

A Cross-linguistic Investigation of Epistemic versus Root Modals: Their Syntax and Semantics

1. Introduction

In this study, we examine the syntax and semantics of three modals in a number of languages. We concentrate on *must*, *may*, and *can* in English, French, German, Japanese, Persian, and Turkish. Modals are interpreted with either an epistemic or a root reading. Epistemic modals involve a speaker-oriented qualification, pertaining to degree of certainty. This type of modals receives a *possibility* or *necessity* reading. Root modals may be interpreted as expressing external factors with respect to the individual involved, such as *obligation* and *permission* (deontic), or factors internal to the person, such as *ability* (dynamic) (Palmer 2001:9-10). All three modals discussed in this paper receive both root and epistemic interpretations. *Must* may have an *obligation* (root) or a *necessity* (epistemic) interpretation, while *may* is interpreted as involving *permission* (root) or *possibility* (epistemic). *Can* receives a *possibility* (epistemic) or an *ability / permission* (root) interpretation¹. Below are some examples illustrating different interpretations of these modals.

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|--------|-----------------------------------|-------------------------|
| (1) a. | She must be home by now. | Epistemic/necessity |
| b. | She might be home by now. | Epistemic/possibility |
| c. | You must be home by four o'clock. | Root/obligation/deontic |
| d. | You may use my car. | Root/permission/deontic |
| e. | He can swim very fast. | Root/ability/dynamic |

Two types of proposals have been discussed in the literature with respect to the syntax and semantics of modals. These two camps compare properties of modals to the syntax and semantics of raising and control verbs, and yet arrive at different proposals.

One camp suggests that epistemic and root modals exhibit different syntactic and semantic properties, while the other camp proposes similar specifications for both.

In this paper, we examine epistemic and root modals in six languages with respect to tense, perfective aspect and scope considerations. We find evidence supporting one of these proposals in certain cases, and the other in other cases. In other words, we observe inconsistencies with respect to both analyses. In order to explain these inconsistencies, we offer an analysis based on Phase Theory (Chomsky 2001) and the modal hierarchy suggested by Cinque (1999). This analysis is in line with work by authors such as Butler (2003, 2006). We propose that one portion of the discrepancies observed in our descriptive analysis is accounted for by assigning two distinct phrase structures to the epistemic and root modals with respect to the positions of T and the relevant modal, as well as the position where the subject is merged. The other portion of the inconsistency is accounted for by the semantics of the root modals.

This paper is organized as follows. In section 2, we provide a brief comparison of raising and control constructions. Section 3 is devoted to a review of the literature with respect to the syntax and semantics of modals. Two opposing views in this regard are discussed in this section. A cross-linguistic discussion of the interaction of modals with tense, perfective aspect, and scope is presented in section 4. We see that French and Turkish show some inconsistencies with respect to the perfective aspect. That is, they allow perfective form with root modals, contrary to the other languages under analysis. As for scope, we observe that epistemic modals allow both wide and narrow readings, while a mixed situation is observed with respect to root modals. These inconsistencies pose

problems for both views in the literature discussed in section 3. Section 5 is an effort to offer a structural analysis of the epistemic and root modals, based on Phase Theory within the Minimalist Program and the modal hierarchy proposed by Cinque (1999). We try to provide solutions to the inconsistencies observed with respect to the perfective forms and the scope readings of the root modals. Section 6 concludes this paper.

2. Raising versus control

The syntax of modals has often been discussed in terms of raising and control (Drubig 2001, Wurmbrand 1999, among others). In this section, we provide a brief review of the literature on raising and control constructions to the extent that they are relevant to our analysis of modals.

Though superficially similar in form, it has been acknowledged by various authors (Rosenbaum 1967, Chomsky 1973, Postal 1974, among others) that there are differences between raising and control constructions. One distinction between these is that in the former, the main verb does not have an external argument while in the latter it does. In the control construction, it is the main clause subject that controls the subject of the embedded clause which is suggested to be PRO (Chomsky and Lasnik 1977, among others), as in (2a,b)². In raising constructions, as in (2c), the subject of the embedded clause may raise to the subject position of the matrix clause.

- (2) a. John promised Bill [_{CP} PRO to go]. (Control)
- b. John tried [_{CP} PRO to go]. (Control)
- c. John_i seems [_{CP} *t_i* to go]. (Raising)

Since raising verbs lack external arguments, the subject positions of these verbs can be filled by pleonastic elements, as in (3a). This is not true of control verbs, as in (3b).

- (3) a. There seems to be a boy in the garden.
 b. *There tried PRO to go.

Another difference between raising and control constructions that is relevant to our discussion is that while the former allow scope reconstruction, as in (4a), the latter do not, as in (4b).

- (4) a. A unicorn seems to be in the room. (Narrow scope possible for *a unicorn*)
 b. A unicorn tried to enter the room. (Narrow scope not possible for *a unicorn*)

While (4a) is ambiguous with respect to the scope of the quantified subject (some specific unicorn or just any unicorn), (4b) allows only a wide scope reading for the subject (some specific unicorn).

Another distinction between raising and control constructions is related to the tense of the infinitive complement in these cases. The nature of this element was discussed in the literature as early as the 1970s. Bresnan (1972) argues that the infinitival complement of a control verb (as opposed to that of a raising verb) is specified for tense, and implies unrealized future. Stowell (1982) concurs. Building on the same idea, Martin (1996, 2001) proposes a three-way Case system for subject positions:

- (5) a. [+Tense, + finite] Checks Nom Case
 b. [+Tense, - finite] Checks Null Case (control constructions)
 c. [-Tense, - finite] Does not check Case (raising and ECM)

Martin suggests that the temporal relationship between the matrix verb and the embedded verb may be used as a diagnostic for raising versus control. He bases his arguments on the temporal properties of nonfinite T(ense). In raising verbs, the events denoted by the matrix and embedded verbs take place at the same point in time (6a)—thus, the tense is

anaphoric. In control verbs, there is a difference in time points (6b). The following examples (taken from Drubig 2001) illustrate this.

- (6) a. Mary believed Bill to be at home. (Raising, same time)
b. John promised to invite Mary. (Control, different times) (Drubig 2001:26)

In (6a), we understand that Mary's believing and Bill's being at home occur at the same point in time (thus the tense is anaphoric). In (6b), on the other hand, we understand that while John's act of promising takes place at one point in time, his inviting of Mary takes place at another, later point in time^{3, 4}.

We have seen the following key differences between these two kinds of constructions: (1) in control constructions, the embedded clause contains a subject which we might call PRO while in raising constructions it does not; (2) raising verbs, but not control verbs, project external arguments and thus the embedded subject may raise from the lower clause, or the sentence may have a pleonastic subject; (3) raising constructions allow scope reconstruction while control constructions do not; and (4) we find anaphoric tense in raising constructions, but not in control constructions. In the next section, we provide a brief discussion of the literature on modals. Then we will see the important role that the raising versus control distinction plays in the analysis of modals.

3. Previous Literature on Modals

With respect to the raising/control distinction and modals, there are mainly two camps within the literature: those consider epistemic modals raising verbs and root modals control verbs, and those who consider both epistemic and root modals to be raising verbs. We call the former an *asymmetrical* approach, and the latter a *symmetrical* approach⁵. A

key proponent of an asymmetrical analysis is Drubig (2001), while a key advocate of a symmetrical analysis is Wurmbrand (1999). We now discuss some of the arguments from these two authors.

3.1 Drubig and the Asymmetrical Analysis

3.1.1 Temporal differences; We may observe the same contrast with epistemic versus root modals as we saw in (6a) and (6b) with respect to raising and control constructions. In (7a), we have an epistemic modal and here the matrix event (the inferring) and embedded event (the being here) occur at the same point in time (again, the tense is anaphoric). In (7b), we have a root modal and here the matrix event (the obliging) and the embedded event (the being here) occur at different points in time.

- (7) a. John must be here (I see his car). (Epistemic)
 b. John must be here (I order it). (Root)

Further, Drubig points out that the sentences in (6) may be paraphrased as below, in (8). The paraphrase of the raising-verb sentence uses no modal, while the paraphrase of the control-verb sentence does. This indicates that while in raising constructions we have no tense differences between the matrix and the embedded clause (in this case, both events were in the past), in control constructions there is a difference (the matrix clause is marked with past tense while the embedded clause bears (future) conditional tense/aspect marking). So we have here further motivation for an asymmetrical treatment of epistemic and root modals.

- (8) a. Mary believed Bill to be at home. (Raising)
 a'. Mary believed that Bill was at home.
 b. John promised to invite Mary. (Control)
 b'. John promised he would invite Mary. (Drubig 2001:27)

Thus, with respect to the temporal ordering of events within the sentence, we see that an asymmetric treatment is warranted for epistemic versus root modals.

3.1.2 Past Tense Replacement (PTR); Drubig uses Past Tense Replacement (Hofmann 1976) to argue for an asymmetrical treatment of epistemic versus root modals. The use of the present perfect to refer to a past time point is called *Past Tense Replacement* (PTR). PTR is not generally available in English (9a), but it is available in other languages, such as German (9b):

- (9) a. He left last Tuesday/*He has left last Tuesday.
b. Sie ging gestern nach Hause/Sie ist gestern nach Hause gegangen.
she went yesterday to home/ she is yesterday to home went
'She went home yesterday' / 'She has gone home yesterday'
(Drubig 2001:16-17)

However, though PTR is generally disallowed in English, there are some exceptions to this. In English, we may have PTR with epistemic modals and raising verbs, as in (10):

- (10) a. Epistemic modals: He may have left last Tuesday.
b. Object-Raising verbs: I believe John to have left last Tuesday.
c. Subject-Raising verbs: John appears to have left last Tuesday.
(Drubig 2001: 17)

Crucially, the sentence in (10a) is only acceptable if interpreted epistemically: *he may [possible] have left last Tuesday* (Epistemic) is grammatical while # *he may [permission] have left last Tuesday* (Root) is awkward at best.

With respect to PTR, we have seen that epistemic modals seem to behave as raising verbs in that they allow PTR, while root modals do not, favoring an asymmetrical approach. Now we turn to some arguments in favor of a symmetrical approach.

3.2 Wurmbrand and the Symmetrical Analysis

Wurmbrand (1999) suggests different tests to show that all modals, including root modals, are raising verbs. Most of the tests are not applicable in the languages that we investigated in this research, such as tests involving *there*-insertion, passivization and quirky case. We only focus on one of the tests that is applicable to these languages, i.e., scopal interpretation

Recall that with raising verbs, and only raising verbs, arguments may be interpreted both with wide scope (a specific reading), as in (4a), and with narrow scope (a non-specific reading), as in (4b). This is because in the case of raising verbs there are two positions at which a subject may be interpreted—the original position as subject of the embedded clause, and the potential final landing site as the subject of the matrix clause.

- (11) Someone from New York is likely to win the lottery.
a. Specific: There is somebody from New York (Edward) and he is likely to win (Edward always buys hundreds of lottery tickets)
b. Non-specific: It is likely that some person or another who is from New York will win (e.g., the winning ticket was sold in New York)
(Wurmbrand 1999:606)

A non-specific reading is not possible with a control verb:

- (12) Someone from New York tried to win the lottery.
a. Specific: Some specific New Yorker (Edward) tried to win.
b. # Non-specific: Some New Yorker or another tried to win.
(Wurmbrand 1999: 606)

An asymmetrical analysis would predict that both interpretations would be available for sentences with epistemic modals, while only the specific reading would be possible for sentences with root modals. Consider, however, the sentences in (13) and (14). In both cases, the specific and the non-specific interpretations are available.

- (13) Someone from New York must have won the lottery. (Epistemic)
- a. Specific: There is some specific New Yorker (Edward), and in view of the evidence available, Edward won the lottery
 - b. Non-specific: In view of the evidence available, someone from New York (whoever they may be) won the lottery (Wurmbrand 1999:607-608)
- (14) An Austrian must win the next race (in order for Austria to have the most gold medals). (Root)
- a. (?) Specific: Some specific Austrian (Arnold) has to win the race.
 - b. Non-specific: Some Austrian or another has to win the race. (Wurmbrand 1999:608)

Given the fact that both interpretations are possible for sentences with epistemic and root modals, just as is the case with raising verbs, it seems that we have evidence in support of the symmetrical analysis.

Now that we have seen arguments for both an asymmetrical and a symmetrical approach to modals and the raising/control distinction, let us examine more closely the criteria for determining whether a modal is a raising verb or a control verb. First we start with some cross-linguistic properties of modals in the languages under consideration. We will see that these data pose problems for both types of analysis.

4. Cross-linguistic properties of Modals

In this section, we discuss the interaction of modals with tense, perfective aspect, and scope in English, French, German, Japanese, Persian, and Turkish. We will see that while tense is a reliable diagnostic for distinguishing root from epistemic modals, perfective aspect and scope are not.

4.1 Tense properties of Modals

This section investigates the tense properties of modals in English, French, German, Japanese, Persian and Turkish. As we will see below, this is one area in which all

these languages manifest cross-linguistically consistent behavior. Specifically, the tense of the event denoted by the complement of an epistemic modal is anaphoric to that of the event denoted by the matrix clause, while the tense of the event denoted by the complement of a root modal is non-anaphoric and temporally follows that of the evaluation time of the root modal.

As discussed in section 2, Martin (1996, 2001) suggests that the temporal relationship between the matrix and the embedded verbs is a diagnostic for the distinction between raising and control verbs, and attributes the relationship to the temporal properties of nonfinite T. Consider the examples in (6a,b), repeated here in (15a, b).

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|-------------------------------------------|----------------------------|
| (15) a. Mary believed Bill to be at home. | (Raising, same time) |
| b. John promised to invite Mary. | (Control, different times) |

We also saw that the same asymmetry is known to hold of the contrast in tense between epistemic and root modals. In (7a), repeated in (16a), we have an epistemic modal and the matrix event (the inferring) and embedded event (the being here) occur at the same point in time. In (7b), repeated in (16b), we have a root modal and the matrix event (the obliging) as well as the embedded event (the being here) occur at different points in time.

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|---------------------------------------------|-------------------------|
| (16) a. John must be here. (I see his car.) | (Epistemic, same time) |
| b. John must be here. (I order it.) | (Root, different times) |

In this section, we observe that the asymmetrical behavior in epistemic versus root modals suggested by Drubig (2001) is cross-linguistically consistent in French, German, Japanese, Persian and Turkish as well.

French; French modals show that the temporal distinction between epistemic and root modals we saw in English holds in this language as well, as the examples in (17a, b) reveal.

- (17) a. Jean doit être ici. (Je vois sa voiture.) (Epistemic, same time)
 Jean must be here I see his car
 ‘Jean must be here.’ (I see his car.)
 b. Jean doit être ici. (Je le commande.) (Root, different time)
 Jean must be here I it order
 ‘Jean must be here.’ (I order it.)

German; The same asymmetry in tense between epistemic and root modals is further manifested in German, as the German equivalents in (18a, b) of the English examples in (16a, b) show.

- (18) a. Johann muss hier sein. (Ich sehe sein Auto.) (Epistemic, same time)
 Johann must here be I see his car
 ‘Johann must be here.’ (I see his car.)
 b. Johann muss hier sein. (Ich habe ihm befohlen.) (Root, different time)
 Johann must here be I have him ordered
 ‘Johann must be here.’ (I have ordered him (to).)

Japanese; Japanese lacks infinitives. However, it still patterns with the other languages examined thus far. Consider (19a, b).

- (19) a. John-wa koko-ni iru nichigainai. (Kare-no kuruma-ga koko-ni aru) (Epistemic, same time)
 John-TOP here-LOC be must:EPISTEMIC he-GEN car-NOM here-LOC exist
 ‘John must be here.’ (His car is here.)
 b. John-wa koko-ni i nakerebanaranai. (Watasi-wa soo meiree-si-ta.) (Root, different times)
 John-TOP here-LOC be must;ROOT I-TOP this order-do-PAST
 ‘John must be here.’ (I ordered it.)

Persian; Persian, similar to Japanese, does not have the infinitival complement in raising or control constructions⁶. Nevertheless, it patterns with the languages we have seen in terms of tense properties.

- (20) a. John bâyard injâ bâsh-e. (Mâshin-esh-ro mi-bin-am.) (Epistemic, same time)
 John must here be-3SG car-his-ACC HAB-see-1SG
 ‘John must be here.’ (I see his car.)
 b. John bâyard injâ bâsh-e. (Man be un dastur dâd-am.) (Root, different time)
 John must here be-3SG I to him order gave-1SG
 ‘John must be here.’ (I ordered it.)

Turkish; Finally, Turkish root modal constructions show non-anaphoric tense while epistemic modals reveal anaphoric tense, as observed in the other languages thus far. This is illustrated in (21a, b).

- (21) a. John burada ol-mal-ı. (Araba-sını gör-üyor-um.) (Epistemic, different time)
 John here be-must-3SG car-his see-PRES-1SG
 ‘John must be here.’ (I can see his car.)
 b. John burada ol-mal-ı. (Yoksa cezalandır-ıl-acak.) (Root, same time)
 John here be-must-3SG or punished-PASS-FUT
 ‘John must be here.’ (Or he will be punished.)

In summary, we have observed in this section that the anaphoric versus non-anaphoric tense of raising versus control constructions is a reliable diagnostic for distinguishing epistemic and root modals in English, French, German, Japanese, Persian and Turkish. Thus this tense property shows cross-linguistic consistency, unlike the other possible diagnostics for the distinction, which we will examine below. These results are consistent with Martin’s (2001) insight, as well as Drubig’s asymmetric analysis. We now turn to the second diagnostic for raising versus control: perfective aspect.

4.2 Perfective Aspect

As we saw in Section 3, one piece of evidence presented to show that the syntactic structure of epistemic and root modals is different is the fact that epistemic modals may appear with perfective aspect while root modals may not. Drubig (2001) calls this phenomenon *Past Tense Replacement*, as mentioned above. We have also shown that perfective interpretations are compatible with English epistemic modals but not with the root modals. This is illustrated in the following sentences:

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|------------------------------------------|--------------------------|
| (22) a. He must have left last Tuesday. | (Epistemic, necessity) |
| b. #He must have left last Tuesday. | (Root, obligation) |
| (23) a. He could have left last Tuesday. | (Epistemic, possibility) |
| b. #He could have left last Tuesday. | (Root, ability) |
| c. # He could have left last Tuesday. | (Root, permission) |

We now examine this phenomenon in other languages.

French; There are several factors which make applying the perfective diagnostic to French difficult. First, in French, epistemic possibility is generally expressed with invariant adverbials such as *peut être* ‘maybe’, and *il se peut que* ‘it might be the case that’. Modal verb *pouvoir* ‘can’ may sometimes be used epistemically, though not as widely as *devoir* ‘must’ (such variation may be due to dialectal differences or other factors). Second, the perfective is used as a regular past form, lacking the particular qualities of English perfective aspect. Consider the contrast between the English and French sentences below:

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|------|-------------------------------------------------------------------------------------|-----------|
| (24) | *He has left last Tuesday. | (English) |
| (25) | Il est parti mardi passé.
he is left Tuesday past
‘He has left last Tuesday.’ | (French) |

Further, in terms of the perfective and modals, while forms such as that in (26) (where the modal bears tense) are possible, forms such as the one in (27) (where an auxiliary bears tense) are preferred:

- (26) ?Il doit être parti mardi passé.
 he must be left Tuesday past
 ‘He must have left last Tuesday’
- (27) Il a dû partir mardi passé.
 he has must:PAST leave Tuesday past
 ‘He must have left last Tuesday.’

Some interesting aspects of forms such as that in (27) are discussed below.

Given the less restricted use of the perfective in French, the perfective diagnostic is perhaps not the best to apply to this language. Still, at least for some speakers, an epistemic interpretation is preferred to a root in the following pair using *devoir*:

- (28) Il a dû partir mardi passé. (Epistemic, necessity)
 he has must:PAST leave Tuesday past
 ‘He must have left last Tuesday.’
- (29) #Il a dû partir mardi passé. (Root, necessity)
 he has must:PAST leave Tuesday past
 ‘He must have left last Tuesday.’

This result is consistent with what we find for English: epistemic and perfective aspects are compatible while root and perfective aspect are not. However, we get the opposite judgment with *pouvoir* ‘can’:

- (30) #Il a pu partir mardi passé. (Epistemic, possibility)
 he has could leave Tuesday past
 ‘He could have left last Tuesday.’
- (31) Il a pu partir mardi passé. (Root, ability)
 he has could leave Tuesday past
 ‘He could have left last Tuesday.’

As mentioned above, there are several factors which could affect this interpretation, including the fact that in some varieties of French epistemic use of *pouvoir* ‘can’ is disallowed, while it is available in root interpretations, contrary to what we expect. Whatever the reason, it seems that French is not compatible with the general observation that the perfective is allowed in epistemic constructions, but not those intending to convey a root interpretation. We will come back to this issue in section 5.

German; German epistemic modals are compatible with perfective forms while root modals are not. Consider the following sentences.

- (32) Sie müsste am letzten Dienstag gegangen sein. (Epistemic, necessity)
 she must:PAST on last Tuesday gone be
 ‘She must have left last Tuesday.’
- (33) #Sie muss am letzten Dienstag gegangen sein. (Root, obligation)
 she must on last Tuesday gone be
 ‘She must have left last Tuesday.’
- (34) Sie könnte am letzten Dienstag gegangen sein. (Epistemic, possibility)
 she could on last Tuesday gone be
 ‘She could have gone last Tuesday.’
- (35) #Sie konnte am letzten Dienstag gegangen sein. (Root, permission)
 she could on last Tuesday gone be
 ‘She could have gone last Tuesday.’

As sentences (32-35) show, the perfective form is only accessible in epistemic modals in German⁷. These data show that epistemic modals co-occur with perfective forms of the verb while root modals are incompatible with perfective forms.

Japanese; Japanese does not have perfect tense. Perfect tense is expressed most closely by the simple past tense marker *-ta*. If we are right in using this form to express perfectivity in Japanese, then perfect aspect co-occurs with epistemic modals, as in (36).

- (36) Kare-wa senshu-no kayoobi-ni sat-ta nichigainai. (Epistemic, necessity)
 he-TOP last:week-GEN Tuesday-LOC leave-PAST must
 ‘He must have left last Tuesday.’

The modal *nakerebanaranai* ‘must’, which only allows a root reading, is not compatible with the past tense marker *-ta*, as we see in (37).

- (37) *Kare-wa senshu-no kayoobi-ni sat-ta nakerebanaranai. (Root, obligation)
 he-TOP last:week-GEN Tuesday-LOC leave-PAST must
 ‘He must have left last Tuesday.’

Now consider the following data which present possibility and permission.

- (38) a. Kare-wa senshu-no kayoobini sat-ta-kanousei-ga aru. (Epistemic, possibility)
 he-TOP last:week-GEN Tuesday leave-have-possibility-NOM exist
 ‘He could have left last Tuesday.’
 b. *Kare-wa senshu-no kayoobini sat-ta-yoi. (Root, permission)
 he-TOP last:week-GEN Tuesday leave-PAST-good
 ‘He could have left last Tuesday.’

As (38b) shows perfective is not possible when we have a root-permission modal. However, it is possible when we have an epistemic-possibility modal, as in (38a). Therefore, based on the above observation we conclude that Japanese root modals cannot appear in perfective form while epistemic modals can.

Persian; Persian epistemic modals co-occur with the perfective form while the root modals are incompatible with this form, as illustrated in the following sentences.

- (39) a. Un bâyard seshanbe rafte bâsh-e. (Epistemic, necessity)
 he must Tuesday gone was-3SG
 ‘He must have left last Tuesday.’

- b. # Un bâyard seshanbe rafte bâsh-e. (Root, obligation)
 he must Tuesday gone was-3SG
 ‘He must have left last Tuesday.’
- (40) a. Un mi-tun-e seshanbe rafte bâsh-e. (Epistemic, possibility)
 he DUR-can-3SG Tuesday gone was-3SG
 ‘He could have left last Tuesday.’
- b. # Un mi-tun-e seshanbe rafte bâsh-e. (Root, ability)
 he DUR-can-3SG Tuesday gone was 3SG
 ‘He could have left last Tuesday.’

Thus the Persian data is consistent with what we have found for English, German, and Japanese thus far.

Turkish: Based on Cinque (2001:50), the Turkish perfect aspect suffix *–miş* appears to be outside the ability/permission modal suffix *–(y)Abil-* as in (41a) and inside the possibility suffix *–(y)Abil* as in (41b).

- (41) a. Oku-yabil-miş ol-ur. (Root, ability, permission)
 read-ABIL-PERF be-AOR
 ‘He has been able/has had permission to read.’
- b. Oku-muş ol-abil-ir. (Epistemic, possibility)
 read-PERF be-ABIL-AOR
 ‘He might have read.’ (Cinque 2001:50)

If Cinque’s observation is right, then we expect Turkish root and epistemic modals to both be compatible with perfective aspect. This is because a root interpretation is possible with the perfect form in (41a). This prediction is confirmed by our consultants. According to them, however, it is not necessary to have the aspect marker *–miş* in order to derive a perfective reading. Adding the past tense marker *–di* also allows a perfective reading, as in Japanese, depending on the context. This is shown in the following data.

- (42) Geçen Salı gid-ebil-di/miş. (Root, ability/permission)
 last Tuesday go-ABIL-PST-3SG/PERF
 ‘He could have left last Tuesday.’

The sentence in (43) shows that the epistemic possibility modal in Turkish is also compatible with the perfective form, as expected.

- (43) Geçen Salı git-miş olmalı. (Epistemic, possibility)
 last Tuesday leave-PERF may-3SG
 ‘He could have left Tuesday’

The above observation shows that unlike other languages we have seen so far (with the possible exception of French), epistemic and root modals both appear in perfective form in Turkish. We turn to this puzzle in section 5 where we try to offer a solution.

Summarizing, the discussion in this section shows that the perfective aspect is compatible with epistemic modals in the languages investigated. In the case of root modals, we have shown that they are not compatible with perfective forms in English, German, Japanese and Persian. However, there are some exceptions in the cases of French and Turkish because in these languages both root and epistemic modals are compatible with perfective forms. The summary of the discussion in this section is provided in the following table⁸.

[Table 1 here]

In section 5, we address the unusual behavior of root modals in French and Turkish.

4.3 Scope

We saw in section 2 that raising verbs allow both narrow and wide scope, as shown in (4), repeated below as (44).

- (44) a. A unicorn seems to be in the room. (Narrow scope possible for *a unicorn*)
 b. A unicorn tried to enter the room. (Narrow scope not possible for *a unicorn*)

We also reviewed two distinct views with respect to modals in section 3. As we saw, the asymmetrical analysis (Drubig 2001) suggests that epistemic modals allow narrow and wide scope, while root modals are restricted to wide scope, while Wurmbrand's (1999) symmetric analysis suggests that the scope distinction between epistemic and root modals does not exist.

In what follows, we will see that although epistemic modals tend to allow wide and narrow scope, this generalization does not hold in all languages. Furthermore, root modals reveal a mixed result. We start with English, which seems to support the asymmetric view.

English; Consider the English data below.

- (45) Someone may have read the article. (Epistemic, Possibility: wide & narrow)
- (46) Someone must have read the article (Epistemic, Necessity; wide & narrow)
- (47) Someone can read the article. (Root, Ability: wide)
- (48) Someone must read the article. (Root, Obligation: wide)

As we can see in (45-48), epistemic *may* and *must* allow both wide and narrow scope, while only wide scope is available in the case of root *may*, *can*, and *must*.

French; In French, we can see that a narrow scope reading is available for both epistemic and root modals.

- (49) Quelqu'un a dû lire l'article. (Epistemic, Necessity: wide & narrow)
 someone has must:PAST read the:article
 'Someone must have read the article.'
- (50) Quelqu'un a pu lire l'article. (Root, Ability: wide & narrow)
 someone has could read the:article
 'Someone could have read the article.'

(51) Quelqu'un doit lire l'article. (Root, Obligation: wide & narrow)
 someone must read the:article
 'Someone must read the article.'

(52) Quelqu'un peut lire l'article (Root, Ability: wide)
 someone can read the:article
 'Someone can read the article.'

The French data is somewhat unique in allowing a narrow scope interpretation in root constructions with *pouvoir* 'can'⁹. But it is still somewhat in keeping with the asymmetrical analysis in that a wide scope interpretation is available only in a root *devoir* 'must' construction and not in an epistemic *devoir* 'must' construction. We will discuss this issue in section 6.

German; As with English and French, German shows a unified pattern for epistemic modals (allowing both wide and narrow scope interpretations), while root modals reveal a mixed pattern (obligation readings of *müssen* 'must' allow both wide and narrow scope interpretations while ability readings of *können* 'can' allow only a wide scope interpretation).

(53) Jemand mag den Artikel gelesen haben. (Epistemic, Possibility: wide & narrow)
 someone may the article read have
 'Someone might have read the article.'

(54) Jemand könnte den Artikel gelesen haben. (Epistemic, Possibility: wide & narrow)
 someone could the article read have
 'Someone could have read the article.'

(55) Jemand müsste den Artikel gelesen haben. (Epistemic, Necessity: wide & narrow)
 someone must the article read have
 'Someone must have read the article.'

(56) Jemand kann den Artikel lesen. (Root, Ability: wide)
 someone can the article read
 'Someone can (has the permission/is able) to read the article.'

- (57) Jemand muss den Artikel lesen. (Root, Obligation: wide & narrow)
 someone must the article read
 ‘Someone must read the article.’

Japanese; Consider the Japanese epistemic modal data below. We can see that, as with English, French, and German, epistemic modals allow both wide and narrow scope interpretations.

- (58) Dareka-ga sono kiji-o yon-da-kamosirenai. (Epistemic, Possibility: wide & narrow)
 someone-NOM that article-ACC read-PAST-may
 ‘Someone might have read the article.’
- (59) Dareka-ga sono kiji-o yon-da-kanoosei-ga aru. (Epistemic, Possibility: wide & narrow)
 someone-NOM that article-ACC read-PAST-possibility-NOM exist
 ‘Someone could have read the article.’
- (60) Dareka-ga sono kiji-o yon-da-nichigainai. (Epistemic, Necessity: wide & narrow)
 someone-NOM that article-ACC read-PAST-must
 ‘Someone must have read the article.’

But now let us look at some root modal data, given below. In the case of these root modal sentences, (61) strongly invites the wide scope interpretation of the indefinite *dare-ka* ‘someone’. We cannot think of any context where *dare-ka* ‘someone’ can be interpreted with narrow scope on an ability/permission interpretation. The sentence in (62), on the contrary, strongly prefers the narrow scope reading of the same element though the wide scope reading is possible given appropriate contexts.

- (61) Dareka-ga sono kiji-o yom-eru./yonde-mo yoi. (Root, Ability: wide)
 someone-NOM that article-ACC read-can/reading-PRT good
 ‘Someone can read the article.’
- (62) Dareka-ga sono kiji-o yoma-nakerebanaranai. (Root, Obligation: wide & narrow)
 someone-NOM that article-ACC read-must
 ‘Someone must read the article.’

Persian; Similar to the other languages discussed thus far, Persian shows a unified pattern for epistemic modals, while root modals present a mixed pattern. First, we see that epistemic modals allow both wide and narrow scope interpretations, as in (63)-(65).

- (63) Yenafar momken-e in maghâla-ro xunde bâsh-e. (Epistemic, Possibility: wide & narrow)
 someone possible-is this article-ACC read SUBJ:be-3SG
 ‘Someone is possible to have read this article.’
- (64) Yenafar mi-tun-e in maghâla-ro xunde bâsh-e. (Epistemic, Possibility: wide & narrow)
 someone HAB-can-3SG this article-ACC read SUBJ:be-3SG
 ‘Someone could have read this article.’
- (65) Yenafar bâyard in maghâla-ro xunde bâsh-e. (Epistemic, Necessity: wide & narrow)
 someone must this article-ACC read SUBJ:be-3SG
 ‘Someone must have read this article.’

But now, looking at root modal constructions, we can see that while only a wide-scope interpretation is available with modal ability expressions, modal obligation expressions allow both wide and narrow scope, as in (66)-(67).

- (66) Yenafar mi-tun-e in maghâla-ro bexun-e. (Root, Ability: wide)
 someone HAB-can-is this article-ACC SUBJ:read-3SG
 ‘Someone can (has the permission/is able) read this article.’
- (67) Yenafar bâyard in maghâla-ro bexun-e. (Root, Obligation: wide & narrow)
 someone must this article-ACC SUBJ:read-3SG
 ‘Someone must read this article.’

Turkish; The Turkish data are consistent with the rest of the languages discussed in this section. That is, the epistemic modals allow both readings, while there is a mixed pattern with respect to the root modals, as in (68)-(72)¹⁰.

- (68) Birisi makâle-yi oku-muş olâbIl-Ir. (Epistemic, Possibility: wide & narrow)
 someone article-ACC read-PERF might-3SG
 ‘Someone might have read the article.’

- (69) Birisi makâle-yi oku-yâbII -Ir -dI. (Epistemic, Possibility: wide & narrow)
 someone article-ACC read-could-3SG-PAST
 ‘Someone could have read the article.’
- (70) Birisi makâle-yi okumuş olmâII. (Epistemic, Necessity: wide & narrow)
 someone article-ACC read-PERF must-3SG
 ‘Someone must have read the article.’
- (71) Birisi makâle-yi oku-yâbII-Ir. (Root, Ability: wide)
 someone article-ACC read-can-3SG
 ‘Someone can read the article.’
- (72) Birisi makâle-yi oku-mâk zorundâ. (Root, Obligation: wide & narrow)
 someone article-ACC read-INF must
 ‘Someone must read the article.’

In summary, we have seen that epistemic modals in different languages allow both wide and narrow scope interpretations. Furthermore, we have seen that ability root modal expressions favor wide scope interpretations, and obligation modal expressions have a greater degree of variation.

4.4 Interim conclusion

We have examined modal expressions in six different languages with respect to their tense properties, their compatibility with perfective form, and the scopal interpretations they receive. In terms of tense, we saw that in all languages, the matrix event and the embedded event are understood to be occurring at the same time in epistemic constructions, while the embedded event is understood to occur at some time after the matrix event in root constructions.

In terms of compatibility with perfective aspect, it is a general trend that epistemic modals are compatible with perfective aspect while root modals are not. The exceptions to

this generalization are French and Turkish, which allow perfective forms with root modal expressions.

In terms of scope, the epistemic modals generally allow both wide and narrow scope in all six languages, although a narrow scope reading is sometimes preferred. For root modals, it seems that root ability modals allow only wide scope (except for French *pouvoir*), while wide and narrow scope interpretations are both available in other types of root modals, depending on the language. Based on this observation, it seems that epistemic modals exhibit similar patterns cross-linguistically. Root obligation modals vary in scope interpretation from language to language. However, modals of ability allow only wide scope (again, except for French *pouvoir*; see footnote 8). These results are summarized in Table 1, repeated in 2, and in Table 3.

[Table 2 here]

[Table 3 here]

The pattern that emerges from the descriptive analysis in this section does not support a symmetric analysis of modals, as suggested by Wurmbrand, since epistemic and root modals receive distinct interpretations, and thus cannot be both considered raising constructions. However, assuming an underlying control construction for root modals, thus supporting Drubig's asymmetrical analysis, cannot be maintained either, since these modals allow both narrow and wide scope, contrary to what we expect of control constructions.

5. Analysis

In this section we turn to a syntactic analysis of modals based on Chomsky's Phase Theory (Chomsky 2001) as well as the modal hierarchy proposed by Cinque (1999), in the hope that such analysis will explain the mixed behavior of root modals. We will also address the inconsistencies observed in French and Turkish.

In the next two subsections, we try to provide a solution for the non-uniform behavior of obligation modals and for the unusual pattern of the perfective forms in French and Turkish. Subsection 5.1 discusses the observed scope facts, while subsection 5.2 is devoted to a discussion of perfective facts. We will not discuss tense here since, as we saw in section 4, all languages exhibit uniform behavior.

5.1 Scope

Cinque (1999:80) proposes the following syntactic hierarchy for epistemic and root modals, based on his cross-linguistic investigation on the morphosyntax of the left periphery¹¹:

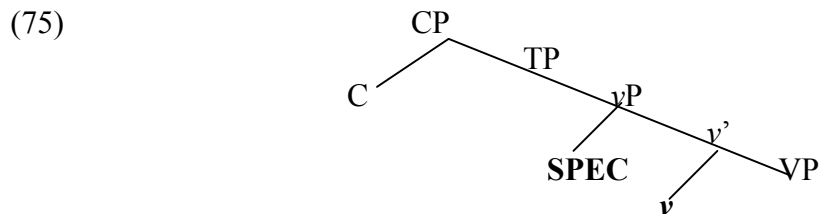
$$(73) \quad \text{Mod}_{\text{epistemic}} > T > \text{Mod}_{\text{obligation}} > \text{Mod}_{\text{ability/permission}}$$

We use this structure as a basic guideline for our analysis, with the addition that if a modal is one of epistemic possibility, we call it $\text{Mod}_{\text{Possibility}}$, while if it is one of epistemic necessity, we call it $\text{Mod}_{\text{Necessity}}$. We also adopt the Phase Theory of the Minimalist Program as proposed by Chomsky (2001 and subsequent work). A phase is a derivational object headed by ν or C. Thematic information about the predicate is in νP while information regarding tense and clause type are located in CP. The complement of a lower phase is not available for further syntactic operations once the head of the higher phase is

merged. This is stated in Chomsky’s Phase Impenetrability Condition (PIC), as defined below in (74).

- (74) Phase Impenetrability Condition (PIC) (Chomsky 2001:108)
The domain of H is not accessible to operations at ZP, but only H and its edge.

By the time C is merged in (75) below, the complement of v , namely VP, is sent for semantic and phonological interpretation, and is not available to any further syntactic operations. Thus only the head and the Spec of the lower phase are available for syntactic operations at that point.

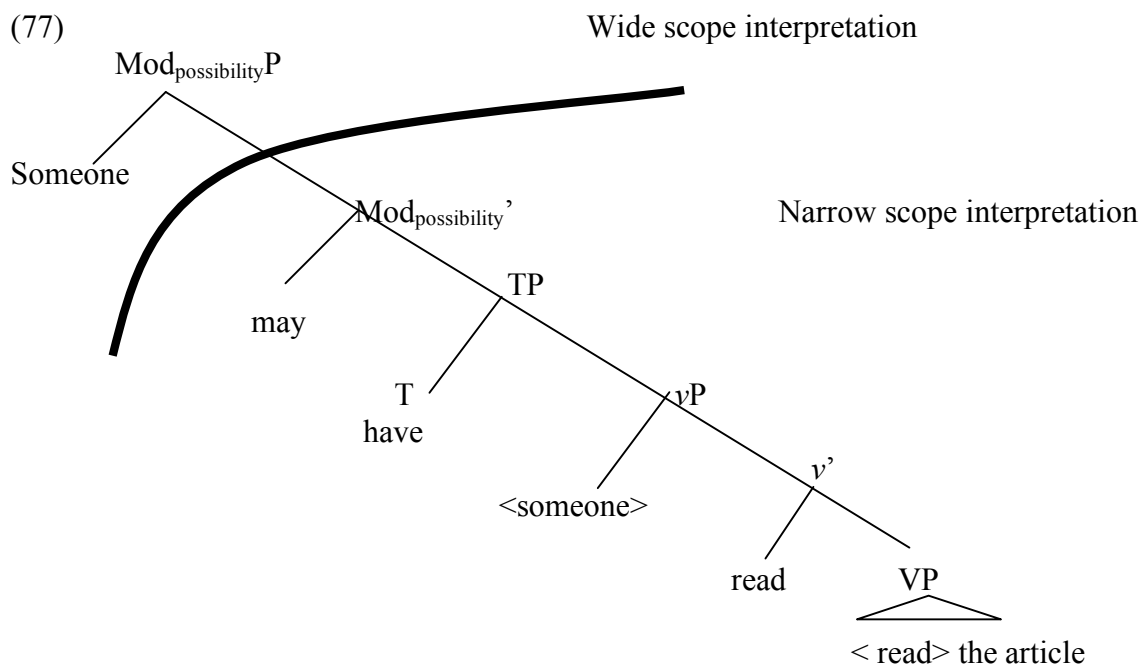


It has been argued in the literature that CP and vP are not the only strong phases (Legate 2005, Carnie 2005, and Svenonius 2004). Each modal contributes to the semantics of the clause, and dictates specific interpretations with respect to tense and scope, as we saw in sections 3 and 4. Therefore, it is realistic to assume that each Mod(al) projection constitutes a phase. It is crucial to note that the Mod phases are merged only if there is a reason for their presence in the syntactic derivation. That is, only those modal heads that enter the semantic interpretation of the sentence are present in the syntactic derivation. This is in accordance with the nature of the Minimalist Program assumed here¹². Our approach is in keeping with work such as Butler (2003, 2006), which also uses articulated syntactic structures and phases in order to account for the syntax and semantics of modals.

In addition, we assume (as discussed above) that epistemic modals do not project external arguments while root modals do.

We start with epistemic modals. The tree in (77) represents the structure of (45), repeated in (76), where the modal receives an epistemic (possibility) reading. We have included in this structure only those elements necessary for our analysis.

(76) Someone may have read the article. (Epistemic, wide and narrow scope)



In (77), the verb has moved out of the VP into *v*, and the subject *someone* is merged in the Spec of *v*P. By the time the modal is merged as the head of Mod_{possibility}P, the complement of *v*, that is, VP, has been sent to PF and LF. The Spec of *v*P, however, is still available to the higher phase, and therefore, a subject residing in that position receives narrow scope

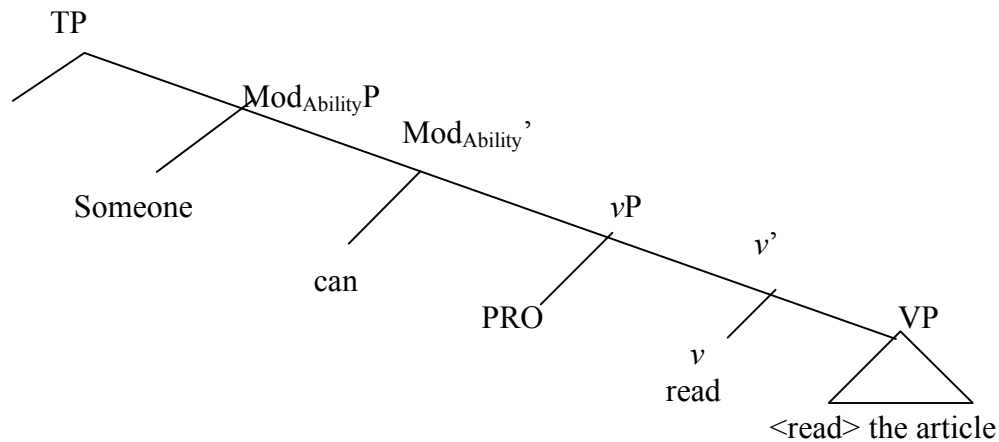
with respect to the modal. Then the subject moves into the Spec of ModP, c-commands the modal, and may thus receive a wide scope reading in that position¹³. The ambiguity of the subject in the case of epistemic necessity is arrived at in this fashion. This analysis is consistent with the raising approach proposed by Wurmbrand.

As the generalization in table 3 indicates, root ability modals behave like control verbs in that the subject receives a wide scope reading only, unlike the epistemic modals, which are ambiguous. The structure in (79) represents the wide scope reading of *can* in (47), repeated in (78).

(78) Someone can read the article.

(Root, Ability; wide)

(79)

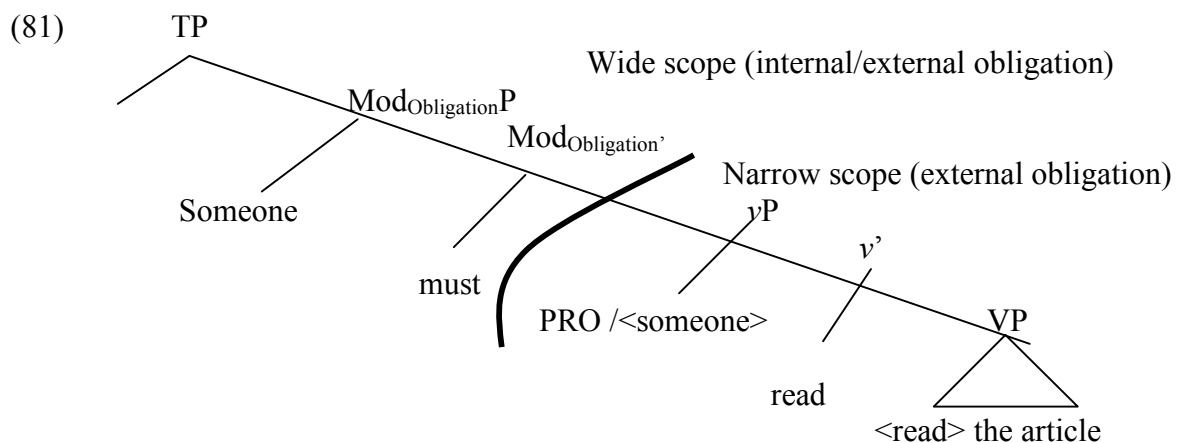


One major difference between the structure representing the epistemic modal in (77) and the one representing the root ability modal in (79) is that the modal is merged in a higher position than T in the former, while it is below T in the latter. This difference accounts for the word order facts with respect to epistemic constructions where the modal precedes T in perfective constructions. Furthermore, the structure in (79) justifies the wide scope reading of the subject with respect to the root ability modal. The overt subject is merged in a higher position, the Spec of Mod_{Ability}, c-commanding the modal, and thus receiving a

wide scope reading. Assuming the existence of PRO in Spec of vP, *someone* controls this element¹⁴. Note that the crucial point here is that the subject is merged in a higher position with respect to the modal, and thus a narrow reading is never possible. This analysis is consistent with Drubig's control approach to root modals.

We saw, however, that root obligation modals allow both narrow and wide scope reading of the subject. We wish to suggest that one important property of these modals is that they may represent two types of obligation: internal (the need is generated within the subject him/herself) and external (the need is generated by some outside person or force). When the obligation is internal, only a wide scope interpretation of the subject is available, as we see with root ability. When we have an external obligation, it behaves like a raising construction. Thus the structure in (81) accounts for (48), repeated below in (80a), as well as the ambiguities stated in (80b) and (80c). (80b) represents the internal reading, and (80c) stands for the external reading of this modal.

- (80) a. Someone must read the article. (Root: wide & narrow)
 b. Someone has the internal need to read an article. (Wide)
 c. Someone is obliged to read an article to satisfy some requirement. (Wide & narrow)



Although the modal is merged lower than T, as in the root ability construction in (79), it allows both interpretations in (80b) and (80c). First, it allows a control-type of reading (= internal need), where the overt subject is merged in a position where it c-commands both the modal and PRO, and second, it allows a raising type of reading (= external obligation), where the overt subject is merged in Spec vP where it receives a narrow interpretation.

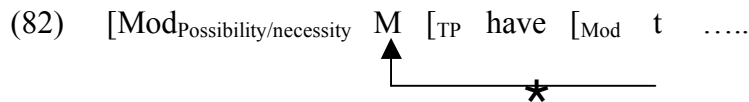
The analysis in this section shows that a unified raising construction is not possible for all modals, contrary to Wurmbrand (1999). It also indicates that a unified control construction for all root modals, as suggested by Drubig, is not supported by empirical facts. The current analysis provides a unified structure for root modals with respect to their position in the phrase structure, but accounts for the ambiguity of obligation modals by allowing both control and raising constructions. One major advantage of this analysis is that it sets up a parallel between internal obligation and root ability which have the same semantic connotation; they are both internally conditioned. The external obligation patterns with the epistemic modals that are also externally conditioned, in terms of allowing narrow reading.

The French data containing the modal *pouvoir* pose a problem, since it allows both narrow and wide scope in a root ability interpretation. We will address this issue in the following section where the unusual behavior of this modal with respect to perfective form is discussed.

5.2 Perfective

The structures proposed in the previous section account for the fact that root modals, even in those cases where a raising construction is proposed (root external

obligation), do not allow perfective aspect. The reason is that these modals are merged into a position below T, and T is where the perfective *have* appears. Thus there is no room for the modal to move into a higher head position, such as Mod_{Possibility/necessity}, in order to precede the perfective element. The movement of the modal into this position would violate the Minimal Link Condition (Chomsky 1995), as illustrated below in (82).



The presence of the perfective *have* blocks the movement of the modal into a higher head position.

The Turkish data in (42) and (43), repeated below in (83) and (84), seem to provide a problem for this analysis, since root modals may appear with the perfective *–mİŝ* in this language.

(83) Geçen Sâli gid-ebil-di/miŝ. (Root)
 last Tuesday go-may-PAST-3SG/PERF
 ‘He could have left last Tuesday.’

(84) Geçen Sâli git-miŝ ol-mâI. (Epistemic)
 last Tuesday leave-PERF may-3SG
 ‘He could have left Tuesday.’

In the root ability construction, the perfective *–mİŝ* (or the past tense marker *–di*) is outside of the modal, while they are inside the verbal complex, preceding the modal, in the epistemic version. However, a step-by-step analysis of the morphological combination of the verbal form turns out to support the structures provided in (79) for root modals and (77) for epistemic modals. The following structures show this order distinction. Note that

Turkish is a head final language with all functional heads appearing in the right side of the phrase structure.

(85) Root: [TP miş [ModP ebil [vP gid]]]

Step I: the verb moves into Mod, giving us [gid+ebil]

Step II: the complex moves into T, giving us [gid+ebil]+[miş]

(86) Epistemic: [ModP olmalı [TP miş [vP git]]]

Step I: the verb moves into T, giving us [git+miş]

Step II: the complex moves into Mod, giving us [git+miş]+[olmalı]

The Turkish data do not contradict the analysis provided in this section, but rather they strongly support it.

Turning to French, the data in this language seem problematic for our analysis.

The relevant data (28), (29), (30), (31), (49), and (50)) are repeated in (87)-(91).

(87) Il a dû partir mardi passé. (Epistemic) = (28)
 he has must:PAST leave Tuesday past
 'He must have left last Tuesday.'

(88) #Il a dû partir mardi passé. (Root) = (29)
 he has must:PAST leave Tuesday past
 'He must have left last Tuesday.'

(89) #Il a pu partir mardi passé. (Epistemic) = (30)
 he has could leave Tuesday past
 'He could have left last Tuesday.'

(90) Il a pu partir mardi passé. (Root) = (31)
 he has could leave Tuesday past
 'He could have left last Tuesday.'

(91) Quelqu'un a dû lire l'article. (Epistemic) = (49)
 Someone has must:PAST read the:article
 'Someone must have read the article.'

(92) Quelqu'un a pu lire l'article. (Root) = (50)
 Someone has could read the:article

‘Someone could have read the article.’

Table 4 summarizes our findings with respect to the data in (87)-(91).

[Table 4 here]

The striking issue regarding the French data is that while *devoir* ‘must’ fits into the general pattern we have arrived at in this paper, *pouvoir* ‘can’ exhibits the exact opposite of what we would expect. This is true of the scope interpretations as well. That is, wide and narrow scope readings are both possible for the root ability interpretation of *pouvoir*, as in (92) and (52), repeated below in (93).

- (93) Quelqu'un peut lire l'article. (Root, Ability: wide & ?narrow)
 someone can read the:article
 'Someone can read the article.'

Thus the modal *pouvoir* reveals an unusual pattern which is contradictory to that of its counterpart *devoir* in the same language. This strange behavior might have something to do with the lexical nature of this element for which we have no explanation at this point. We leave this issue for a future in-depth analysis of the lexical properties of *pouvoir*, and its syntactic and semantic behavior in other contexts.

6. Conclusion

The analysis in this paper shows that epistemic modals reveal a unified pattern with respect to perfective aspect and scope interpretation. They seem to support Wurmbrand's and Drubig's suggestion that these modals are raising predicates. Root modals seem to lead us to a control construction, as proposed by Drubig. However, we saw that there are some inconsistencies with respect to root modals, both in terms of perfective aspect and scope reading. That is, Turkish and French allow perfective forms with root modals, a

pattern not observed in other languages. Moreover, root obligation allows both narrow and wide scope, contrary to Drubig's unified control construction analysis for all root modals.

The alternative analysis proposed in this paper, based on the Phase Theory (Chomsky 2001) and the modal hierarchy (Cinque 1999) is an effort to account for these inconsistencies by providing a unified structure for root modals with respect to their position in the phrase structure. It also explains the ambiguity of obligation modals by allowing both control and raising constructions for this type of modals. One major advantage of this analysis is that it accounts for the semantic similarities and differences of modals. That is, internal obligation and root ability modals pattern together structurally as control constructions, and thus have the same semantic connotation by being both internal to the subject. External obligation and epistemic modals are all raising constructions, and thus are externally conditioned.

As for French, we observed that although *devoir* 'must' exhibits a syntactic and semantic behavior on a par with what is expected, *pouvoir* 'can' deviates from this norm. We leave this issue for a future examination of the properties of this element.

Despite some points of variation, we have shown that, overall, a unified syntax-semantics system such as the one proposed here may adequately account for a wide variety of cross-linguistics modal data.

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Tables

Language	Root	Epistemic	
	Obligation/Ability	Necessity	Possibility
English	-	+	+
French	+	+	
German	-	+	+
Japanese	-	+	+
Persian	-	+	+
Turkish	+	+	+

Table 1

Perfective patterns

Language	ROOT Obligation/Ability	EPISTEMIC Necessity	EPISTEMIC Possibility
English	-	+	+
French	+	+	
German	-	+	+
Japanese	-	+	+
Persian	-	+	+
Turkish	+	+	+

Table 2

Scope patterns

LANGUAGE	EPISTEMIC	ROOT OBLIGATION	ROOT ABILITY
English	Wide & Narrow	Wide & Narrow	Wide
French	Wide & Narrow	Wide & Narrow	Wide (& Narrow)
German	Wide & Narrow	Wide & Narrow	Wide
Japanese	Wide & Narrow	Wide & Narrow	Wide
Persian	Wide & Narrow	Wide & Narrow	Wide
Turkish	Wide & Narrow	Wide & Narrow	Wide

Table 3

	EPISTEMIC: PERFECT	ROOT: PERFECT
DEVOIR 'must'	OK (87 & 91)	# (88)
POUVOIR 'can'	# (89)	OK = (90 & 92)

Table 4

Notes

¹ Although it has been suggested that English *can* does not receive an epistemic reading while *could* does (Papafragou 2000). Such morphological distinction between root and epistemic modals is observed in German as well. See footnote 7 on this issue.

² We are leaving out object control constructions, such as those in (i) in this work.

- (i) a. John persuaded Mary [_{CP} PRO to go].
- b. John expected Mary [_{CP} PRO to go].

In addition, we recognize a theory of control that eliminates PRO, and reduces the control phenomena to raising, thus a case of movement (Hornstein 1999, Boeckx and Hornstein 2004). See also Manzini and Roussou (2000) who argue against the existence of PRO.

³ The distinction between raising and control is sometimes blurred as the following data, from Davies and Dubinsky (2004), reveal.

- (i) a. The boy promised to pick up a quart of milk on the way home.
- b. There promises to be trouble at the concert.
- c. It promises to be a beautiful day. (Davies and Dubinsky 2004:10)

While *promise* is a control predicate in (ia), it is a raising verb in (ib) and (ic) evidenced by the presence of the pleonastic subject in these examples. Despite such ambiguous cases, we still take the difference between raising and control to be a fundamental one.

⁴ We wish to point out that there is no general pattern with respect to the interpretation of tense in control constructions. In fact, Wurmbrand (1998) suggests that control complements consist only of VPs. Following her, Ghomeshi (2001) provides some evidence from Persian indicating that obligatory control has no independent Tense, thus there is no TP in this construction. The following example is taken from Ghomeshi (2001).

- (i) a. *Bijan diruz mi-tunest (ke) [fardâ be-r-e].
 Bijan yesterday DUR-be-able-PAST-3SG (COMP) tomorrow SUBJ-go-3SG
 ‘Bijan could yesterday go tomorrow.’
 b. ?Bijan diruz sa’y-kard (ke) [fardâ be-r-e].
 Bijan yesterday try - do -PAST-3SG (COMP) [tomorrow SUBJ-go-3SG]
 ‘Bijan tried yesterday to go tomorrow.’ (Ghomeshi 2001:26)

It seems that some control verbs with intentional semantics, such as *try*, allow only anaphoric tense in the embedded clause, while speech act verbs such as *promise* or *decide* indicate future tense. See Karimi (in press) for an analysis of control constructions where she shows that obligatory control verbs differ in terms of their tense: some allow only anaphoric tense, and some a separate tense in the embedded clause.

⁵ Some question the very category of modal verb, e.g. Maché (2006) who claims that there are no modal verbs in German, but argues rather for a class of epistemic verbs, characterized in part by a [+raising] feature. Here, however, we assume that modal verbs form a natural class.

⁶ The Persian verb is in subjunctive form in these cases.

⁷ The morphological form of the same German modal is different in root and epistemic readings. For example *müssen* ‘must’ in root reading will be changed to *müssten* in

epistemic reading, or *können* ‘can’ in root, ability reading will be *könnten* ‘could, might’ in epistemic, possibility reading. See a similar morphological situation with respect to *can* versus *could* in footnote 1.

⁸ We have left the Possibility slot for French empty. The reason is that some speakers do not like an epistemic reading with the perfective form with respect to *pouvoir*, while others do.

⁹ Some speakers get both wide and narrow scope readings on an ability interpretation with *pouvoir*.

¹⁰ In (72), a wide scope interpretation is preferred for some speakers.

¹¹ We are leaving out Mod_{volition} as it is not relevant to our discussions.

¹² See, for example, Chomsky (1995) who states the following:

(i) α enters the numeration only if it has an effect on output. (Chomsky 1995:294)

¹³ It would be reasonable to assume that the subject moves into the Spec of TP for Case, on its way to the Spec of the modal phase. However, this is not relevant to our analysis.

¹⁴ We are aware that there are arguments against the presence of PRO in root modal constructions, for example Wurmbrand’s (1999) discussion on quirky case in Icelandic.