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Covert Movement of Negation: raising over modality

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This paper will explore the relation between the phonetical realization of sentential negation and its LF-mapping. Languages that share many common features often differ in the position where the negative marker surfaces but it is unclear if those variations have an effect on the logic representation of the sentence. In order to try to answer to this question, I will consider some empirical facts related to inverse scope interpretations of negation above modality, showing that when the possibility of reconstructing the modal operator is excluded, as in double-modals constructions, the only option available to build the appropriate LF representation is to covert-move negation[1].

1. Surface variation and logic interpretation

It is relatively uncontroversial in the literature that languages show a great variability in their means to express negation. It is well known, for example, that some languages convey a negative sentential meaning by using a verbal affix which directly attaches to a verbal host while other languages adopt a self-standing negation which can be separated from the verbal complex and which shows characteristics similar to the ones of adverbials. Among the romance languages, Standard French is famous as it negates a sentence showing both the affix *ne-* which is part of the verbal morphology and the adverb *pas* which surfaces in a different and lower structural position

(1) Jean n'a pas lu
J. Neg aux Neg read
'*Jean didn't read*'

[1] A preliminary version of this paper has been presented at the XXXIII Incontro di Grammatica Generativa (Bologna, Italy, 1-3 March 2007) and at the XXXIV Österreichischen Linguistiktagung (Klagenfurt 8-9 December 2006). I wish to thank Wolfgang Meyer, Patrick Grosz, Leonardo Gatti and Federico Misirochi for their judgments on Milanese and German. Thanks also to Andrea Gualmini and Valenina Bianchi for comments. A special thank also goes to Kate Seib.

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This is a clear case of redundancy, probably due to diachronic variation (Jespersen 1917), which reveals that even a single language may switch between two different settings of the mechanism governing the expression of the negative operator.
The duplication of *ne-* and *pas* in French also illustrates another important characteristic, which is the possibility for negation to surface in different structural positions. In the case of French, the difference in the positioning of *ne-* and *pas* can be related, following Haegeman (1995) to the X/X' difference which allows the head *ne-* to move together with the auxiliary in the functional projection hosting this latter element. Even if it is possible in French to support an analysis which base-generates two different elements in a unique structural position NegP between TP and AgrP (Belletti 1990, revisiting Pollock's 1989 proposal), a single fixed position is not sufficient to account for the broad cross-linguistic variation related to the position of NegP.

This is clear if we compare negative markers of the same kind, both head or both adverbials. Ouhalla (1991) notes, for example, that Turkish and Berber express negation by means of a verbal affix, but he also notes that this affix appears in reverse order with respect to Tense in the two languages:

(2) a. Jan elmarlar-i ser-me-di-∅ (Turkish)
J. apples-ACC like-**neg**-past-agr

b. Ur-ad-y-xdel Mohand dudsha (Berber)
neg-fut-agr-arrive M. tomorrow

In (2)a the negation *me* is closer to the verb stem than the affix expressing Past, while in the Berber example (2)b the situation is the opposite, with the Future affix *ad* being closest to the verb with respect to the negative morpheme *ur*. This contrast is hard to account for assuming that verbal morphology is collected by the verbal root through a successive roll-up movement across head-positions unless we do not also assume variation of NegP. Under this mechanism, the difference between pre- and suffixation is not relevant: it is only a morphological property of the particles. The ordering of the verbal morphology reveals the following underlying structure for the two languages:

Turkish: AGRP > TP >NEGP *Berber: NegP > TP > AGRP*

^{AgrP}[-Ø ^{TP}[-di ^{NegP}[-me ^{VP}[ser-]]]] ^{NegP}[Ur- ^{TP}[ad- ^{AgrP}[y- ^{VP}[-xdel]]]]

The claim that the position of NegP is variable is also supported if we compare negative markers which, instead of being lexical heads, are both adverbial. In this case the variation can be detected looking at the ordering difference related with adverbial and verbal forms. Consider the other minimal pair from Zanuttini (1997):

(3) a. l'a <u>semper</u> pagà *no* i tas (Milanese)
s.cl. has always paid neg the taxes
'It's always been the case that he hasn't paid taxes'

b. da 'ntlura, a l'ha pi *nen* <u>sempre</u> vinciu (Piedmontese)
from then, s.cl. s.cl. has more neg always won
'since then, he has no longer always won'

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In sentence (3)a from Milanese, the sentential negative marker *no* follows the adverbial *semper* 'often' and the past participle *pagà* 'paid'. In (3)b instead, the negation *nen* precedes the adverbial and the participle. Once again two varieties, in this case two Northern Italian dialects, which share all the relevant syntactic features, show a difference in the order of the negative marker with respect to other elements. A complete survey of the syntactic range of variation is not possible here but there are many crosslinguistic data (see Moscati, 2006) in support of the idea that negation may be syntactically realized from positions as low as the VP, as in the case of Milanese, up to position CP-internal, as in some Irish varieties (McCloskey, 2001).

This variation in the PF realization of NegP opens up a series of questions regarding the interaction between this level of representation and the semantics. One of those questions which I will address here is how the mapping between PF and LF might be done, given that PF is subject to a great degree of cross-linguistic variation. The null hypotheses is that there exists a direct mapping between the two levels of representations, but this view is extremely problematic, as I will try to show, both on conceptual and on empirical grounds. Firstly, given the fact that languages differ in their PF realization of NegP, we would be forced to conclude that languages also differ in the logic scope that the negative operator might have, with all the consequences that derive from the idea that languages vary in their logical representation and in their expressive power. However, this view cannot be rejected *a priori* and if it can be convincingly shown that two different PFs trigger two different LFs, we should carefully consider the null-hypothesis of an isomorphic PF-LF mapping. On the other hand, if differences in the surface realization of negation do not reflect variations in meaning, we have to discard the idea that LF is sensitive to variations in the PF realization of NegP.
In the following sections I will provide evidence in favour of this last possibility, supporting the idea that this is the correct approach and that the logic representation of negation is not bound by its surface realization.

2. Interactions with modality

One standard argument in favor of movement in Logic Form has traditionally been built on the presence of the ambiguity stemming from the presence of two scope-bearing elements within a single clause. This has been the case for Quantifier Raising (May, 1985) which, independently of its specific formulations (Beghelli & Stowell 1997, Hornstein 1995, Fox 2000, Reinhart 2006) can be characterized as a covert syntactic operation which can assign different (multiple) scope positions to quantificational elements in the output LF structure. In the presence of an ambiguity, one option is to formulate the presence of two competing logic representations, where a semantic operator might occupy different structural positions. This logic might be applied to account for sentences where a modal operator is combined with negation, a combination which in certain cases gives rise to an ambiguity solvable only by admitting that some covert operations apply at LF. I will focus here on a sub-case of this more general problem and I will consider the inverse scope readings of negation over modality.

In order to find the desired configuration where negation has inverse scope over modality, it is necessary to individuate a language where negation surfaces at PF in a low structural position, lower than the syntactic projection where the expression of modality appears. I will consider here two cases, from Milanese and from Standard German. Both languages have an adverbial negative marker which surfaces in a

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structural position immediately above the VP and which is overtly C-commanded by a modal. Let us consider first the case of Milanese.

We already saw in the example given in (3)a, repeated below, that the negative particle *no* follows low verbal forms such as past participles and low adverbial like 'always':

(4) l'a semper pagà *no* i tas (Milanese)
s.cl. has always paid neg the taxes
'It's always been the case that he hasn't paid taxes'

This suggests that the functional projection where negation is realized at PF is lower than PartP and also lower than the position devoted to aspectual adverbs like '*semper*'. Among Romance varieties, Milanese belongs to the group of languages which show a NegP in the lowest position of the inflectional system, immediately above the VP. The structural representation of (4) is than the following:

(4)' $^{AgrP}[l_j'\ a_k\ ^{TP}[t_k\ ^{AspP}[$semper $[\ ^{PartP}$ pagà$_v\ ^{NegP}[$no $^{VP}[\ t_j\ t_v$ i tas]]]]]]

This structure results from standard assumptions on verb movement. For example, the possibility that the auxiliary is originated in a projection situated below NegP is excluded since the auxiliary *a* cannot cross the past participle *pagà* which is another head element (Head Movement Constraint, Travis 1984). These considerations ultimately favour the order TP > AspP > NegP > VP, where NegP marks the lower edge of the inflectional system.

Consider now a case where a different auxiliary is present in the structure and instead of the auxiliary *a* we have a modal auxiliary which expresses deontic necessity:

(5) El gà de studià *no*
s.cl must of to-study neg

Here the modal verb *ga*, similar in meaning to the English quasi-modal 'to have', precedes the negative marker. Both assuming a bi-clausal configuration for sentence (5) with a restructuring operation (Rizzi 1982) or a single-clause structure (Cinque 2006), the modal *ga* c-commands the negation *no* at PF.

(5)' $^{AgrP}[El_j'\ ga_k\ ^{ModP}\ [t_k\ ^{TP}[$de studià$_v\ ^{NegP}[$no $^{VP}[\ t_j\ t_v\ ]]]]]$

Under this representation we expect that, if the LF-representation is isomorphic with the PF-structure, the modal operator is only able to take wide scope over negation. But this is disconfirmed by the two possible interpretations[1] available for sentence (5) and reported in (6)

(6) El gà de studià *no*
s.cl must of to-study neg
a. he is not required to study ¬ > □
b. he is required not to study □ > ¬

[1] Thanks to Leonardo Gatti e Federico Misirochi for judgments.

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The narrow scope reading (6)b directly follows from the structure given in (5)a, but the alternative reading presented in (6)a, where a low sentential negative marker c-commanded by a modal operator at PF is able to take inverse wide scope at LF, is unexpected. Before trying to account for this problematic reading, let us consider another similar case taken from German.

Standard German closely resembles, *mutatis mutandis*, the problem posed by Milanese. In German the sentential negative marker is realized immediately above the VP but when combined with a verb expressing modality, it can take wide scope over this latter element:

(7) Hans muss Julia nicht sehen
H. must J. neg to-see
a. Hans is not required to see Julia ¬ > □
b. ? Hans is required not to see Julia □ > ¬

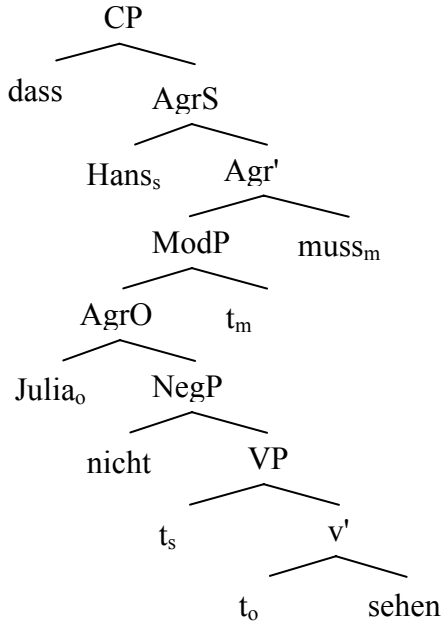
(8) ...dass Hans Julia nicht sehen muss
that Hans Julia neg see-inf must
'...that it is not necessary that Hans sees Julia'
a. Hans is not required to see Julia ¬ > □
b. ? Hans is required not to see Julia □ > ¬

In sentence (7) the modal verb appears in V2 position, thus c-commanding negation but taking narrow scope below it at LF. The preferred –if not the only- reading is the inverse one given in (7)a[2]. If we cancel the V2 effect by embedding (7) and transforming it in a subordinate clause, again negation might take scope over the same modal (8)a. Many different analyses for SOV languages have been proposed, stemming from the original head-final analyses or from Keyne's *remnant movement* analysis (Kayne 1994, Zwart 1993, Den Dikken 1996, Haegeman 2002, Koopman & Szabolcsi 2000) but a common feature is that there is a substantial agreement in considering the position triggered by Object-Shift to be below ModP and above NegP. For the point at issue here, nothing changes if we derive (8) through remnant movement (Moscati 2006) or adopt the head-final analysis as long as this choice does not have consequences on the relative ordering of the relevant functional projections ModP and NegP. For concreteness, let us adopt the head final analysis and give sentence (8) the following representation:

[2] Thanks to Christian Biemann, Patrick Grosz and Wolfganf Meyer for judgments and discussions.

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(8)'



Looking at (8)' it is evident that we are in the same situation that we found in Milanese: negation is c-commanded by modality at PF, but it might be interpreted with wide scope at LF. At this point the problem posed by the existence of inverse scope readings (6)a and (7)a-(8)a should be clear and it is evident that those readings cannot be accounted for by the representations given in (5)' and (8)'.

We need a mechanism that can create a configuration in which the negative operator c-commands the modal operator at LF. In principle there are two means to achieve this result: either reconstructing the modal in a position below negation or raising negation above the modal operator. In the following paragraph I will consider the first hypothesis, showing that it is not void of problems due to its reliance on a specific set of assumptions and that it faces at least one important empirical problem in double modal constructions.

3. Against reconstruction of modals

Let us explore the first of the two possibilities presented in the previous paragraph. As mentioned above, one way to derive the problematic inverse scope readings is by reconstructing the modal verb in a position below negation. If this solution is on the right track, it follows that negation does not play any special role in the derivation of inverse scope readings and that it is instead the operator expressing modality that is affected by some kind of covert movement. We may refer to this hypothesis as the *Reconstruction Hypothesis*. This hypothesis relies on the possibility that there exists at least one position below NegP where the modal can reconstruct. I will show that this prerequisite has important consequences on the analyses of modal verbs.

Moreover, if we assume that the mechanism required to derive inverse scope is based on the reconstruction of the modal, we also expect that whenever such a mechanism cannot apply, inverse scope should also be impossible. We can state the following prerequisite and consequence for the Reconstruction Hypothesis:

i) there exists a reconstruction site below the position where NegP is realized
ii) the inverse scope readings are impossible when reconstruction is blocked

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In order to evaluate the Reconstruction Hypothesis, in this section I will consider if there is evidence supporting i) and if the empirical prediction in ii) is borne out.

3.1. VP-internal reconstruction

If we want to derive the inverse readings in (6)a and (7)a-(8)a by reducing the scope of the modal operator, one way to obtain this result avoiding counter-cyclic lowering movements is to resort to the reconstruction of the modal verb. This is an alternative to the representation given in (8)', where the modal is base-generated in its functional projection ModP (Cinque, 1999), and the modal could have moved in this position through possibly successive head movements (Lechner, 2006). Prima facie this seems to be a tenable position, but it encounters several problems when we try to determine the original position from where the modal verb has been moved.
One possibility is that modals are lexical verbs, originating within the VP, but this solution has important consequences on the treatment of 'restructuring constructions'. It is known that sentences with a modal verb selecting an infinitive clause show certain kinds of monoclausal effects (Rizzi 1976b, 1982). This can be illustrated by looking at certain properties of Italian:

(9) a. *lo odio fare *t* di notte
obj.cl. I-hate to-do by night

b. lo posso fare *t* di notte
obj.cl. I-can to-do by night
'I can do it by night'

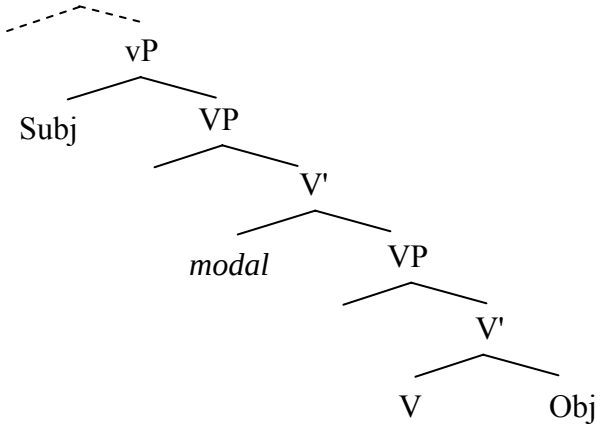
The sentences in (9) show that clitic climbing, a phenomenon that is considered to be clause bounded (9)a, might be found with a special class of verbs as the ones expressing modality, volition and motion. This observation, together with other special properties of the verbs belonging to this set (Rizzi 1982, Burzio 1986, Cinque 1988, 2006) suggests that modals in sentences such as (9)b are 'transparent' with regard to a series of syntactic phenomena. In their original formulation, monoclausal effects were derived through a 'restructuring rule' which takes a bi-clausal construction and which transforms its input in a monoclausal sentence. I will not refer to this formulation here, rather I will consider a more recent proposal by Cinque (2004c-2006) according to which modal verbs are functional heads[3] in opposition to a competing analysis which considers modal verbs as being lexical verbs base-generated in VP. Wurmbrand (2004) refers to this opposition as the one between *lexical* and *functional* restructuring. Since the discussion here will be based on Wurmbrand's original work, I will maintain this denomination.

According to a lexical restructuring analysis, modal verbs are normal lexical verbs originating within the VP and taking as complement a reduced clause. Thus the transparency effects related to the lack of a clause boundary are a consequence of the properties of the selected complement:

[3] It is possible to re-cast the restructuring mechanism in terms of functional projection assuming that restructuring verbs might be either lexical or functional. This will account also for the optionality of reconstruction phenomena (Rizzi p.c.).

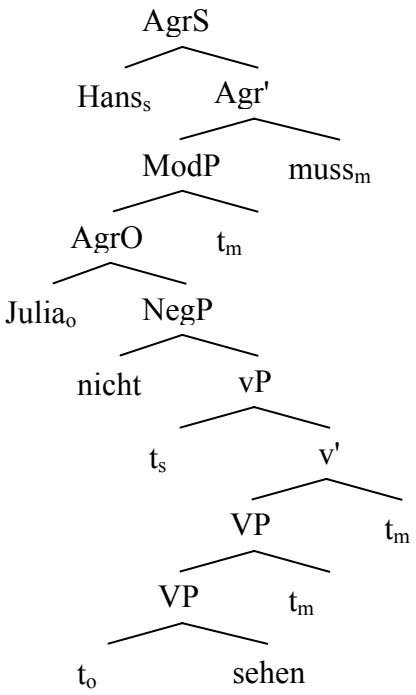
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lexical restructuring



The hypothesis of modal reconstruction is directly related to the lexical restructuring just presented, since lexical restructuring makes available a VP-internal site where the modal might reconstruct. In this way the semantic interface has access to an additional position constituted by the lower trace of the modal without any further need to covert-move the negative operator in order to generate the inverse scope readings.
Therefore, an alternative for (8) is the following representation with the presence of different traces left behind by the movement of the modal verb:

(8)"



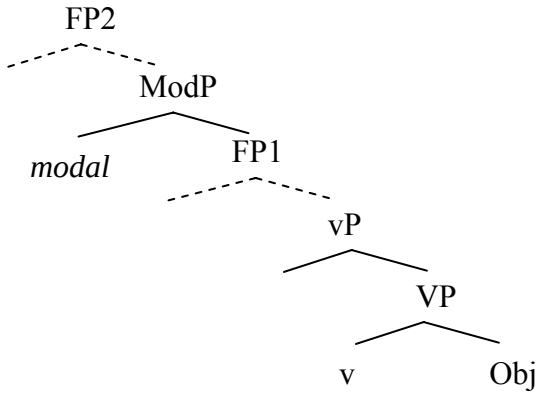
If the representation (8)" is on the right track, we can straightforwardly account for the inverse scope interpretation (8)a. As it is possible to see looking at (8)", the modal moves to ModP leaving behind a certain number of traces, depending on the richness

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of the functional structure we assume. The crucial observation is, however, that the lowest of those traces is inside the VP, in a position lower than NegP.
The inverse scope readings are then problematic only for the first representation we have given in (8)', which is instead consistent with *functional restructuring*.

Functional restructuring, in fact, assumes that modals are fixed and base generated in the functional domain. Under this view, there are no traces and, by consequence, no potential reconstruction sites for the modal

functional restructuring



At first sight, the hypothesis of lexical restructuring seems to be superior to the functional restructuring alternative in deriving the inverse scope readings with respect to negation, provided that head-movement of the modal comes for free. One might argue that this is the case, since modals must rise in order to reach a spec-head configuration with the subject in AgrP. But notice that if this is the only reason for moving the modal out of the vP, it will not be easy to explain the ordering restrictions active on modals:

(10) a. Er *dürfte* zu Hause sein *müssen*
He might at home be must
'He might have to be at home'

b. * Er *muß* wieder singen *dürften*
He must again sing might
'It must be the case that he might sing again'

this pair shows that modals cannot be freely ordered and that the linear order is constrained in some way. If modal movement is motivated by some sort of general syntactic mechanism (i.e. Subject criterion, Rizzi 2004), it will be impossible to provide a syntactic explanation on the reasons why only one modal can be attracted in the relevant position. By the Head Movement Constraint, only the higher of the two modals can undergo head-movement to the Subject head. The contrast (10)a-b could be accounted for by assuming that *mussen* must be generated in the lower VP. But why is this the case? One would need a purely semantic account of the observation that the epistemic modal (might) is always above the root modal (must). The hypothesis of functional restructuring, on the other hand, might account for the facts in (10) assuming the same extended ordering of functional projections but without movement.

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A series of empirical arguments against base-generating modals within vP comes from some facts presented in Wurmbrand (2004), which strongly argues against the lexical restructuring hypothesis.
This hypothesis relies on two assumptions: firstly, that modals, being lexical verbs, express thematic relations; secondly, that modals take a (reduced) clausal complement.

With regard to the first assumption, it is at least dubious that modals are capable of θ-role assignment. It is not easy to determine if modals have an internal argument, given that they obligatorily select an infinitive complement, but when we turn to the external argument, there are clear indications that they behave as raising predicates. Consider the case of German. Here unergative intransitive predicates can be passivized whereas unaccusatives cannot.

(11) a. unergative
Es wurde einen Abend lang getanzt
it was an evening long danced
'they danced for an evening'

b. unaccusative
*Es wurde am Flughafen angekommen
it was at the airport arrived
'they arrived at the airport'

This difference seems to be a diagnostic for the presence/absence of the external argument. In (11)a the verb *tanzen* 'to dance' selects an external argument, allowing passivization, while in (11)b such possibility is blocked with the unaccusative verb *kommen* 'to come'. Modal verbs behave exactly like unaccusatives with respect to passivization:

(12) * Der Wagen wurde (zu) reparieren gemusst/müssen
the car-NOM was (to) repair must-PART/INF
'they had to repair the car'

In (12) the transitive verb *reparieren* is embedded under the modal, but despite of the possibility of having long-passives in German in restructuring context, passivization is not allowed in constructions involving a modal matrix verb as (12)[4].
Support for the raising predicate analysis for modal verbs comes from the possibility to have non-thematic subjects as *weather-it* subjects:

[4] The ungrammaticality of modal passives does not seem to be limited to German, but appears to be a more general property of modals (Aissen and Perlmutter 1983, Burzio 1986). Also in Italian passivization has a degraded status, as shown in the following sentences:

i. *L'esercizio è stato dovuto riscrivere
the exercise is been required to rewrite

ii. *Quel tramonto non fu più potuto rivedere
that sunset not was anymore can see-again

Again the ungrammaticality of (i-ii) might be related to the purely functional role expressed by modals. Cinque (2004) suggests that the ungrammaticality of (11) is due to the fact that modals are base-generated outside the vP shell, above the functional projection VoiceP responsible for passivization.

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(13) a. Es muß morgen schneien
It must tomorrow snow
'It must snow tomorrow'

b. * Es plante zu schneien
it planned to snow
'It planned to snow'

In (13)a the modal verb, similar to functional restructuring verbs and raising predicates in general, is compatible with the expletive *es* 'it' while a non restructuring verb (13)b which assigns an external θ-role cannot appear with a vacuous expletive. The impossibility of passive constructions, combined with this last observation that a semantically vacuous expletive subject might be licensed by modals, indicates that modal verbs lack an external argument.

What is harder to demonstrate is that the internal argument is also absent. In fact modals always take what can be considered a clausal complement and one can always assume that this complement absorbs the θ-role assigned to the internal object. But remember that the lexical restructuring analysis considers the complement of the modal verb as being clausal, even if with a reduced structure. We can than check if this complement has clausal properties. One way to do so is to consider the possibility for a relative pronoun to pied pipe the relevant clause. This possibility is given in German with non-restructuring verbs, but is blocked in restructuring modal context:

(14) a. . . .der Roman [den zu lesen]INF der Hans plante
. . .the novel [that to read]INF the Hans-NOM planned
. . .'the novel that Hans planned to read'

b. * . . .der Roman [den lesen]INF nur der Hans muß
. . .the novel [that read]INF only the Hans-NOM must
. . .'the novel that only Hans must read'

The contrast seen in (14) follows if we assume that only clauses can pied-pipe and that in (14)b the pied-piped element is only a fragment of the main clause, in conformity with the functional restructuring hypothesis.
To summarize, the idea that modal verbs originate outside the vP allows us to explain i) all those properties as the lack of passivization and the presence of expletive subjects related to the absence of the external argument, ii) the impossibility of pied-piping the infinitival complement of a modal verb, and iii) the ordering restrictions in force on the relative ordering of modals. From this discussion, it seems that there is no evidence –but instead counterevidence- that modals originate within the VP, in a position lower than NegP.

3.2. Double modal constructions

Even if we have several arguments against the idea that modals originated within the vP-shell, this is not enough to exclude the possibility that modals reconstruct in a position lower than negation. In fact, even if they cannot be reconstructed inside the VP, we must also consider the possibility that they are reconstructed in some functional projection below NegP. Next I will present an argument against this last possibility and against reconstruction in general.

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So far we have focused on some specific properties of modals, but a more general line of reasoning might be followed to exclude lowering of the modal operator. Remember that what we want to account for is the inverse scope readings for sentences (6), (7) and (8). We repeat (8) as (15):

(15) ...dass Hans Julia nicht sehen muss
that Hans Julia neg see-inf must
'...that it is not necessary that Hans sees Julia'
a. Hans is not required to see Julia ¬ > □
b. ? Hans is required not to see Julia □ > ¬

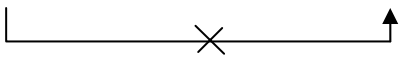
What we want to check is if whether the inverse reading (15)a can be derived through an operation able to reconstruct the modal verb below negation:

(16) $OP_{mod\alpha}$ OP_{Neg} $OP_{mod\alpha}$



Obviously this configuration must obey general principles of syntax. For example, the idea that there exists a ban for a linguistic object to establish a distance relation across another object of the same kind is less controversial. This principle, which has taken several formulations in the literature (*Minimal Link Condition*, Chomsky 1995; *Relativized Minimality*, Rizzi 1990), should also govern the operation proposed in (16). Therefore we expect that if another modal operator is present, reconstruction (or raising) will be impossible:

(17) $OP_{mod\alpha}$ $OP_{mod\beta}$ $OP_{mod\alpha}$



This expectation is confirmed if we consider double modal constructions, and in fact, in cases where there are two expressions of modality, scope relations are rigidly fixed and the only possible reading is the one visible at PF. This observation seems to exclude any instance of covert movement. Consider the following Italian sentences:

(18) Gianni deve poter parlare
G. must can to-speak
a. it is necessary that G. can talk □ > ◊
b. *it is possible that G. must talk * ◊ > □

(19) Gianni può dover parlare
G. can must to-speak
a. * it is necessary that G. can talk * □ > ◊
b. it is possible that G. must talk ◊ > □

In (18) the modal *deve* 'must' precedes *poter* 'can' and the logical scope of this sentences is isomorphic to the observable PF representation, with the highest modal taking scope over the lowest one. This is not an idiosyncratic property of the modal *dovere* but seems to hold in general. In fact, if we reverse the linear order, the inverse interpretation holds in (19). This suggests that some kind of intervention effect is really in force on the interpretation of double modal constructions. This observation is not restricted to Italian, but it extends also to German. Consider (20):

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(20) ...dass ich einschlafen können muss.
...that I fall.asleep can must
a. ...that I must be able to fall asleep □ > ◊
b. * ...that I can necessarily sleep * ◊ > □

The only possible interpretation is the one given in (20)a, where the modal *muss* which c-commands at PF the other modal verb *können* asymmetrically takes scope over it. Again this shows that the possibility of disjoining the LF interpretation of a double modal sentence from its surface realization is impossible. This directly follows if we assume that this is due to a violation of the Minimal Link Condition.

Given this state of affairs, we expect that if the reconstruction of the modal is the operation responsible for the inverse wide scope interpretation of negation, those readings will be unavailable when reconstruction is impossible. The prediction is that if inverse scope interpretations are generated through the mechanism in (16), when (16) is blocked then only surface scope should emerge. But this conclusion is disproven by negative double modal sentences:

(21) a. Karl muss nicht schwimmen können
Karl must not swim can
'it is not necessary that Karl is able to swim' ¬ > □ > ◊

b. ... dass Karl einen Kilometer nicht schwimmen können muss
... that K. one Kilometre not to swim able must
'... that it is not necessary that Karl is able to swim one kilometre' ¬ > □ > ◊

Sentences in (21) present the two modals *können* and *mussen* that are interpreted, as already shown for sentences (18)-(19), in accordance with their surface scope. But those sentences also present another scope bearing element, the negative marker *nicht*, which occupies the specifier of the low projection NegP, crucially lower than the position where modals surface (see § 2). The low position of NegP is also confirmed by Austrian German (as pointed out to me by Patrick Grosz) where the position of negation is clearly situated in a low portion of the middle-field, as suggested by its position following the low-particle *ja*:

(22) a. Der Karl muss **ja** nicht schwimmen können
the Karl must ja not swim can
'Karl (as you know) doesn't have to be able to swim'

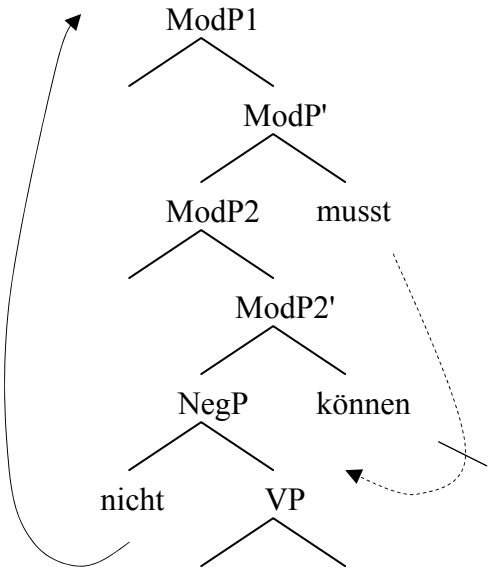
b. ...dass du **ja** nicht einschlafen können musst
...that you PRT not fall.asleep can must
'that you are (as you know) not required to be able to fall asleep'

Sentences in (22) also show that in this variety negation does not obey to an isomorphic mapping between LF and PF but instead it is interpreted with the widest scope among the three logic operators. The interpretation of (21) and (22) is then unexpected if it relies on the reconstruction of the modal. I suggest that the only way to derive the wide scope reading of negation over the modal complex is to covertly move negation in a position where it c-commands at LF both modal verbs. I will refer

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to this operation as LF-Negation Raising[5]. It is now possible to derive the interpretations in (21) and in (22) without any need to move the modal and in conformity with the functional restructuring hypothesis. The mechanism is illustrated in (19b') below:

(21)b'



The dashed line in (21)b' indicates the impossibility to reconstruct the modal in ModP1 in a position below ModP2 while the black arrow represents LF-Negation Raising in a position c-commanding ModP2.

4. Negative Chains

In the previous paragraph we have seen that the operation in (16) is problematic for several reasons. Firstly, it will not be easy to accommodate the base-generation of the modal verb within the VP with a series of properties which characterize the syntax of modal constructions and secondly, inverse scope readings are available even in those cases where reconstruction is banned by general principles of syntax. It is reasonable then to assume, instead of (16), an operation which raises the negative operator:

(23) OP_{neg} OP_{mod} OP_{neg}

[5] This operation is different from *Negative Raising* (Horn 1989) and actually it is the exact inverse. Negative raising has been proposed to account for scope diminishment of sentences as i., interpreted as equivalent to ii.:

i. I do not believe that John will come

ii. I do believe that John won't come

In sentence i. the negative marker surfaces in a position higher than the one where it could be interpreted.

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This alternative allows us to straightforwardly account for the inverse scope interpretations in double modal constructions, but this is not the only data that it can capture.

There is at least another well-known case where negation takes inverse scope over modality. Sentential negative markers are not the only elements able to carry interpretable negative features but also nominal elements as negative quantifiers in Non-Concord Languages seem to incorporate a negative operator. There are cases where another scope bearing element –typically with modality- is also present in addition to the negative indefinite and it is known that this latter element might split its negative feature from its quantificational constituent (Beck 1955, Jacobs 1991, Rullmann 1995, De Swart 2000, Penka & Zeijlstra 2004). This is illustrated by the following Dutch example from Rullman (1995):

(24) Ze mogen geen eenhoorn zoeken
they are allowed no unicorn seek
a. they are not allowed to seek a unicorn ¬ > allowed > ∃
b. there is no unicorn that they are allowed to seek ¬ > ∃ > allowed
c. they are allowed to seek no unicorn allowed > ¬ > ∃

The interpretation (24)a is the *split-scope* reading since, under this interpretation, the sentence expresses the prohibition against the quest of an unspecified unicorn. The indefinite receives narrow scope and it is interpreted *de dicto* without any commitment of existence. The negative feature, instead, is the element which takes the widest scope in the sentence and it is interpreted with wide scope over the modal *mogen* 'can'. This phenomenon, which is also found also in German (De Swart 2000), seems to be another instance of the operation illustrated in (23), confirming the idea that the empirical coverage of Negation Raising may well go beyond the data presented in §.3.

In the rest of this paper, I want to briefly explore a way (Moscati, 2006) of formalizing (23) according to a recent proposal by Pesetsky & Torrego (2004). According to this latter proposal, the basic operation of Negation Raising can be formalized through a chain formation mechanism which relies on a split of visibility between the conceptual and the sensory-motor interfaces, with regards to the negative operator. This possibility, not allowed in Chomsky (1998, 2001), relies on the assumption that there is no principled reason to insist that the conditions on valuation and interpretation must be met in the same syntactic locus: it should be possible to evaluate a feature in overt syntax and to interpret this feature in a different position at the semantic interface. This idea results in an extended feature typology which includes the possibility to have interpretable but unevaluated syntactic features as in (25)d and also uninterpretable but evaluated features as in (25)c:

(25) a. F = [+val], [+int]
b. F = [-val], [-int]
c. F = [+val], [-int]
d. F = [-val], [+int]

The combinations in (25)c-d constituted the innovation of P&T system and I will briefly show how they can be exploited to derive the inverse scope readings through a chain formation mechanism. In (25) we have all the possibilities given for a certain feature F. Thus the feature F might express valuation and interpretability together, as in the case of (25)a, but it can also fulfil those two conditions by the union of different

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instances of the same feature F. Instances of the same feature can be co-indexed in order to create a chain in which one instance must be valued in syntax and one must be interpretable (*Principle of Radical Interpretability*, Brody 1997):

(26) $F_{[-val]\,[+int]}$ $F_{[+val]\,[-int]}$

In (26) the higher instance of F is interpretable, but its result is not valued. The novelty of the P&T system is that it allows also interpretable features to be probes, if they are unevaluated.

If we turn to the scope of negation, it is easy to see how Negation Raising can be re-formalized through a chain connecting different instances of a single negative feature. In those cases where the scope of the negative operator needs to be widened at LF, this result can be reached by inserting a [+int, -val] negative feature. If such an instance is inserted above the operator expressing modality, for example, it can be interpreted at the semantic component as taking wide scope over it. However, this is not sufficient to ensure that the derivation will converge, and the additional syntactic condition on valuation must be fulfilled. The high interpretable negative feature must probe its search domain in order to find a valued negative feature, and if this happens, a negative chain is created. The mechanism can be exemplified by looking at our problematic sentence (8) under its interpretation with negation taking wide scope over modality:

(8) ...dass Hans Julia nicht sehen muss
'that Hans is not required to see Julia'

dass ^{AgrP}[Hans ^{NegP2}[$_{\mathbf{neg[+i/-v]}}$ ^{ModP}[^{AgrOP}[Julia^{NegP1}[nicht $_{\mathbf{neg[-i/+v]}}$ ^{VP}[sehen]]]OP$_{mod}$]] muss$_i$]

Here, a negative feature [+int/-val] is inserted in a position c-commanding the modal operator, and it probes looking for valuation. When it encounters the lower feature [-int/+val] both the conditions on interpretability and on valuation are met and a chain can be created, resulting in the inverse wide scope of negation. The same derivation might be straightforwardly applied also to the case of Milanese presented in (6):

(6) El gà de studià *no*
'he is not required to study'

^{AgrP}[El *gà*$_i$ ^{NegP2} [$_{\mathbf{neg\ [+i/-v]}}$ ^{ModP}[t$_i$ ^{TP} [de studià ^{NegP1}[*no* $_{\mathbf{neg\ [-i/+v]}}$ ^{VP}[...]]]]]]

Conclusions

The account proposed here for the inverse scope reading of negation allows us to derive the problematic interpretation without assuming any LF-movement for modal verbs. This proposal has the advantage of being consistent with the observation that modal heads respect strong ordering restrictions, with regard to both surface order and logic scope (Cinque, 1999). If this observation holds, this implies that in the case of

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modal verbs there is an isomorphic mapping between LF and PF that must be respected. We saw that, aside from this consideration, there are also several empirical problems that make the option to lower the modal operator at least problematic. All those drawbacks can be avoided if we allow the negative operator to raise, with the welcome consequence of having a unified explanation for other phenomena involving negation and modality, such as the split-scope readings.

Another advantage related with the introduction of Negation Raising is that it allows us to unify the scope of the negative operator regardless of the broad parametrical variation found across languages. If we express such an operation in Pesetsky & Torrego's system, we have a way to respect the parameterization through the checking of valuation in the appropriate and variable position of NegP. At the same time, we have a way to relegate variations only to PF, since the logic scope of the operator might be widened at LF by the presence of covert interpretable negative features.

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