuch dinamikasi" va "subyektivizatsiya" nazariyalari asosida ushbu konstruksiyalarning nazariy tahlilini taqdim etish.

Ilmiy manbalardagi mavjud tavsifiy va nazariy tadqiqotlarni chuqur tahlil qilish orqali maqolada ingliz tilidagi modal fe'llar va inkor o'rtasidagi munosabatlar o'rganildi. Modal fe'llarning taqsimlanishi va ularning asosiy hamda epistemik qo'llanishlari, shuningdek, inkorning taqsimlanishi bo'yicha umumiy ma'lumot berildi. Modal fe'llar va inkorning o'zaro qamrov munosabatlariga alohida e'tibor qarotildi. Jumladan, may modal fe'li inkorni ham ustidan, ham ostidan qamrab olish xususiyatiga ega. Can modal fe'li, ko'pincha, inkordan pastda, must modal fe'li esa aksariyat holatlarda inkordan yuqorida qamrov hosil qiladi.

Ingliz tilidagi modal fe'llarga oid ikki muhim tadqiqot natijalari tahlili asosida hodisalarning nazariy jihatlarini yoritildi. Bir tomondan, modallarning turlicha qo'llanishi "kuch dinamikasi" doirasida metaforik kengayishlar orqali tizimga solinishi mumkin, ya'ni epistemik ma'no asosiy ma'nodan metaforik yo'l bilan shakllanadi. Boshqa tomondan, kognitiv nuqtayi nazardan, asosiy ma'nodan epistemik ma'noga

the latter model properly capture the aspects of modals and negation in English that are discussed in the previous sections.

Key words: modal verbs, root modality, epistemic modality, negation, metaphorical extension, Force Dynamics, subjectification, English, syntax.

o'tish jarayonini subyektivizatsiya jarayoni orqali izohlash mumkin. Bunda tayanch nuqta subyektivlashadi va voqea-hodisadan ajralib chiqadi. Birinchi tahlilga nisbatan yuzaga kelgan muammolarni ko'rsatib o'tgach, ikkinchi model ingliz tilidagi modallar va inkorning oldingi bo'limlarda muhokama qilingan jihatlarini to'liqroq qamrab olishi isbotlandi.

Kalit so'zlar: modal fe'llar, asosiy modallik, epistemik modallik, inkor, metaforik kengayish, kuch dinamikasi, subyektivizatsiya, ingliz tili, sintaksis.

INTRODUCTION

It was three scores and seven years ago that Noam Chomsky published his first research book on linguistics, in particular, Generative Grammar, entitled *Syntactic Structures* [Chomsky, 1957]. However, much work needs to be done towards formalization of even very basic constructions, including (but certainly not limited to), copular sentences, questions, relative clauses, to name a few. In addition, a number of linguistic theories have been posited to develop and/or replace Generative Grammar.

This paper is part of a preliminary report of my research project to reveal syntactic structures of English sentences from two (often considered competing) theoretical perspectives: i.e., Generative Grammar [Chomsky, 1957] and Cognitive Linguistics [Langacker, 1987a; 1987b].

Towards this goal, this paper explores the interactions between modal verbs and negation in English. It is widely recognized that English modal verbs, along with those in many other languages like German, serve two distinct functions: **root** and **epistemic**. Such distinction can be observed in (1) and (2):

- (1) You **may** borrow my bicycle if you wish [Quirk et al., 1985; 223].
- (2) It **may** rain tomorrow, but I hope it will be sunny [Leech, 1989; 257].

In (1), the modal verb *may* expresses **permission**, which is a root usage of *may*, whereas in (2), *may* conveys an epistemic meaning of **possibility**. It has been argued in past literature that these two meanings are purportedly interconnected. E. Sweetser [Sweetser, 1990] contends that epistemic meaning is metaphorically derived from root meaning, while R. Langacker [Langacker, 1998; 2002; 2008] asserts that epistemic meaning arises from root meaning through a process called *subjectification*.

In English, sentential negation either scopes over or below the meaning of the modal. Examine the examples in (3) and (4), which show the differential scope taking by negation (Enclosed in the square brackets are the paraphrases of the sentences containing the modals.):

- (3) You may not smoke in here. [You are not allowed to smoke in here.]
- (4) They may not like the party. [It is possible that they do not like the party.]
[3-4, Quirk et al., 1985; 794]

For instance, in (3), negation alters the modality. As shown in the paraphrase,

the sequence of the modal and negation constitute an auxiliary complex collectively. Meanwhile, in (4), the negation is part of the epistemic modality. The speaker of (4) states the possibility that the people discussed do/will not like the party. Following R.Quirk et al. [Quirk et al., 1985] and T.Asakawa [Asakawa, 1986], I call the negation in (3) Auxiliary Negation, and that in (4) Main Verb Negation.

In this paper, after clarifying the research methodology employed in this paper, I examine the interactions between the modals and negation in English. In Section 3, I briefly present differences between root and epistemic meanings of three modal verbs in English: *must*, *may*, *can*. In Section 4, I describe the scope of negation in sentences containing these modal verbs. In Sections 5 and 6, I introduce two analyses of modality, following E.Sweetser [Sweetser, 1990] and R.Langacker [Langacker, 1998; 2002; 2008], and argue that the latter better explains the phenomena described in the previous sections.

METHODS

This paper reports both descriptive and theoretical works in linguistics, focusing on above mentioned constructions in English: i.e., modal verbs and negation. I follow the convention of management of data in the field of Generative Grammar [Matthewson, 2004]: i.e., native speakers' grammaticality judgement, and referencing past literature, in which the example sentences should have undergone native speakers' judgement.

The descriptive part sorts out grammatical and ungrammatical configurations, and evaluates properties of grammatical sentences and phrases. I collected English data from past relevant literature, and also elicited from native speakers. I also checked the grammaticality of some of the sentences cited from the past literature, which are not commonly used in daily life conversation with a native speaker of English. However, the data was not extracted from more formal methods, e.g., large scale and comprehensive elicitation sessions, or a corpus study.

In the theoretical part, careful scrutiny of past relevant literature was conducted to examine the constructions, for which in-depth descriptions are provided in the preceding sections, with theoretical apparatuses. This part can be divided into two subparts. First, linguistic theories employed in this paper and their implications were examined. Second, their application to the construction examined were evaluated.

Before going into the modals and negation, two notes are in order: terminology and the scope of this paper. *Will* is more frequently used than the modals, *must*, *may*, *can*, which I take up in this paper. In many cases, however, it is difficult to distinguish the scope of negation, as, as R.Quirk et al. [Quirk et al., 1985; 795] point out, *will* neutralizes the distinction between Auxiliary Negation and Main Verb Negation. For instance, the negation in (5) may be interpreted both as Auxiliary Negation and as Main Verb Negation, without altering the meaning of the sentence:

(5) He will not be gentle.

[I do **not** suppose that he is gentle. OR I suppose that he is **not** gentle.]

Therefore, I exclude *will* from the discussions in this paper. However, I follow T.Hofmann [Hofmann, 1976; 93], who also examines only *must*, *may*, and *can*, in that

syntactic and semantic characteristics found in these modals are also common among other modal verbs.

In addition, sentential negation is not as simple as it first looks, as pointed out by H.Zeijlstra [Zeijlstra, 2015]. Affirmative and negative sentences cannot always be paraphrase with *it is not the case that*. Negation interacts with other scope-taking elements in various ways. In this paper, I exclude sentences that include scope-taking elements, e.g., *somebody, probably, not long ago* [Zeijlstra, 2015]. For a comprehensive overview of negation, see L.Haegeman [Haegeman, 1995] and A.Ota [Ota, 1980], as well as H.Zeijlstra [Zeijlstra, 2015].

In the past literature, in addition to the **root** modality, the term **deontic** is also used, e.g., D.Lee [Lee, 2001] and M.Tomasello [Tomasello, 2003]. As H.Kinoshita [Kinoshita, 1996] points out, however, the term **deontic** appears to exclude some of the major root usages, such as ability and volition. Therefore, I employ the term *root* in this paper.

Root and epistemic modality

This and next sections report the results of the descriptive work of English modals (Section 3) and negation (Section 4), mainly referencing the relevant past literature. Two types of modality, i.e., root and epistemic, and their interactions with negation, are focused.

3.1. Root modality

Root modality is subject-oriented and involved with “intrinsic human control over event” [Quirk et al., 1985; 219]. When the referent of the subject of the sentence (henceforth, simply *the subject*) is required by someone authorized, rules or regulation, who governs the action of the subject (henceforth, *governor*), to take an action, it is bound by obligation, thereby “it’s essential, i.e., if this isn’t done, there will be a lot of trouble, or a big problem” [Leech, 1989; 274]. *Must* in (6) exemplifies the root usage:

(6) You must lose weight [Leech, 1989; 274]. (You are dangerously overweight.)

This usage of *must* can be paraphrased with *have to* or *be obliged to*.

If it depends on the subject whether or not an event happens, and if a governor lets it go, then the modality presented is permission. The examples in (7) and (8) describe such uses of *may* and *can*:

(7) You may go now [Hofmann, 1976; 93].

(8) You can leave whenever you like [Lee, 2001; 124].

As well as *may* and *can*, *be permitted to* and *be allowed to* may be used. It is noteworthy that paraphrasing the modal verbs to or from idiomatic expressions (*have to*, *be obliged to*, *be permitted to*, *be allowed to*) often alter the meaning of the sentence [Quirk et al., 1985]. Subtle differences in meaning of each modal are beyond this paper.

Moreover, when a governor is less and less focused on to the extent that an event is fully controlled by the subject, the issue concerned is the subject’s **ability**, which is represented by *can* as in (9) or, alternatively, *be able to*:

(9) I can stand any pain, any trouble – but not boredom [Kinoshita, 1996; 124].

Besides, if the subject controls an event less, it becomes volition, stated with *will* or *be going to*, which is beyond the scope of this paper.

The event identified by the subject and modal verbs in the root meaning is or is not happening in the future. For instance, the sentence in (6) is paraphrased to “It is necessary that the event ‘*you lose weight*’ will happen sometime in the future”. Focusing on a potential event assumed to happen in the future, root modality is not compatible with perfect aspect and progressive aspect. The example in (10) might be considered as a counterexample of the ban on using root modality with progressive aspects:

(10) You must be going [Ota, 1980; 461].

In (10), a phrase denoting progressive aspect follows a root modal. However, according to A.Ota [Ota, 1980], it describes an action, i.e., *your going*, to be taken as soon as possible, or very soon. Except for a rare case of *must*, as in (11), where future occurrence of the event is indicated by *next*, modal verbs in root usages are not used with progressive or perfect aspects:

(11) You must have completed the work by next April [Kinoshita, 1996; 152].

There are several restrictions on root modals other than aspects as mentioned above. First, in an active sentence with a root modal, the subject is required to be animate as in (12) (The asterisk “*” attached at the beginning of the sentence indicates that the sentence is ungrammatical or severely unnatural.):

(12) *My car must leave now [Hofmann, 1976; 93].

Since root modality is concerned with the subject’s obligation, permission, and ability, the subject is supposed to have a potential, or at least volition to take the action. *The car* does not do anything intentionally by itself unless it is personified. D.Lee [Lee, 2001] presents supporting evidence from historical perspective that no modals in root usage was used with impersonal pronouns, *hit* (= *it*) and *Paet*, (= *that*), which are not volitional.

Second, stative verbs may not be used with the root modals, as in (13):

(13) *You must (=be obliged to) wish/resemble to/tend to -- [Ota, 1980; 461].

Stative verbs imply that the subject has already been in the state that the verb refers to. Namely, the sentence “I want to study linguistics” means that my desire to study linguistics emerged in the past. Here, the implications of stative verbs conflicts with future-orientedness of the root modals. Lastly, the meaning of a sentence with a root modal is affected by voice. In (14a), it is *John* to be permitted to take the action, whereas *you* are permitted to be killed in (14b):

(14) a. John may kill you.

b. You may be killed by John [Sawada, 2001; 704].

3.2. Epistemic meaning

Epistemic modality is speaker-oriented and involved with “human judgment of what is or is not likely to happen” [Quirk et al., 1985; 219]. What is at issue here is the possibility of occurrence of an event. If the speaker concludes as a logical deduction

that the event necessarily happens, then s/he employs *must* as in (15):

(15) You must be joking [Quirk et al., 1985; 225].

[It is necessarily the case that you are joking.]

On the other hand, when it is less certain that the event happens/will happen, *may* or *can* is used as in (16) and (17):

(16) You may be right. [Perhaps/possibly you are right.] [*ibid.*, 225]

(17) Even expert drivers can make mistakes.

[It is possible for even expert drivers to make mistakes.] [*ibid.*, 221-222]

Since epistemic modality is employed to state whether the event will actually happen, the event is objectified and isolated from the speaker.

R.Jackendoff [Jackendoff, 1972] considers the semantic structure as in (18), in which the rest of the sentence is complemented to the modal. In (18), the speaker affects only on the modality:

(18) John may leave. {MAY} (JOHN LEAVE)

As epistemic modals do not refer to the subject but refer to the event, voice does not affect the meaning of the sentence. In (14a) and (14b), when the modal is used in the epistemic usage, the events described by each sentence can be the same murder case; i.e., *John* is a causer and *you* are a victim.

Compared with root modals, epistemic modals are used relatively freely. They can refer to the event not only in the future, but also at present and in the past. Hence, it is possible that they can be used with perfect or progressive aspects or with stative verbs, as in (19). Moreover, the subject of sentence (an event) is not limited to animate participants, as in (20):

(19) a. The smith must have a lot of money [Quirk et al., 1985; 224].

b. She may have walked to the store [Taylor, 2002; 407].

c. You may be singing now [Sawada, 2001; 704].

d. I think he must still like me a little [Ota, 1980; 462].

(20) News here must travel faster than light [Kinoshita, 1996: 153].

However, the epistemic modals are not supposed to appear in *if*-clause, as in (21):

(21) ?If there will be a fight, we'll stay home [Sawada, 2001; 704].

In addition, each modal has a tendency to use certain forms and to avoid others, although they are not ungrammatical. For instance, the epistemic *must* is rarely used in a negative clause, as in (22) and in an interrogative clause, as in (23):

(22) He must not be there [Kinoshita, 1996; 154]. (= Apparently he isn't there.)

(23) Must there be some good reason for the delay? [Quirk et al., 1985; 225].

On the other hand, *can* is common to be used with negatives, as in (24), or with passives, as in (25):

(24) John can't be right [Lee, 2001; 124].

(25) Many plants can be grown easily indoors [Leech, 1989; 73].

In the last section and this section, I have introduced two different usages of

modals, root and epistemic, and show briefly the meaning of each modal, as summarized in (26):

(26) Root modality and Epistemic modality

	Root	Epistemic
<i>must</i>	obligation	necessity/certainty
<i>may</i>	permission	possibility
<i>can</i>	permission, ability	possibility (less common)

3.3. Relati on between root and epistemic

In this section, I discuss the relation between the root and the epistemic modals, arguing that epistemic usage is an extension from root usage. To justify this claim, three support facts are presented from a study of language acquisition, from historical perspective, and from a work of creole language.

According to M.Tomasello [Tomasello, 2003], the root expressions emerge from pre-linguistic stage typically with demanding intonation. Children begin to use root modality by around the second birthday, prior to epistemic modality, which are not developed until fourth birthday. The beginnings of linguistic root expressions in the course of first language acquisition, are *wanna*, *gonna*, *hafta*, and *needta*. These phrases are employed to express their volition, intention and obligation. They soon begin to use *can*, *can't* and *don't* to express requests, permissions, wishes and abilities. Way behind root modals, children encode epistemic expressions into linguistic constructions.

M.Tomasello [Tomasello, 2003] also claims that not only developmentally but also historically, root modality and expressions emerge first, and then they are often expanded to epistemic usage. There are several facts to support M.Tomasello's claim. For instance, T.Nakao & O.Kodama [Nakao & Kodama, 1990] represents a historical transition of the English modals where a main verb was developed to get a modal usage. A modern modal *can* originated from a main verb *cuunan* 'to know' that seems to have extended its usage into intellectual ability (= to know how to). In addition, *must* and *may* as well as *can* developed its root usage in modality in Old English, and the epistemic usage in Middle English. T.Nakao & O.Kodama [Nakao & Kodama, 1990] conclude that based on the facts mentioned above, the subject-oriented usages (= epistemic modals) derived from the speaker-oriented usages (= root modals).

S.Shepherd's [Shepherd, 1981] research on Anyiguan, a creole/pidgin language between English and local languages (East Caribbean) in Antigua and Barbuda. S.Shepherd claims that the pidgin/creole language there "gives some evidence that creoles first develop their expression of root modality before going on to extend that expression fully to the epistemic domain" [*ibid.*: 50]. This work also supports the claim that epistemic modality is derived from root modality.

The scope of negation

As mentioned above, modal verbs take the scope either over or below negation. For instance, in (3), repeated here as (27), negation takes wider scope against the modal (NOT >> MAY: Auxiliary Negation), while, in (4), repeated here as (28), the modal scopes over negation (MAY >> NOT: Main Verb Negation):

(27) You may not smoke in here. [You are not allowed to smoke in here.]

(28) They may not like the party. [It is possible that they do not like the party.]

To capture two types of negation as in (27) and (28), T.Asakawa [Asakawa, 1986] presents the structure in (29) for the English sentences that include diverse auxiliary verbs and negation, from a generative perspective [Chomsky, 1957; 1965; 1981; 1995]. The proposed structure has two positions available for negative marker as in (29). Namely, one is within a Verb Phrase and the other is outside of a Verb Phrase:

(29) Sentence → NP. Auxiliary (not) VP3

VP3 → (not) (have-EN) VP2

VP2 → (not) (be-ING) VP1

VP1 → (not) V (NP) --- [Asakawa, 1986; 60]

The description of the structure predicts that more than one negation may appear in the English sentence. This prediction is borne out, as in (30). In fact, at most two sentential negative markers may appear, one of which should contract with the modal (i.e., n't), as in (31):

(30) a. John couldn't not have been sleeping.

b. John couldn't have not been sleeping [ibid., 61].

(31) *John must have not been not sleeping [ibid., 62].

The idea that there are two places to be occupied by *not*, is crucial to explain the difference of the scope of negation between the sentences in (27) and (28). However, it depends on each modal and moreover on whether it is root or epistemic. In this section, I show the scope of negation and its interaction with the modals.

4.1. *must*

In many cases, *must* takes wide scope, i.e. MUST >> NOT, in both root and epistemic usage, as in (32), although negation in root reading is rare, as in (33):

(31) You mustn't keep us waiting [Quirk et al., 1985; 795].

(32) He must not be there [Kinoshita, 1996; 154]. (= Apparently he isn't there.)

4.2. *may*

May may include or exclude negation in the scope. In root meaning, negation is out of the scope of modality, as in (27), repeated here as in (34): NOT >> MAY. In epistemic meaning, *may* include negation within its scope, as in (28), repeated here as (35): MAY >> NOT:

(33) You may not smoke in here. [You are not allowed to smoke in here.]

(34) They may not like the party. [It is possible that they do not like the party.]

As A.Ota [Ota, 1980] and R.Quirk et.al. [Quirk et.al., 1985] point out, however, even in root meaning, by inserting a pause before *not* or by stressing *not*, Main Verb Negation is still achievable, as in (36):

(35) You may / not go swimming [Ota, 1980; 475, slightly modified].

4.3. *can*

Can usually takes scope under negation both in root and epistemic reading as in (37) and (38): NOT >> CAN:

(36) Visitors cannot fish on this side of the river [Leech, 1989; 75].

(37) She can't be serious [Quirk et al., 1985; 796].

As well as *may*, with a pause before *can*, thereby *can* does not contract with *can*, it may take wide scope over negation, as in (39) and (40): CAN >> NOT:

(38) You can / not go. [You are permitted not to go.] [Ota, 1980; 475, slightly revised]

(39) It can / not be true. [= It's possible for it not to be true.] [Kinoshita, 1996; 125, slightly revised]

In case where two negative markers are used simultaneously, as in (41) and (42), *n't* takes wide scope over the modal and the modal over *not*: N'T >> MODAL >> NOT:

(40) a. John couldn't not have been sleeping.

b. John couldn't have not been sleeping [Asakawa, 1980; 60].

(41) I can't not tell her about it [Kinoshita, 1996;115].

In summary, below is a summary table of the relations between the English modal verbs and the scope of negation:

(42) Interactions of modality and negation (to be revised)

	Root	Epistemic
<i>must</i>	MUST >> NOT	MUST >> NOT (rare)
<i>may</i>	NOT >> MAY MAY >> NOT (rare)	MAY >> NOT
<i>can</i>	NOT >> CAN CAN >> NOT (rare)	NOT >> CAN CAN >> NOT (rare)

Whether negation includes or excludes the meaning of the modals in its scope is independent from whether it is a root modal or an epistemic modal. I assume, however, that epistemic *can* in negative sentence is in fact a single modal *cannot* (or *can't*). *Cannot* is morphologically distinct from other modals, and if it is divided into two parts as in (34) and (35), it changes the meaning of the sentence. Therefore, *cannot* (and *can't*) in epistemic reading is, I believe, one complex modal verb.

The remaining issue in (43) is irregularity of the root *must*. However, in fact, a case of NOT >> MUST is missing altogether. H.Kinoshita [Kinoshita, 1996] introduces two instances, as in (44) and (45), although he also mentions that he has never found other examples:

(43) 'That's all right,' Bill answered brightly. 'You mustn't worry about me.' He put his suitcase on the chair and started to open it [Kinoshita, 1996; 229].

(44) 'You mustn't mind too much', Grandpa said. 'Even the most famous writers started like this' [ibid., 229].

He insists that *mustn't* here is a kind of honorification, hence the case should be taken to be a Main Verb Negation. Against his claim, I insist that although it can be

seen as Main Verb Negation pragmatically, it is still Auxiliary Negation semantically and grammatically. There is a case in which negation takes the root meaning within its scope. Thus, the table in (43) is revised to the table in (46), from which the basic paradigms can be stated regarding the basic pattern of the scope relation, as in (47):

(45) Interactions of modality and negation (revised version)

	Root	Epistemic
<i>must</i>	MUST >> NOT NOT >> MUST (rare)	MUST >> NOT (rare)
<i>may</i>	NOT >> MAY MAY >> NOT (rare)	MAY >> NOT
<i>can</i>	NOT >> CAN CAN >> NOT (rare)	CANNOT >> NOT (rare) CAN >> NOT (rare)

(46) The basic scope patterns of modals and negation

- a. Root (obligation) MODAL >> NOT
- b. Root (permission, ability) NOT >> MODAL
- c. Epistemic MODAL >> NOT

The putative inconsistency between (47a) and (47b) can be attributed to the peculiar characteristics of the former. Since root usages are historically derived from the main verbs, they are primarily connected to predicate, which is under negation. Therefore, root usages are interpreted under negation, as in (47b), contrary to the overt word order. (47a) indicates that *must* almost always takes wide scope over negation. I present two factors for the peculiarity in (47a). The pattern MODAL >> NOT is not limited to *must*. *Should* and *ought to*, both of which, more or less, force the subject to take a certain action, and also take negation within its scope. Moreover, *must*, *should* and *ought to* are all in the past forms historically. Since tense elements place on or above the auxiliary position in the structure presented in (29), these modals carry tense features, wherein they are given interpretation over negation. Another related factor for modals to scope over negation in (47a) is regarding its meaning, i.e., obligation. (47c) states that epistemic modals take negation under its scope. In fact, epistemic modality cannot be negated. Because it is the speaker's judgment for possibility of an event, it is expressed with 'percentage', for instance *must* stands for 100%, *cannot* 0%. The speaker does not judge with, for example, "other than 100%", for s/he should employ more specific expression.

Metaphorical extension

This and next sections present two linguistic theories that aim at capturing the properties of modality: E.Sweetser [Sweetser, 1990] (Section 5) and R.Langacker [Langacker, 1998; 2002; 2008] (Section 6).

5.1. Modals and force dynamics

E.Sweetser [Sweetser, 1990] argues that root usages of English modal verbs are extended to epistemic usages by virtue of metaphor. We human beings describe epistemic domains by applying expressions of physical domains into it. For instance,

in “I see”, the meaning regarding epistemic perception, i.e., “I understand”, is extended from the sensory domain, i.e., “I perceive with the vision.” The phenomenon like above are pervasive throughout our language, and can be applied to the extension from root expressions to epistemic expressions as well.

E.Sweetser [Sweetser, 1990] proposes that root modality is best understood by means of force dynamics, referencing a series of L.Talmy’s [Talmy, 1981; 1988] work. In this perspective, modality can be analyzed in terms of force and barrier. *Must* is “a compelling force directing the subject towards an act” [*ibid.*: 52]. *May* (= permission) is “an instance of taking away (or keeping away) a potentially present barrier” [*ibid.*: 51]. *Can* is a bit more complicated. It denotes “positive ability on the part of the doer” [*ibid.*: 53]. It can be described as “potential force or energy” [*ibid.*: 53]. E.Sweetser [Sweetser, 1990] insists that epistemic modal usages are extended from root usages in terms of metaphor, wherein the language of the external sociophysical domain is applied to the internal mental domain. She sees epistemic modality as the speaker’s judgment. An epistemic force of *must* “compels the *speaker* (or people in general) to reach the *conclusion*” [*ibid.*: 64]. A forceful obligation in the external world, i.e. root modality, is transferred into the epistemic domain, altering its meaning to epistemic force. *May* expresses that “there is no barrier to the speaker’s process of reasoning from the available premises to the conclusion” [*ibid.*: 59]. Force dynamics in the root meaning, absence of potential barrier, is extended metaphorically to the epistemic domain. Since E.Sweetser [Sweetser, 1990] considers *can* in epistemic meaning not to be used in affirmative sentence, she represents an analysis of negative sentence. *Can’t* indicates that epistemic potential on the speaker is negated.

5.2. The scope of negation

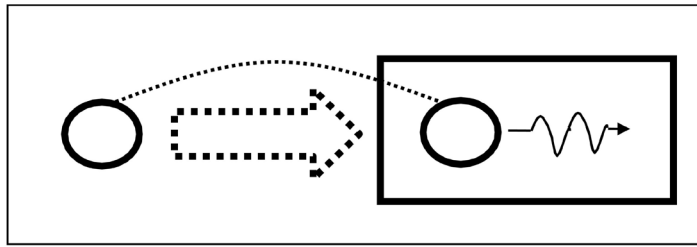
When negation and a modal verb are employed together, negation takes scope over a modal verb, or vice versa, as summarized in (46) above. The meaning of *can’t* indicates that when a force is negated, negation takes the modal within its scope (NOT >> MODAL). If the subject’s action is negated, then negation takes the scope under the modal (MODAL >> NOT).

Subjectification

6.1. Root and epistemic expressions from R.Langacker [Langacker, 1998; 2002; 2008]

R.Langacker explains the development of modality in terms of *subjectification*, the alternation of the relation from **profile** (= the objective) to **ground** (= the subjective). He, as well as M.Tomasello [Tomasello, 2003], E.Eweetser [Sweetser, 1990] and many others, proposes that a root expression emerged from a main verb historically, and extended to an epistemic expression. He claims that the transition from main verb usages to the root usages, and further to epistemic usages, is achieved by virtue of **subjectification**. First, he presents how the subject, the object and the speaker (conceptualizer) are related to each other, as shown in Figure 1 (Note that “scope” in Figure 1 is used in a different meaning from that in the previous sections.):

Figure 1. Lexical source



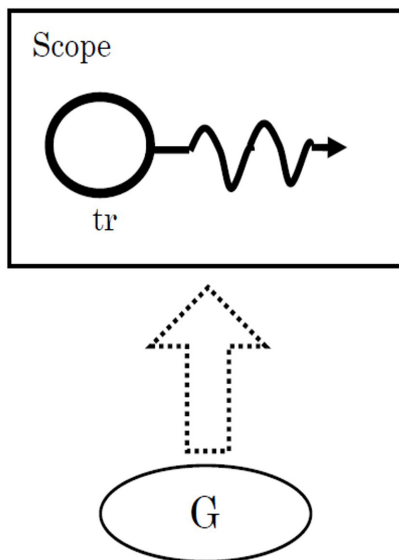
(C)

[Langacker, 2008; 304, slightly modified for simplicity]

He calls the object the target, who takes an action, being affected by the subject’s force. In the main verb usages, the subject and the target are identical, and hence, in Figure 1, these are connected with a broken line. The subject referent (= trajector: tr) has a physical force (drawn with dotted arrow in Figure 1) such as a desire, ability, knowledge, strength, all of which cause the target to take a certain action (= landmark: lm). In this usage, a trajector, i.e., a source of the force (a circle on the left in Figure 1), and a target (a circle on the right in Figure 1) are all allotted to the subject.

Second, he presents modal expressions shown in Figure 2, in which a source of the force and the force itself are out of scope. Instead, they are *subjectified*, that is, grounded (G) in the speaker’s domain, while the target and its action are profiled in the immediate scope:

Figure 2. Grammatical modal (Epistemic)

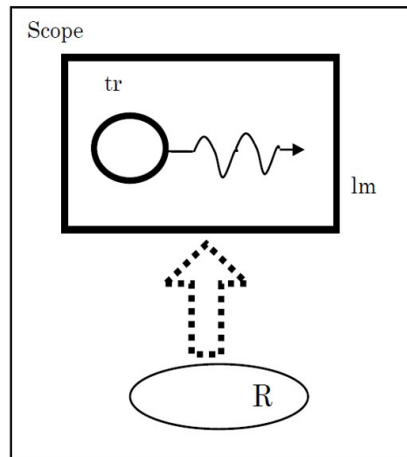


[Langacker, 2008; 304]

In this stage, an utterance is speaker-oriented. The speaker objectively judges an event, and expresses its possibility with modality (drawn with a broken arrow in Figure 2). Since the modality here is typical epistemic modal expression, modality is no longer forceful for the target or for the event.

In the intermediate stage between Figure 1 and Figure 2 is root modality, as shown in Figure 3 from C.Fukuda and K.Nakamoto [Fukuda & Nakamoto, 2008], applying R.Langacker's [Langacker, 1997] model:

Figure 3. Grammatical modal (Root)



[Fukuda & Nakamoto, 2008; 182]

A source of the force becomes a reference point (R). the Reference is a governor such as society, rule, and regulations (often, the speaker) and is already backgrounded. Instead, the target becomes the subject and is profiled. A source of the force gives the force to the target (= the subject) for him/her to take a certain action.

RESULTS AND DISCUSSION

This section explores how the linguistic theories introduced in the previous sections, i.e., E.Sweetser [Sweetser, 1990] and R.Langacker [Langacker, 1998] and subsequent works, capture (or fail to capture) the properties of the modal verbs, in particular, the interactions between the modal verbs and negation. It is illustrated that some issues are arisen in the analyses in E.Sweetser's model, while R.Langacker's model properly captures the properties in question, including those E.Sweetser's model fails to capture.

Problems on E.Sweetser's model

I discuss three problems of E.Sweetser's [Sweetser, 1990] analyses. First, her application of force dynamics needs revisions. As J.Taylor [Taylor, 2002] points out, the example in (48) means that John chose one of the options to keep the book on the shelf, resisting a desire or necessity to choose other options: e.g., put the book on the desk, threw the book into a trash box, etc.:

(47) I kept the book on the shelf [Taylor, 2002; 524].

That is, force dynamics on main verbs has two aspects: a force compelling to do an act; a force resisting on choosing other options. Nevertheless, the force of modals has only one direction, the one to compel to take an action, and do not have influence over other options. Sweetser applies force dynamics to the meanings of modal verbs, arguing that the force obliges or enables to do something in the root reading, or to conclude with a certain conclusion in the epistemic reading. In these usages, modals affect only the verb phrase it precedes. As noted above, this is a wrong application of force dynamics. Thus, applying the theory of force dynamics to modal verbs needs alternation of the definition of force to fully capture the functions of modals. Second, J.Taylor [Taylor, 2002] points out that, (49) is understood, from the viewpoint of force dynamics, in a way that only a difference is the entity who has an ability: *I* in (49a), and someone in (49b):

- (48) a. I am able to solve this problem.
 b. This problem is able to be solved [Taylor, 2002; 408].

However, J.Taylor claims that there is more to (49). Since the ability in (49a) is in the domain of mental capacities, while the ability in (49b) is in the domain of logic. What is at issue is not merely on who has the ability how.

Lastly, the relation between negation and the subject's volition is not captured by Sweetser's model. As Sweetser herself points out, *must* implies the subject's reluctance. In (50), *John* actually does not want to do or wants to do others. However, in (51), *must* does not imply the volition of the subject. Sweetser fails to capture this difference:

- (49) John must study English hard to pass the exam.
 (50) You must not disturb your roommate.

Thus, E.Sweetser's [Sweetser, 1990] analysis has problems on the very basis of her theory, namely applying force dynamics into analysis of the modals. In addition, it needs to modify the explanation for how to negate.

7.2 . Validity and applicability of R.Langacker's model

The notions presented in the series of works by R.Langacker capture characteristics of modal expressions mentioned in Sections 3 and 4. First, in Figure 3, subject-orientedness of root modality, and in Figure 2, speaker-orientedness of epistemic modality, are well understood with the alternation of the scope and grounding. As well, this feature also explains the constraint on the subject to be animate in the root usage.

Second, R.Langacker's Model explains an aspect and tense relation. Since, as shown in Figure 2, epistemic modality expresses an event from an objective view, time and aspect of the event is not constrained. On the other hand, because the Reference affects the event, forcing the target to take a certain action, the event should not be happened, according to the root usages.

Third, Figure 2 clearly indicates the constraint that epistemic expressions must not be in the *if*-clause. Since a source of the force and the force itself are out of the scope, they are not presupposed.

These models also resolve the problem raised towards E.Sweetser [Sweetser, 1990] in the previous section. The difference in (52) can be captured in R.Langacker's model. (52a) is just like the one described in Figure 3, while for the case in (53b), the

target in Figure 3 (the circle in bold) is backgrounded, and the process and its object (the wavy line) are profiled:

- (51) a. I am able to solve this problem.
 b. This problem is able to be solved [Taylor, 2002; 408].

Next, it is shown that the scope of negation is also well analyzed by R.Langacker's model. In the root usage shown in Figure 3, if the force (a broken arrow) is negated, namely, blocked to affect to the event or the target, then negation takes wide scope over the modal (NOT >> MODAL). On the other hand, if the process (the wavy line) caused by the target affected by the force of the Reference, is obstructed, then it is Main Verb Negation, and negation takes the scope under the modal (MODAL >> NOT). In the epistemic usage shown in Figure 2, it is only the process that can be negated. Therefore, the modal takes negation within its scope.

Moreover, this model is tenable to explain the problem mentioned in Section 3.3: i.e., on the affectee's reluctance. When the target is affected by the negative modality as in (53), Figure 3 clearly describes what is blocked:

- (52) You must not disturb your roommate.

Namely, the event happening or the event continuing, while force dynamics model gives the force so that the event is not to happen. (53) implies that s/he has a desire or probability to take an action prohibited, and it is described in Figure 3 as the wavy line.

CONCLUSION

In this paper, I discussed the English modals, the scope of negation and the interplay among them, and I tried to adopt these constructions and their properties to E.Sweetser's [Sweetser, 1990] and R.Langacker's [Langacker, 1998; 2002; 2008] analyses for modality. I conclude that the latter explains better than the former on these issues. R.Langacker's models shown in Figures 2 and 3 not only capture many features and phenomena on the English modals, but also apply to the issue on the scope of negation.

The present research calls for extension of this paper in order to provide more comprehensive and more plausible analysis on the construction examined. First, it is necessary to elicit and collect data in a structured way. While the grammatical judgement of the sentences in this paper were doubled-checked by native speakers of English when those are not used in daily life, data collection heavily relied on the past relevant literature. Ideally, all the data used in a paper should be elicited and collected from the same controlled group of native speakers. The data would be more valid if we could also collect from corpora, which represent natural language use.

Second, linguistic theories, in particular, those in the generative framework, should be able to be applied to various languages in the world, rather than only applicable to one specific language. Namely, it should be examined and proven tenable that the analysis presented in this paper can also explain properties of the same constructions in other languages.

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