A Unified Model for Resolving Modal Ambiguity

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Abstract

Cross linguistically, one and the same modal can be used to express both epistemic and deontic interpretations of modality. *Must/should* in English, *devoir* in French, *oonə* in Sinhala and *dovere* in Italian are only a few of the examples. Whether it is the syntactic structure or context dependant (pragmatic) parameters that trigger different interpretations has been a topic in debate in the syntactic and semantic studies. Within this background, this paper investigates the effects of phonological (prosodic) factors on the generation of the two different interpretations, other than the syntactic and semantic factors. The paper focuses on the prosodic structures of Sinhala and French modal constructions and shows that prosody reflects the underlying syntactic and scope structures in deriving a particular modal interpretation. Thus, this paper highlights the significance of prosody (other than syntax and semantics) in the study of different interpretations of modality. I argue that syntax feeds the logical form (LF) and LF feeds the phonetic/phonological form (PF) filtering different modal flavours, which is demonstrated with a model proposed in the study. A sample of sentence constructions in Sinhala and French selected by the author was used to discuss and draw conclusions. The analysis of data primarily employed the notions of nuclear stress application and shift involved in a sentence. The study will help understand and analyze the processes involved in the acquisition and production of the constructions involving modals cross-linguistically.

Keywords: modals, syntax, semantics, prosody

1. Introduction

There has been a long-lasting debate as to what makes it possible for a modal to be able to express different flavours such as deontic and epistemic (Jackendoff, 1972; Roberts, 1985; Brennan, 1993; Nauze, 2008; Kratzer, 1991). For instance, the examples from (1) to (4) illustrate that the same modal could bring about different interpretations/flavours of modality and it is a common phenomenon cross-linguistically.

French

(1) a. John doit être à la maison. (deontic)
(John is obliged to be at home.)
b. John doit être à la maison. (epistemic)
(John is assumed to be at home.)

English

(2) a. John must be at home. (deontic)
(John is obliged to be at home.)
b. John must be at home. (epistemic)
(John is assumed to be at home.)

Sinhala

(3) a. John gedərə innə oonæ. (deontic)
(John is obliged to be at home.)
b. John gedərə innə oonæ. (epistemic)
(John is assumed to be at home.)
c. Malli den ennə oonæ. (deontic)
(Brother must come now. He is obliged to come now.)
d. Malli den ennə oonæ. (epistemic)
(Brother must be coming now. He is assumed to be coming now.)

Italian

(4) a. John deve essere a casa. (deontic)
(John is obliged to be at home.)
b. John deve essere a casa. (epistemic)
(John is assumed to be at home.)

As far as the two types of meanings (deontic/epistemic) are concerned, whether it is the syntactic deep structure, (control for deontics and raising for epistemics) as argued by Jackendoff (1972), Roberts (1985), Brennan (1993) and Nauze (2008) or LF oriented contextually dependant parameters as discussed by Kratzer (1991) is still an unresolved debate in the literature pertaining to modality. However, as far as the author is aware, the phonological/prosodic effects on deriving different flavours have not received attention in the literature. Accordingly, this study investigates the role that prosody plays in triggering different flavours of modality. The paper claims that

in drawing different flavours of modality, the syntactic structures derived in the narrow syntax and scope structures projected at logical form (LF) pattern with the phonetic/phonological form (PF) structures created by stress shift and prosodic rephrasing to bring out a particular flavour.

The claims in this paper basically build on the evidence from the modal constructions in French and Sinhala and are expected to be extended to those of English and other world languages in the future work.[1] The samples of the sentences of modal constructions in French and Italian were tested for syntax and semantics judgements by native speakers of the two respective languages. For Sinhala and English data, the author's own judgements were used. However, even though, cross-linguistic similarity in generation of different modal flavours is highlighted to demonstrate the universal character of the flavours, a comparative analysis of modal constructions of different languages is not the main concern of the paper. The paper mostly focuses on the processes involved in the generation of different modal flavours with respect to narrow syntax, LF and PF. As opposed to the assumptions in relation to the inverted Y or T model in syntax, such as the independence of LF and PF, it is claimed that at least in the case of modal structures in question, all three components: syntactic, LF and PF branches work in harmony like 'close bosom friends' in bringing out different flavors, or in saturating a construction with a particular modal flavour. Accordingly, I propose a unified architectural model to demonstrate this.

The paper is organized as follows. Section two deals with the literature and theoretical background to the study. Section three presents the method of data collection for the study. Section four analyzes and discusses the theoretical and empirical implications of the study. Section five derives conclusions with the proposed model.

[1] It is also important to note the differences in modal constructions in the two languages: French and Sinhala. For instance, the modal verb in French inflects as *devoir – je dois, tu dois, il doit, elle doit, nous devons, vous devez, ills doivent, ells doiven.* However, the modal *oonæ* in Sinhala does not inflect. At the same time, there are differences in the word order between the two languages (i.e. French S V Adv word order while Sinhala S Adv V word order). Thus, the paper also demonstrates that despite these surface differences, the modal constructions in the two languages (and possibly in the other languages) generate meaning in a universal manner. However, as a comparative analysis is not the main focus of the paper, this is not taken up for investigation and discussion in detail.

2. Literature and theoretical background

2.1. On triggers of different flavors

As Jackendoff (1972), Roberts (1985), Brennan (1993) and Nauze (2008) have argued, in a deontic modal construction the subject receives a theta role from the deontic modal, because the subject has a property of an obligation or permission getting assigned by the modal and there is a PRO that the subject controls and that receives a theta role from the lexical verb in the embedded clause. Thus, a deontic modal construction is said to take a control structure as shown in (5)[2].

(5) John must be at home. (deontic)
[John must [PRO be at home.]]
(John is obliged to be at home.)

And, they also demonstrate that in an epistemic modal construction the modal has a thematic relationship with the whole TP. The subject is an argument of the lexical verb and it subsequently moves to the structural subject position.

(6) John must be at home. (epistemic)
[John [must *t* be at home.]]
(John is assumed to be at home.)

The same claims hold for Sinhala and French modal constructions. Given that *oonə* in Sinhala is a lexical verb that can function as a modal and the French modals *doit*/*devrait* also function as lexical verbs, I assume that the control/raising dichotomy holds for both Sinhala and French modals.[3]

Kratzer's (1981, 1991) approach to deriving different flavours is that they are derived from contextual backgrounds and are left to be handled post syntactically at the interface level. According to Kratzer's doubly relative analysis of modality, in both types of constructions, the modal as a quantifier/operator scopes above all the constituents and quantifies over different worlds as identified by a modal base and

[2] Whether all the constructions that trigger deontic flvaours take a control structure is still a controversial topic as argued by Bhatt (1998) and Wurmbrand (1999), where they put forward examples such as "There have to be fifty chairs here", in which the deontic modal construction does not involve a control structure. In my study, for now, I considered only the constructions where the structural subject bears the obligation/permission to carry out the event denoted by the lexical verb.

[3] The assumption here is that if the modal has the properties of a lexical verb, the argument that the modal can assign a theta role to the subject holds well.

an ordering source (context dependant parameters) to derive different flavours. In other words, in her analysis, there are no syntactic structure or scope differences in relation to different flavours derived.

However, the current analysis here is in keeping with the claims of Jackendoff (1972), Roberts (1985), Brennan (1993) and Nauze (2008) who have argued that there are syntactic and scope differences in the derivations of the two types of modal flavors. Keeping in line with their argument, I also show that these syntactic and scope structures are represented by PF structures as well. Essentially, I argue that these prosodic structure differences also bear evidence for the fact that there are structural differences in the derivations of the two types of flavours.

Since this analysis basically builds on stress shift and prosodic rephrasing, it deems important to briefly introduce the nature of stress shift that I have adopted for my analysis. This is discussed next.

2.2 Nuclear stress and its shift

Following the nuclear stress rule (NSR) of Chomsky and Halle (1968), Halle and Vergnaud (1987) developed a metrical approach to NSR showing that NSR applies cyclically based on syntactic constituency. Cinque (1993) further developed NSR to claim that the main stress of a sentence will always be on its most embedded constituent. As seen in (7), the NP cycle-line (7b) will identify the "book" as the most embedded constituent. When it comes to VP cycle level, there is only one stress for (7d) cycle in the previous line. Even when it comes to IP cycle level the same stress will be projected as nuclear stress.

(7)

		[Max [read [the **book**]]]
a.	line 1 (=word line 3):	[* [* [*]]]
b.	line 2 (NP cycle):	[[[*]]]
d.	line 3 (VP cycle):	[[*]]
c.	line 4 (IP cycle):	[*]

Cinque (1993) also argues that discourse properties such as focus can interfere with the application of the main stress resulting in a different constituent gaining stress prominence by way of nuclear stress shift (NSS). This could result in assigning an additional stress to a focused constituent or destressing the original prominent stress. The current study makes use of this way of nuclear stress shift as discussed by Cinque (1993).

3. Methodology

In this section, I discuss methodology applied in the investigation. First, I introduce the method of data collection. Second, I present the details pertaining to the method used to analyse and test the data.

3.1 Method of data collection

As standardly adopted in the discipline of linguistics, the example sentences taken for testing and analysis in the paper are sentence constructions containing modals that are commonly used in the languages in question. The data were tested for grammatical judgements with the native speakers of French and Italian at the Department of Linguistics of the University of Ottawa, Canada.

3.2 Testing and analysis of data

The analysis in the current study primarily makes use of the version of nuclear stress application to a sentence as in Cinque (1993) as discussed in the previous section. However, instead of NP, VP and IP cycle levels, and following Buring (2009), I make use of a hierarchy of prosodic units: *prosodic word* (PWd), *prosodic phrase* (pP) and *intonational phrase* (IP) to mark different levels of prosodic representation. The idea here is that one or more syllables will form a *prosodic word* (PWd), one or more PWds will form a bigger prosodic unit; *prosodic/phnological phrase* (pP) and one or more pPs will form an *intonational phrase* (IP)[4].

4. Analysis and discussion: a unified model

The attempt in this section is to show how the prosodic structures related to different flavours reflect the relevant syntactic and scope structures and thus pave the way for designing a model that accounts for a unified grammatical architecture to resolve modal ambiguity.

4.1 Nuclear stress in modal constructions

If (1) and (3) repeated here as in (8) and (9) are uttered without any assumption or obligation on John in mind, following the general Nuclear Stress Rule (NSR)

[4] Whether these kinds of prosodic domain exist or not is still a controversial topic. The purpose of using this way of demarcating prosodic domains is to make different levels of prosodic representation clearer. Any kind which shows correspondence between prosodic domains and syntactic constituents would have helped in the analysis.

(Cinque, 1993), the main stress will fall on the most embedded word *maison* or *gedərə.* The whole sentence will assume an intonational phrase (IP).

(8) (*) IP
(*) pP
([John doit être à la maison])

(9) (*) IP
(*) pP
([John gedərə innə oonæ])

4.2 Stress shift for deontic modal flavours

I argue that when they trigger a deontic flavour, the main stress from the most embedded constituents will shift to the modals *doit* and *oonæ.* The whole construction will undergo prosodic rephrasing, creating new pPs based on the structure of constituents. The most embedded words *maison* and *gedərə* will still retain some stress as secondary stress as shown in (10) and (11) which give only a rough picture of nuclear stress and prosodic rephrasing which will be dealt with in detail in the following sections. Receiving the main stress, the modal will be marked as focussed. What is noteworthy here is that this rule applies irrespective of the word order; SVO in French and SOV in Sinhala, which shows that the effect is obviously related to the modal not the word order.

(10) (*)IP
( ) (*) (*)pP
([[John] [doit]$_{F-}$ [être à la maison]])
(John is obliged to be at home)

(11) (*)IP
( ) (*) (*)pP
([[John] [gedərə innə] [oonæ]$_{F}$])
(John is obliged to be at home)

4.3 Stress in situ for epistemic modal flavours

As opposed to what happens in a construction with a deontic flavour, if the flavour to be derived is epistemic, the nuclear stress will remain in situ, and the whole TP

will be within one prosodic domain. In other words, the whole TP will be focussed as shown in (12) and (13).[5]

(12) (*) IP
(*) pP
([John doit être à la maison]$_F$)
(John is assumed to be at home)

(13) (*) IP
(*) pP
([John gedərə innə oonæ]$_F$)
(John is assumed to be at home)

4.4 Similarity in syntactic and prosodic structures

I show that these different PF structures are triggered by different structures derived in the syntactic component for deontic and epistemic modal constructions as discussed in Section 2.1. For example, as shown in (5), in a deontic modal construction the subject was shown to be an argument of the deontic modal and the subject and the modal will syntactically pattern together. The same structure will be represented even at PF level, the subject patterning with the modal prosodically as shown here in (14) and (15) with improved versions of (10) and (11) to be in line with the argument being developed here. What is seen in (14) is that when stress shift happens in French, the whole construction will undergo prosodic rephrasing, where with a high tone, a prosodic boundary will be marked to the right edge of the modal creating one prosodic 'constituent' combining the subject and the modal. Thus, in deriving a deontic flavour, at the prosodic phrase (pP) level, the subject and the modal together will create an individual prosodic domain. The verb and the PP will create a separate prosodic domain together as shown in (14).

(14) (*) IP
(*$_H$) (*) pP
(John [doit]$_{-F}$) (être à la maison)
(John) (doit) (être) (à) (la) (maison) PWd

However, as seen in the example in Sinhala in (15), this way of analysis poses problems for the Sinhala modal constructions due to the SOV word order where, as seen in (15), the VP pP seems to block the subject and the modal getting together to create one prosodic domain. The claim here is that this level of prosodic

[5] I use the term TP (Tense Phrase) here to avoid ambiguity with IP (Intonation Phrase).

representation is more abstract than what appears at the surface level. Thus, when the construction triggers a deontic flavour due to stress shift and prosodic rephrasing the lexical verb with the object/pp as one prosodic phrase/domain, will be separated from the subject and the modal in Sinhala. The subject and the modal will acquire the same/equal tonal contours while the verb and the object/PP as VP falls within one prosodic domain. Following the analysis for creating prosodic domains for the subject and the modal in a deontic modal construction and based on similarity in tonal contours of the subject and the modal, I argue that the subject and the modal create a separate prosodic domain.[6]

(15) (*) IP
((*) H*) pP
(John (gedərə innə) [oonæ]-F)
(John) (gedərə) (innə) (oonæ) PWd

In deriving an epistemic flavour, I show that there is no prosodic rephrasing. The same structure will be represented at both the pP and IP levels, with the most embedded constituent carrying nuclear stress as shown in (16) and (17).

(16) (*) IP
(*) pP
([John doit être à la maison]F)
(John) (doit) (être) (à) (la) (maison) PWd

(17) (*) IP
(*) pP
([John gedərə innə oonæ]F)
(John) (gedərə) (innə) (oonæ) PWd

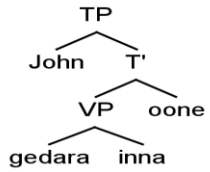
What could be gleaned from this is that these PF projections pattern with syntactic projections of the two different types of modal constructions. In the prosodic structure of a deontic modal construction, the subject forms one prosodic phrase with the modal, and the same happens in the syntactic structure, the subject and the modal forming the main clause in a sentence and the lexical verb with an object / PP and an implicit subject forming the embedded clause in the sentence as shown in (18).

(18) [Subject... [modal... [TP... VP...]]]

[6] The claim here that the subject and the modal have equal tonal contours is based on the author's own intuitions about Sinhala.

This kind of analysis again poses problems for the constructions in Sinhala, because in Sinhala, the subject appears in the clause initial position while the modal appears in the clause final position and the two do not seem to be able to pattern together in Sinhala. However, as shown in (19) and (20), the modal in Sinhala still appears in the T position and structurally forms an adjacent constituent to the subject.

(19) [Subject... [[TP... VP...] modal...]]
(20) [7]



It was shown in (16) and (17) that at the pP level, the whole sentence was in one prosodic domain in an epistemic modal construction. The syntactic structure of an epistemic modal construction also patterns with that kind of structure. If the subject is syntactically reconstructed in its trace position, we get a syntactic structure as in (21) for the epistemic modal construction. As Elbourne & Sauerland (2002) also argue, in a raising construction, the subject stays in its thematic VP- internal position throughout its syntactic derivation until LF and raising to structural subject position happens in the PF part of the derivation. So, in the syntactic derivation and until the PF, the structural subject position remains empty as seen in (21) and the whole construction will spell out in one clause.

(21) [e [modal... subject... VP...]]

Even if the structural subject position is filled in the PF branch, following the account of prosodic rephrasing and the whole sentence receiving focus, the similarity between both the syntactic and prosodic structures become obvious.

4.5 Similarity in syntactic, LF and PF projections

As shown in (12) and (13), when a modal construction triggers an epistemic interpretation the main stress remains in situ and the whole TP is focussed. I show that this property of the whole TP of an epistemic modal construction receiving focus is also in keeping with the scope properties of an epistemic modal construction.

[7] The verb *inna* which is similar to the BE verb in English is projected like a lexical verb here to make the projection clear. The same structure works for any verb in Sinhala.

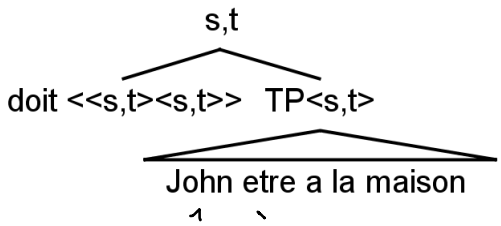
Epistemics are said to be speaker oriented and are said to mediate a relationship between the speaker and his belief (Bybee, Perkins & Pagliuca, 1994) and they always have the widest scope in a sentence (Fintel & Heim, 2010).

What is interesting is, following the raising account for epistemic modal constructions, if the subject is semantically reconstructed in its trace position, we get a structure similar to that in (23), where the modal scopes high and takes a full sentence or a proposition as its argument[8].

(22) [John [λ_I [doit [$_I$ être à la maison]]]]
(23) [doit [John être à la maison]][9]

This could be represented as in (24)[10].

(24)

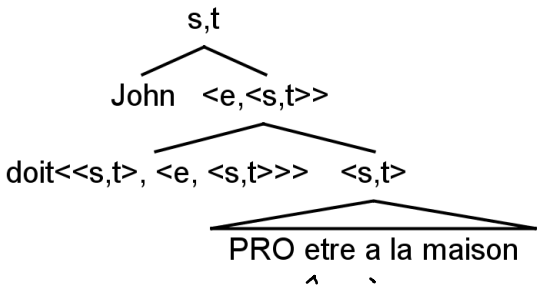


As it was discussed earlier, deriving this kind of LF is also possible as Elbourne & Sauerland (2002) argue that in a raising construction, the subject stays in its thematic, VP- internal position in its derivation until LF and raising to structural subject position happens after LF and in the PF part of the derivation. Thus, the LF as seen in (23) will look as if the raising never happened.

As opposed to this, deontics are argued to be subject oriented and are said to take scope narrower than that of an epistemic (Bybee, Perkins & Pagliuca, 1994). The modal scopes lower than the subject. My argument here is that the prosodic structure shown of a deontic modal construction (as in (14) and (15)) is in keeping with these claims about syntactic and scope structures of a deontic modal construction. The modal takes scope from where it receives prosodic prominence and over what follows as its phonological or syntactic 'constituents'.

[8] The basic idea was taken from Fintel and Heim (2010).
[9] Even though *John être à la maison* is not a finite sentence, it is assumed that it does not have any effect on its semantic type.
[10] I am here assuming that movement of a pronoun or a proper name does not affect the truth conditions of a sentence, so that interpretations of (22) and (23) will be the same.

(25)

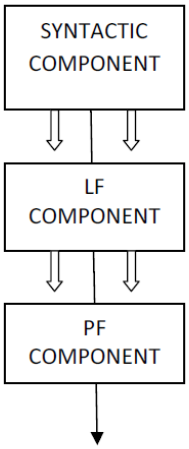


What the account developed so far shows is that it is the same syntactic structure that is scopally and prosodically represented at LF and PF levels. In other words, when deriving different modal flavours, syntax determines scope and scope determines prosody.

5. Conclusions and implications for future work

It was seen that the same modal construction can trigger different flavours of modality: epistemic or deontic. It was shown that different syntactic, scope and prosodic structures are responsible for filtering one flavour from another. It was also shown that when deriving a particular flavour, the prosodic structure reflects the syntactic and scope structure associated with the particular flavour. What this shows is that syntax feeds LF and LF feeds PF in deriving a particular flavour. All the three components: syntax, LF and PF work in harmony in bringing out different modal flavours. Accordingly, to account for the mechanisms at work to bring out different modal flavours, I propose a model as in (26).

(26)



The claim here is that in deriving a particular flavour, the syntactic component determines the relevant syntactic structure for a particular flavour (control for deontics and raising for epistemics) which feeds the LF component where in drawing an epistemic and a deontic flavour, the modal scopes high and low respectively. The LF structure feeds the PF structure which ultimately helps bring out the desired flavour.

As it was also discussed in Section 2.1, inflectional and word order structures between the two languages are radically different. However, it was found out that the semantic core of the two languages is common despite their morphological and syntactic differences.

However, as it was said, the arguments and conclusions were based on the observations of the native speakers of the languages studied. An experimental study would support more concrete conclusions. Besides, whether these conclusions hold for other languages such as English, Malay, Italian, etc where the same phenomenon of one modal being able to express different flavours, could be tested to make cross-linguistic generalizations, which is left for future work.

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