To Be or To Not Be: A Moving Story about Sentential Negation

Elise Newman, MIT

1. Knowledge and Puzzles

We know from Chomsky (1957) and subsequent work the following facts about the English auxiliary system and negation: 1) auxiliary verbs exhibit V to T movement, 2) multiple auxiliaries follow a fixed hierarchy: *modal - have - bePROG - bePASS - main verb*, and 3) when the vP is separated from T by negation or emphasis, and there is no auxiliary that can move to T, *do* - support obligatorily applies.

(1) a. Mary did not eat cheese at the scene of the crime.

b. No, Mary *did* eat cheese at the scene of the crime!

c. *Mary not ate cheese at the scene of the crime.

While there is a general consensus about why finite auxiliaries such as *have* and *be* must precede, and may not follow, sentential negation (2c-d), the absence of such a contrast with infinitival *to* (2a-b) has received much less attention.

(2) a. For Mary to not finish her cheese would be a shame.

b. For Mary not to finish her cheese would be a shame.

c. Mary has not eaten any cheese recently.

d. *Mary not has eaten any cheese recently.

To explain this, I will argue that both sentential *not* and auxiliary verbs move to T. These instances of movement are motivated by a requirement that generalizes traditional EPP so that it is satisfied by complementation as well as specifier creation. For this **Extended EPP (E2P2)** property of a particular probe to be satisfied, the probe must not only find and agree with a goal, but also merge with a head bearing the relevant feature. The E2P2 property of a particular head thus may be satisfied in one of two ways: either if the goal of the probe in question heads its sister, or if the

goal moves to it. I will support this proposal with evidence from adverb placement and sentential/constituent contrasts in infinitival phrases that make it clear that both (2a-b) show sentential negation. I will then show that this proposal, combined with Matushansky's (2006) view of head movement, accounts for the movement patterns of negation and auxiliaries in English. Furthermore, I will show that this account has interesting ramifications for *do*-support.

2. T and Sentential Negation

An important phenomenon that motivates this paper's proposal is the behavior of negation in infinitival phrases. In the following section, I present tools for diagnosing sentential and constituent negation contrasts in infinitival phrases, and use these tools to 1) show that the *not* in both *to not* and *not to* is sentential negation and 2) illuminate a syntactic difference between sentential and constituent *not*. These facts set the stage for my proposal that movement accounts for this word order alternation. The traditional tests for constituent and sentential negation *in finite clauses* that are relevant to this paper include:

(3) Tags (reverse the polarity of the sentence as a whole)

a. Mary hasn't eaten her cheese, has she? (sentential)

b. Mary has been not eating her cheese, hasn't she? (constituent)

(4) *And/or*

a. Mary hasn't eaten John's cheese or Sue's strawberries. (sentential)

b. Mary has been not eating John's cheese and/*or Sue's strawberries. (constituent)

Furthermore, sentential negation licenses *do*-support (constituent negation doesn't).

(5) a. Mary does not eat cheese on a regular basis, does she?

b. *Mary does not eat cheese on a regular basis, doesn't she?

In general, these tests allow us to distinguish between sentential and constituent negation in finite clauses. However, as the minimal pair in (6) shows, these contrasts are not always clear. Assuming the difference between sentential *not* and constituent *not* is syntactic, the minimal pair in (6) shows an interesting subtlety in the structure. If both sentential *not* and constituent *not* occupied the same position in the tree (i.e. both headed NegP or both modified vP), we would not expect the contrast between (6a) and (6b). I propose that constituent *not* is a modifier while sentential *not* heads NegP.

(6) a. She's really not reading War and Peace, is she?

b. She's really not reading War and Peace, isn't she?

There is support for this hypothesis from Hankamer (2011), which proposes the use of VP ellipsis tests to show that sentential *not* heads NegP while constituent *not* doesn't. For these tests, I assume the conventional view of VP ellipsis as detailed by Lobeck (1995), Potsdam (1997), and Merchant (2005), which is that ellipsis can only be licensed by the head of a maximal projection (this is illustrated in (7)). [1]

Now we use VP ellipsis tests to check whether *not* is the head of a maximal projection (referred to as a "projecting head"). Examples (8a) and (8b) show that sentential *not* licenses VP ellipsis, while constituent *not* doesn't, showing explicitly that sentential *not* is projecting head while constituent *not* is not.

(8) a. Mary bought 5 pounds of cheese yesterday but John did not.

b. *Mary was eating her cheese yesterday but John must have been not.

[1] In other words, a constituent may only be elided if it is the complement of the head of a maximal projection. In (7c), we see that the complement of D is elided while in (7b), what is elided is not a complement of the head of a maximal projection, leading to ungrammaticality.

(7) a. Mary ate John's stinky cheese and John ate Mary's bland cheese.

b. *Mary ate John's stinky cheese and John ate Mary's bland.

c. Mary ate John's cheese and John ate Mary's.

We can repurpose Hankamer's ellipsis tests to diagnose sentential/constituent contrasts in infinitival phrases where standard tests fail. These tests reveal some key differences between the word orders *not to* and *to not*, illustrated in (9).

(9) a. You could pet my gorilla, but I would prefer for you not to.

b. ?You could pet my gorilla, but I would prefer for you to (*always) not.
cf. *You could pet my gorilla, but I would prefer for you to always not pet my gorilla*

c. *You usually don't pet my gorilla, but I would prefer for you to always.

We see in (9a-b) that *not to* and *to not* may both license ellipsis (though some speakers prefer *not to*), while a *not* that is separated from *to* by an adverb cannot. This suggests that the *not* in *to adverb not* is not a projecting head, and is therefore constituent negation. The judgements are fuzzier for the *not* in *to not* but most speakers agree that *not* can license ellipsis here, signifying that it is a projecting head in NegP, and therefore sentential negation (for speakers who disagree, the *not* in *to not* is constituent). (9c) shows the unsurprising fact that adverbs do not license VP ellipsis.

The order *not to* also licenses ellipsis in (9a), but since *to* is a projecting head, this doesn't tell us anything about the nature of this *not*. The gapping examples in (10) show that *not to* is sentential negation by making use of the fact that sentential negation should be followed by *and neither/or* while constituent negation should be followed by *and so/and*. The fact that (10a) is grammatical shows that *not to* is sentential while the fact that (10c) is ungrammatical confirms our earlier conclusion that *to adverb not* is constituent negation. (10b) shows that *to not* is ambiguous.

(10) a. For Mary not to eat caviar, or/*and Sue beans, would be a shame.

b. ?For Mary to not eat caviar, or/??and Sue beans, would be a shame.

c. For Mary to occasionally not eat caviar, *or/and Sue beans, would be a shame.

Scope examples provide further evidence for the same conclusion. The examples in (11) show a contrast between sentential *not* and constituent *not* in finite clauses. The contrast is that (11a) is scopally ambiguous while (11b) is not. The two readings in (11a) are *none of the arrows hit the target* and *some of the arrows didn't hit the target*, while (11b) only has the reading *none of the arrows hit the target*. Then in (12), we see these same contrasts in infinitival clauses.

(11) a. All the arrows have not been hitting the target. (all > not, not > all)

b. All the arrows have been not hitting the target. (all > not, *not > all)

(12) a. For all the arrows to have been not hitting the target recently, you must be tired. (all > not, *not > all)

b. For all the arrows to not have been hitting the target recently, you must be tired (all > not, not > all)

c. For all the arrows not to have been hitting the target recently, you must be tired (all > not, not > all)

Thus, evidence from VP ellipsis, gapping, and scope all point to the fact that the *not* in *not to* is sentential negation, the *not* in *to not* is ambiguous, and the *not* in *to adverb not* is constituent negation.

We now take up the question of how sentential negation comes to precede *to*. I will argue that it moves to T on the basis of the contrast between (13a-e) and (13f). The examples in (13) show that when *not* is below *to*, any combination of *to*, *adverb*, and *not* is possible, with some orders involving a sentential *not* and others a constituent *not*. However, when *not* is above *to*, the adverb cannot separate *not* and *to* (13f).

(13) a. For Mary to occasionally not finish her homework would be a shame.

b. For Mary to not occasionally finish her homework would be a shame.

c. For Mary not to occasionally finish her homework would be a shame.

d. For Mary occasionally to not finish her homework would be a shame.

e. For Mary occasionally not to finish her homework would be a shame.

f. *For Mary not occasionally to finish her homework would be a shame.

Let us assume that adverbs cannot modify NegP's [2]. This assumption will be important because it will help us explain the positions of the different *not*'s in relation to adverbs. I also assume that adverbs are merged with a projection of the phrase they modify (an adverb to the left of T is modifying the TP and an adverb to the right of T is modifying the vP).

Starting with (13a), we see *occasionally* modifying the vP, and we therefore know that this *not* is in the vP domain. It is therefore clearly not heading NegP, i.e. not sentential negation (an observation in accord with (10c)). In (13b) and (13c), *occasionally* again modifies the vP but this time *not* is above it, either in NegP or somewhere in the T domain. In (13d), (13e), and (13f), *occasionally* modifies the TP. In (13d), *not* is ambiguously in vP or in NegP (and therefore ambiguously sentential or constituent). In (13e), *not* is again somewhere in the T domain. The ungrammaticality of (13f) is striking because it shows the following fact: not only must sentential *not* be adjacent to *to* (i.e. T) when it is in NegP, but it also must be adjacent to *to* when it precedes *to* (i.e. in the T domain). This shows that sentential *not* can *never* be separated from T by an adverb.[3]

The examples in (13), on the assumption that NegP cannot host adverbs, teach us

[2]There are a few adverbs such as *totally* and *absolutely* that might be taken as modifying negation (eg. *For Mary to absolutely not understand the homework...*). In this paper, I will not attempt to show explicitly that these do not modify NegP. I will also only use adverbs that unambiguously modify vP's.

[3]Seemingly parallel finite examples such as *Mary has recently not eaten any of her cheese, has she?*, are acceptable for many speakers. I will return to finite cases later in the paper.

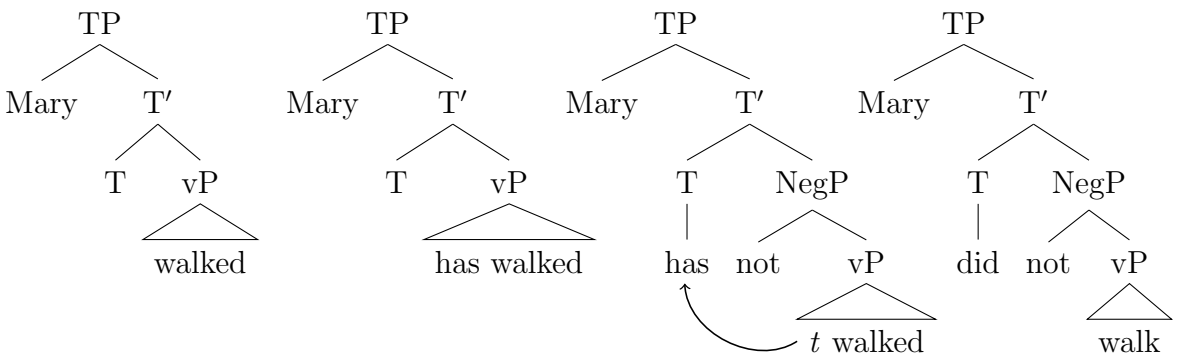
that 1) sentential *not* is a projecting head while constituent *not* isn't, 2) sentential *not* cannot be separated from T by an adverb while constituent *not* can, and 3) sentential *not* may either be in NegP or in the T domain, while constituent *not* is in the vP.

Let us now ask, 1) what is the surface position of *not* and why can it appear to either the left or right of *to*? In other words, why does it optionally move?, and 2) if the order *not to* is possible, why is the order **not be/have/modal* impossible?

3. T and Auxiliaries

In order to investigate the nature of *not* movement we begin by analyzing four relevant configurations (illustrated below).

(14) a. b. c. d.



First I assume that main verbs cannot move, a still unexplained stipulation common to most accounts. This is illustrated in (14a), where *walked* remains in vP. *Do*-support is illustrated in (14d). Since negation separates T from the vP, and since there is no auxiliary to fill T, *do* is inserted. Regarding auxiliary movement, a key observation is that in (14c), it is obvious that the auxiliary has moved to T, but in (14b), it is unclear if this is the case (though it is often assumed that the auxiliary has moved). I will claim that in (14b), the auxiliary optionally moves to T while in (14c), the auxiliary must move to T due to intervening negation. The possibility that auxiliary movement is optional parallels the optionality of *not*'s movement. I propose

that the same factor drives the movement of both auxiliaries and sentential negation.

Any explanation for the the key puzzle, (that the movement of *not* is an obvious assumption in infinitives but a non-obvious assumption in finite clauses), must also account for the general behavior of negation and auxiliaries as illustrated in (14). I propose a modification to the current view of T's EPP property. This new view of EPP asserts that T must merge with a particular relevant head, but is indifferent to whether this head is merged as a complement or as a specifier. I will refer to this modification of EPP as the Extended Extended Projection Principle or E2P2.

E2P2 T has both a tense probe and a negation probe with an E2P2 property. This property can be satisfied in the following ways (where x^T and x^{neg} represent the goals of the tense and neg probes):

1. via movement (x^T or x^{neg} moves to T)

2. via complementation (x^T or x^{neg} heads T's sister)

We may now use E2P2 to explain the structures in (14). In (14a), the main verb *walked* is x^T. T's sister is the vP, which is headed by x^T. Hence, E2P2 is satisfied via complementation. In (14b), the auxiliary *has* is x^T and may satisfy E2P2 either way, either by moving to T or remaining in the vP. In (14c), *not* heads T's sister instead of x^T. *Not* therefore prevents T's E2P2 property for tense from being satisfied via complementation, so *has* must move to satisfy E2P2.

In (14d), we see that E2P2 has consequences for *do*-support, which I propose is a last-resort method of satisfying E2P2. *Not* heads T's sister, preventing the tense probe from merging with the main verb. The main verb also cannot move so E2P2 for tense is not satisfied via either of the normal routes. Therefore, *do* is merged with T to satisfy E2P2. This raises several questions, discussed in later sections.

The difference between E2P2 for negation and E2P2 for tense is that *not* always

has two ways of satisfying E2P2. Tense, on the other hand, is constrained by sentential negation. In the presence of sentential negation, T's tense probe can only be satisfied via movement (as T's sister is not headed by x^T but rather x^{neg}).[4]

4. *not to* vs. **not aux*

Given this view of negation and auxiliary movement, we revisit the question: why do we see the order *not to* but not *not have/be/modal*? Approaching *not* movement from the perspective of Matushansky (2006), we will see that in finite clauses, regardless of how E2P2 is satisfied, the resulting order will always be *have/be/modal not*. Conversely in infinitival phrases, we will see why *not to* is a possible result in addition to *to not*.

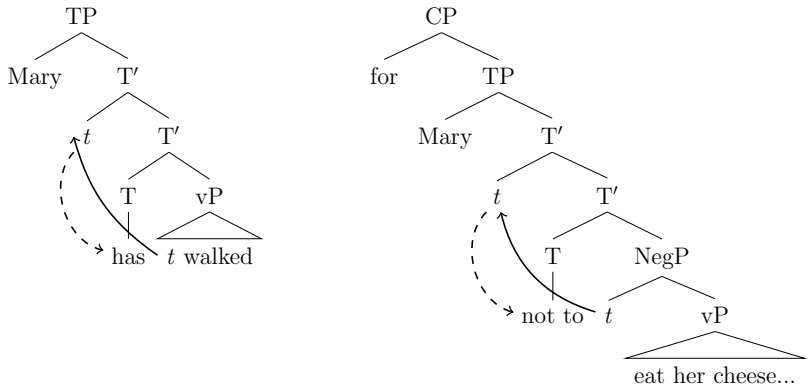
According to Matushansky, a moving head first forms a specifier by normal cyclic external merge to a higher head, followed by an obligatory process of *m-merge* that forms an indivisible unit from the two heads (illustrated in (15a)). In this view, moving *not* first forms a specifier above T and then m-merges to T, resulting in the order *not T*. In infinitival sentences, *not* can satisfy E2P2 either by remaining in NegP as T's sister's head (yielding *to not* order) or by head moving to T (yielding *not to* order). It is crucial to this account that even if *not* satisfies E2P2 without moving, movement is still optionally possible. (Alternatively, if movement is always a last resort, it is possible that movement of *not* is motivated by some silent head intervening between Neg and T).

Applying this logic to finite sentences with auxiliaries seems like it should yield *not aux* when negation moves. However this is not the case. The order *aux/modal/do not* is derived regardless of how T's E2P2 property of neg probe is satisfied. In these

[4]Alternatively we might wonder if, in cases where *not* moves to T, there is actually something preventing T's neg probe from being satisfied by its complement. However, I don't know what that would be. It seems that speakers prefer *not to* to *to not* in ellipsis tests but that could merely be because *to not* is ambiguously constituent negation while *not to* is not.

sentences, since Neg is closer to T than vP is, T sees negation and satisfies its neg probe before it sees the vP and satisfies its tense probe. When *not* satisfies E2P2 by remaining in NegP, auxiliary movement or *do*-support give the order *aux/do not* by virtue of the fact that T is above NegP. When *not* satisfies E2P2 by moving to T, cyclicity accounts for the order that we see. *Not* will move and m-merge to T before the auxiliary moves and m-merges to T (or *do* is merged).

(15) a. b.



Matushansky's view of head movement excludes the possibility of tucking in (Richards 2005, 2010) because *not* already m-merges to T by the time auxiliary movement is triggered. Consequently, the auxiliary will always surface above negation, yielding the order *aux not*. I further propose that the contraction *n't* is the result of an auxiliary m-merging with a previously m-merged *not*. This two-step process when both *not* and an auxiliary move to T is illustrated in (17) (the dotted lines represent m-merge). Modals behave similarly to auxiliaries in that the only possible order is *modal not*. If this analysis is correct, it is evidence that modals are not instances of T, but rather move to T.

Evidence that the contraction *n't* is a result of an m-merged auxiliary with *not* is that *not* can only adjoin to verbs in T to form *n't* (as seen in (16)). *Not* cannot adjoin to anything else to form *n't*.

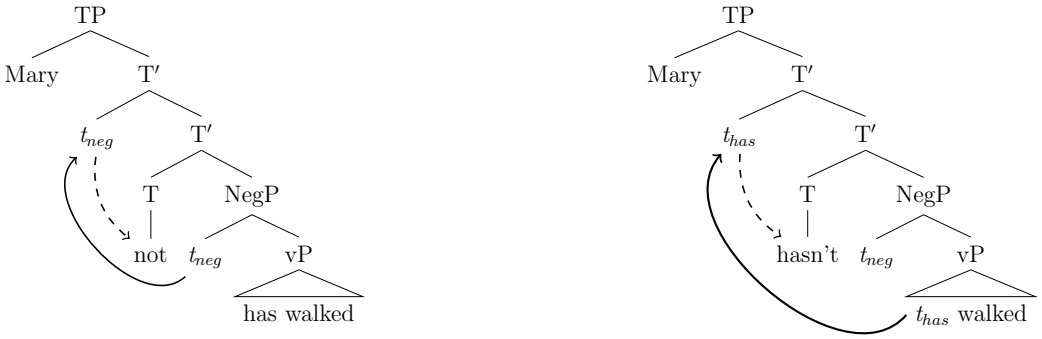
(16) a. I can't/won't/don't/haven't eat(en) cheese.

b. *I often tryn't to pay attention. (meaning *I often try not to pay attention.*)

c. *For hern't to understand would be a shame. (meaning *For her not to understand...*)

d. *It would be a shame to haven't seen the movie.

(17) Step 1: *not* moves and m-merges to T. Step 2: *has* moves and m-merges to T.



5. Auxiliaries, Negation and Adverbs

Extending this view of head movement to the examples in (13), we immediately see why (13f), repeated as (18) is excluded. When *not* moves to T, it is required to m-merge with *to*, which precludes merge of an adverb so that it is linearized between *not* and *to*. Hence we never see *not* separated from T by an adverb.

(18) *For Mary not occasionally to finish her homework would be a shame.

The examples in (19) however show two interesting phenomena that pose a puzzle for this picture of movement. First, auxiliaries can be separated from sentential *not* by an adverb. If the above analysis is correct, why is it that auxiliaries can be separated from T by an adverb while *not* can't? [5] Second is the fact that auxiliaries are able

[5]When an auxiliary is separated from sentential *not* by an adverb, we know it is separated from T because of our assumptions about adverb placement. An adverb above sentential *not* must be modifying the TP and appear above the T node because we assumed adverbs do not modify NegP's. So if there is an auxiliary to its left, we know the auxiliary is separated from T.

to contract with subjects. I claim that these two facts are related.

(19) a. She's purposefully/occasionally not finding anything, is she?

b. She is purposefully/occasionally not finding anything, is she?

c. She's purposefully/occasionally not found anything, has she?

d. She has purposefully/occasionally not found anything, has she?

I suggest that we revise our view of m-merge to account for contraction of the auxiliary with the subject. We assumed previously that after the head moves and forms a specifier, it must m-merge with the head position of the phrase it moves to. However, it might also be the case that the moving head just has to m-merge with *something*. Furthermore, we stipulate that this element too must also have moved. This stipulation is necessary to account for the fact that neither *not* nor *aux* m-merges with adverbs that modify TP (which are base generated in their surface positions). If this is true, we expect that the auxiliaries should be able to move to anywhere in the T domain as long as they have the ability to either m-merge with T or SpecTP (since subjects raise from the vP). *Not* does not have the ability to m-merge with the subject (we never see *shen't/hern't*) and so *not* may only move to a specifier position directly above the T node.

6. *Do*-support

If NegP is absent when negation or affirmation is absent, the acceptability of sentences with only main verbs (e.g. *Mary walked*) follows as an example of complementation satisfying E2P2 for tense. When negation or emphasis intervenes, neither verb movement nor complementation can satisfy E2P2 for the tense probe on T. In this case, either the structure should be excluded or there must be a (last-resort) third way of satisfying E2P2. I propose that if both strategies for satisfying E2P2 fail, the tense feature on the main verb moves independently from V to T, lexicalized

as *do*.

Adopting this feature movement (Chomsky 1995, Yuan 2015) view of *do*-support explains the fact that tense is only pronounced on *do* and not on the main verb (e.g. *Mary did not walk* vs. **Mary do not walked* or **Mary did not walked*). If *do*-support is a result of movement, we wouldn't expect the trace of this movement (tense morphology on the main verb) to be pronounced.[6]

Conclusion In this paper, I argued that there is a simple explanation for puzzling facts about the English auxiliary system if we adopt 1) a generalization of EPP, 2) Matushansky's view of head movement, and 3) the possibility that feature movement is available as a last resort when head movement fails.

References

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[5] Omer Preminger, *Agreement and Its Failures* Linguistic Inquiry Monographs, 2014.

[6] The examples in (20) pose a puzzle. (20a) shows the unsurprising fact that constituent negation doesn't license *do* - support. This is explained by E2P2. Since constituent negation is not a projecting head, it does not block T's tense probe and the main verb can satisfy E2P2 via complementation. However, (20b) is impossible, leading to the possibility that either 1) constituent negation *does* somehow interfere with the satisfaction of E2P2, or 2) something else is preventing the possibility of constituent negation of the highest verb. This is a topic for future research.

(20) a. *Mary does not eat cheese on a regular basis, doesn't she?
b. *Mary not eats cheese on a regular basis, doesn't she?

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