This paper explores the structure of infinitival clauses in English. It is generally assumed that *to* in infinitival clauses is of category T; but this assumption leads to a problem when we consider the position of *not* in infinitival clauses, and in particular the usual order of Subject - *not* - *to* - VP observed there. A fairly long chain of inference leads to the conclusion that *to* in infinitival clauses is indeed a T, but the *not* in negated infinitival clauses is an adjunct.

1. Introduction

Since Pollock 1989, it has been generally accepted within transformational-generative frameworks that the order Subject-Auxiliary-Negative-Verb ... in finite negative clauses such as (1) is the result of movement of an auxiliary verb to the position of T:  

(1) Harvey has not washed his pig. 

(2) 

```
TP
   DP
  Harvey
   T
 [pres] NegP
     Neg
      VP
       not
        V
         [+Aux]
          have
           wash
            VP
             DP
              his pig
```

One could question whether Neg is a head on the clausal spine, as shown in (2), or an adjunct to VP. I will deal with this below, in section 2.2.

The Auxiliary verbs (Auxes) can be defined as those verbs that can move to T in this way. These will of course, along with perfect *have*, include the main verb (copula) *be*, as well as its two cousins, the progressive *be* and the passive *be*:

(3) I am not a pig.

---

1 I am using the expression "move to T" loosely. In fact, since the information in T is not lost as a result of this movement, it is probably best to assume that the V *adjoins* to T.

* I would like to thank Sandy Chung and Eric Potsdam for comments on an earlier draft.
(4) Harvey was not washing his pig.
(5) The pig was not washed by Harvey.

Thus we can adopt the feature [+Aux] as picking out the class of verbs that can undergo this movement.\(^2\)

There is not, however, general agreement about a number of details. Among these are whether the Modals are Ts or Vs that (like other Auxes) move to T; whether not in a sentence like (1) is an adjunct or a head; and most prominently, what the story is about Auxiliaries, to, and Negation in nonfinite clauses:

(6) For Harvey not to have finished his ice cream, the noise in the street must have been really loud.

A common assumption is that to is a T, as are the Modals—this would explain why to never cooccurs with a modal in its own clause. But if this is correct, the T to and the Neg not seem to be in the opposite order from what is assumed for finite clauses.

The goal of this paper is to unravel this conundrum, and that will require a complete and explicit analysis of the behavior of Auxiliary verbs, to, and not, both in finite and nonfinite contexts.

2. Auxiliaries and Negation in the Finite Clause

This section will establish a few background assumptions about the nature of Auxiliaries and Negation in finite clauses.

2.1 Auxiliaries

As noted in the introduction, Auxiliaries are just Verbs that have the [+Aux] property, i.e. the property that they can move to finite T. In a given clause, only one Aux undergoes this movement, and it is always the highest one in the stack of verbs. For V->T movement to occur, the T must be occupied by [+/-past] (i.e. must not contain a Modal or any other Aux). It seems that the highest Aux in a clause must undergo this movement, if it can:

(7) *Harvey not has washed his pig.
(8) *Harvey does not have washed his pig.

A sentence like (7) is ungrammatical because, as we shall see below, the presence of the not prevents the realization of Tense on the Verb have, and (8) is what we would expect if do-support could apply to save the day. This obligatoriness of the movement of an Aux to T when possible, together with the fact that an Aux is happy to stay put when movement to T is impossible, may pose a difficulty for a feature-driven theory of movement, for it cannot be any

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\(^2\) What is a [+Aux] verb varies from dialect to dialect: in British English, at least in some dialects, the main verbs have and need are [+Aux].
need on the part of the Aux that drives it to move; and on the other hand there is an alternative way for T to get expressed via do-support. I will not worry about that, and simply say that an Aux has to move to T if it can.

Since Auxes are the only verbs that can move to T, and only T undergoes T->C movement, it is no surprise that Auxes are the only Verbs that appear before the Subject in Yes-No Questions. The fact that Auxes are the only Verbs that undergo contraction with not can presumably also be linked to the fact that they are the only Verbs that can move past not to the T position, if we assume that Contraction is really an adjunction of not to a preceding T.

Auxes also seem to be the only Verbs that license VP Ellipsis, and this property cannot be reduced to movement:

(9) He ate it, but he shouldn't have.
(10) The bowl was empty, though we didn't expect it to be.

So it remains a mystery why the property of being able to move to T should correlate with the property of licensing VP ellipsis. That is a puzzle I would dearly like to see figured out.

2.2 Clausal Negation in Finite Clauses

There are two reasons to treat the clausal negation morpheme not in finite clauses as a head in the clausal spine (as indicated in (2)), rather than as an adjunct to VP.

First, if it were an adjunct, we would have no explanation for why it blocks realization of finite Tense on a non-Auxiliary verb:

(11) *Harvey not kissed the gorilla.
(12) Harvey almost kissed the gorilla.
(13) Harvey never kissed the gorilla.

As we see in (12) and (13), adverbs adjoined to VP do not block the realization of Tense on the V, but not does. If we assume that not heads a projection in the clausal spine, and that the realization of Tense on a non-Auxiliary V is the result of postsyntactic Lowering (or an equivalent morphological process), we can say that Lowering is blocked by an intervening head but not by an intervening adjunct.

Second, as argued in Potsdam 1997, not can license VP Ellipsis:

(14) They suggested that I should kiss the gorilla, but I would rather not.
(15) You could bring your gorilla into the house, but I would prefer that you not.\(^3\)

Adverbs cannot perform this licensing function:

(16) *You usually don't bring your gorilla into the house, but I would prefer that you always.

---

\(^3\) Example (15), based on an observation by Baltin (1993) (see also Potsdam 1997), is particularly interesting, because in such a subjunctive clause there is no other potential licenser at all.
(17) *I sometimes have to kiss the gorilla, but I would rather never.

It seems likely that VP Ellipsis is subject to a licensing condition (Lobeck 1995, Potsdam 1997, Merchant 2005) requiring the elided VP to be the complement of a licensing head. A VP-modifying adjunct would not count as such a licensor. So my analysis will assume that clausal-negation *not* is the head of a NegP (or SigmaP) situated between T and V.

This analysis entails that an Aux can move past an intervening Neg head to get to T, and consequently that the Head Movement Constraint of Travis (1984) cannot be correct. I assume a kind of typed HMC, where a head cannot move past a head of the type it needs to move to. For Vs, the type is T, or perhaps more generally a family including T and v, Voice, Aspect, ... (but not Sigma or Neg). Thus the reason only the highest [+Aux] Verb moves to T is that no other is close enough.

2.3 What are the Modals?

A standard assumption is that Modals are Ts, which would account for their position above Neg. There is another possibility, which is that the Modals are [+Aux] Verbs, which originate below Neg but above all the other Auxes. Being the highest [+Aux] V in the clausal structure, a Modal would always move to T.

In finite clauses these two hypotheses would appear to be equivalent syntactically. As we shall see in section 3, the question of what Modals are interacts with the question of what *to* is, and with what happens in participial clauses, so this issue will be considered there.

2.4 Dummy 'do'

I will assume that the three forms of do (*do, did, does*) that appear to surface as Auxiliaries are in fact spellouts of finite T when T is prevented by some process or configuration from being realized as the form of a Verb that is its sister or the head of its sister's complement.

Nearly every conceivable hypothesis about the origin of the dummy *do* has been explored and espoused somewhere. I adopt an analysis that links the appearance of dummy *do* to the isolation (by any process or configuration) of T from its normal spellout site, which is on a V that T locally governs.

In a normal case, either an Auxiliary V will have raised to T or not. If one has, the configuration is as in (18):

---

4 I do not subscribe to the notion that *every* kind of ellipsis requires a licensing head. Gapping, for example, manifestly does not.

5 Since it doesn't seem to matter for English, I will remain agnostic about whether the phrase headed by 'not' is a NegP or a more general SigmaP, which might also be headed by a positive polarity morpheme, as occurs in some languages, such as Spanish. For convenience, I will henceforth call this projection NegP.

6 This is the essential insight of the old "do support" analyses, but they usually did not include all the cases and did not really work.
and T is spelled out as a suffix on V or as a form of V.

If no Auxiliary was there to raise, the configuration is as in (19):

(19)  

\[
\begin{array}{c}
T' \\
T \\
\text{VP} \\
V \\
\end{array}
\]

In both cases, T c-commands V and there is no other head that c-commands V. This is what I will call local government.

The dummy do appears in all circumstances where T fails to locally govern V at surface structure (or wherever you want to call it when the syntax proper is finished). This happens in five circumstances:

(a) When an overt Neg intervenes, and there is no [+Aux] V moving to T:

(20) She did not answer the question.

(b) When T moves to C by T->C Movement:

(21) Does your mother wear combat boots?

(c) When the VP is elided, and there is no Aux:

(22) She does.

(d) When the VP is preposed:

(23) We thought she would put on the combat boots, and put on the combat boots she did.

(e) When the clause is emphatically affirmed. This case needs some discussion, because it has not generally been understood. Emphatic affirmation of a clause, in the general case, involves contrastive stress on whatever is in T:

(24) Harvey CAN tame gorillas.
(25) Harvey HAS tamed gorillas.
(26) Harvey IS taming gorillas.
When there is no Aux or Modal, emphatic affirmation cannot be expressed by stressing the V:

(27) Harvey TAMED gorillas.

Sentence (27) is grammatical, but is not an emphatic affirmation of (28):

(28) Harvey tamed gorillas.

Rather, (27) contrasts the verb *tamed* with something else Harvey might have done with gorillas. The emphatic affirmation of (28) is (29):

(29) Harvey DID tame gorillas.

I propose to treat emphatic affirmation as a requirement that stress fall on T, and this is incompatible with T being realized as a suffix on or a form of the main V. Thus a stressed T must be realized as a T, just as a moved or stranded one is.\(^7\)

Within the framework of Distributed Morphology (Halle and Marantz 1993), a straightforward way to implement this is to assume that when T locally governs a V and is not required to be stressed, it will be realized as a suffix on or a form of the host V; otherwise it must be spelled out as the appropriate form of *do*. A simple way to do this is to simply say that the forms *do*, *did*, and *does* are spellouts of T, and the most unspecified ones, so that they will arise exactly when no more specifically determined spellout is available (which, of course, will be exactly when T is isolated from a host V.\(^8\)

2.5 Summary

I have assumed a clausal skeleton like (30):

(30)

\[ \text{CP} \rightarrow \text{C} \rightarrow \text{TP} \rightarrow \text{T} \rightarrow \text{NegP} \rightarrow \text{Neg} \rightarrow \text{VP} \rightarrow \text{V} \rightarrow \text{VP} \rightarrow \text{...} \]

\(^7\) An alternative would be to assume that in emphatic affirmation there is a positive Sigma head between T and V.

\(^8\) It would also be possible to assume, as Embick and Noyer (2001) do, that *do* is inserted as a V, which then interacts with Tense in the usual way. The assumption that these forms of *do* are merely expressions of finite T, however, seems more straightforward.
And the following are the central assumptions about lexical categories:

- T can take either NegP or VP as a complement (in Grimshaw (2005)'s terms, NegP and TP are extended projections of V). Neg takes VP as a complement.

- [+Aux] Vs move to T across the intervening head Neg (because it is the wrong type for Vs to move to). I assume, of course, that they *adjoin* to T, preserving the information in each node.

- Modals are either Ts, or they are Vs that (like other [+Aux] Vs) move to T.

- Dummy *do* is a spellout of T when it is stranded (cannot be realized as an affix on or a form of a V).

3. Nonfinite Clauses

Nonfinite clauses in English come in at least two kinds: infinitival clauses (with *to*) and participial clauses (with *-ing*). I will focus on infinitival ones, but the participial ones have many of the same properties.

A striking property of nonfinite clauses is that they never contain Modals:

(31) *For Harvey to would leave might be nice.
(32) *Harvey's woulding leave surprised everyone.

It is this property that provides the best reason for assuming that the Modals are of the category T. First, if infinitival clauses are TPs, the most obvious candidate for the head T is *to*. This *to* could be selected by the C (*for*, when overt) of the containing CP. If we then in addition assume that the Modals are of category T, the fact that they never appear in infinitival clauses would follow straightforwardly.

Participial clauses also never contain Modals, though they do contain other Auxiliaries:

(33) Harvey's having already washed the car saved us some time.
(34) The car's already having been washed saved us some time.
(35) The car's being impounded by the police was rather inconvenient.

---

9 The term 'clause' is being used loosely here, to denote a syntactic object that more or less corresponds to a proposition. In fact, following Abney 1987, I will assume that participial constructions are neither CPs nor TPs, but rather just DPs, so perhaps they should not be called clauses at all. Nevertheless, I will continue to call them clauses, for convenience.

10 As noted by Ross (1972), there is something bad about a sequence of two Verbs in the *-ing* form in a row:

(i) *Harvey's being talking was not surprising.
(ii) Harvey's having been talking for that long was not surprising.
If we adopt (a version of) the Abney (1987) analysis\footnote{Abney assumed that the \textit{-ing} suffix heads a NP projection, but that seems to do no useful work. See LaCara 2010.} of these clauses, as in (36), the explanation for the absence of Modals is that there is no T:

(36)

\[
\begin{array}{c}
\text{DP} \\
\text{DP} \\
\text{Harvey} \\
\text{D} \\
\text{'s} \\
\text{V} \\
\text{having} \\
\text{VP} \\
\text{washed} \\
\end{array}
\text{DP} \\
\text{VP}
\]

Note that the "subject" of a participial clause is in the specifier of D. This, then, I take to be the standard view:

- Modals are Ts
- \textit{to} is a T
- \textit{to} is selected by C\textit{[for]}
- There is no T at all in participial clauses.

4. **Negation in Nonfinite Clauses**

4.1 A Puzzle

A difficulty arises, however, when we consider the syntax of (apparently) clausal negation in nonfinite clauses:

(37) Harvey prefers not to be in the limelight.
(38) For Harvey not to have eaten the ice cream, the noises must have been very loud.

If \textit{to} is a T, the order of \textit{to} and \textit{not} is not as expected.\footnote{The order "to not" is in general possible, but that seems to be constituent negation of the VP, and in any case is not the preferred order when clausal negation is intended.} What can account for this?
I will consider and reject several possibilities. First, let us dismiss a movement of T downward to a position below Neg. That would be downward movement, to a putative lower head position for which there is no motivation. Similarly, let us dismiss a movement of Neg to a position above T. The only virtue of such a movement would be that it is not downward. This movement could not be to C, since the C for can be overt (as can the subject intervening):

(39) For Harvey not to have eaten the ice cream ...

and there is no motivation for a Head position for *not to move to, existing just in infinitival clauses.13

Less easy to dismiss is the possibility that the hierarchical order of Neg and T is reversed in infinitival clauses (T above Neg in finite clauses, T below Neg in infinitival clauses); yet I think we can dismiss it. The main reason is that it is hard to see how these different orders could be insured. The usual assumption is that a head selects the category of its complement and sometimes the head of its complement. So it would be no surprise if finite T could select Neg and nonfinite T could not; and also no surprise if Neg could select nonfinite T but not finite T. But then what would prevent a structure like (40), corresponding to a sentence like (41)? (I assume do-support would come into play, since the finite T would have no V to get realized on.)

(40)

```
          T[
            T [+fin]
            Neg
          T [-fin]
          T[ VP
to]
```

(41) *Harvey does not to swim.

Or, with a Modal in the upper T:

(42) *Harvey will not to swim.

There does not seem to be any way14 to assure the order Neg-T in nonfinite clauses that does not rely on inventing two different Negs, with no other distinguishing property than that one

---

13 The movements considered and rejected in the text are syntactic Head movements. One might wonder whether, within the framework of Distributed Morphology (Halle and Marantz 1993) the order of to and not might not result from a postsyntactic lowering or local dislocation. I believe those possibilities can be rejected too, after a couple of things have been established. See section 4.2.
sits above nonfinite T (and never below finite T) and the other the opposite. So I think we can dismiss this possibility too.

4.2 The Nature of to and not in Infinitival Clauses

In this subsection I will argue that 'to' is a head in the clausal spine; but also that if to is a head in the clausal spine, not in infinitival constructions cannot be.

There are two very good reasons to assume to is a head. First, it appears to be selected by the C for. This indicates that it is either the head of a complement or a dissociated morpheme. That it is not a dissociated morpheme is clearly demonstrated by the second fact, which is that it licenses VP Ellipsis:

(43) They invited me to kiss the gorilla, but I didn't want to.

So it seems fairly safe to assume that to is the head of a projection in the clausal spine.

But if it is, then not cannot be a head in the spine above to. If it were, neither the C for nor any other head above Neg could select to. Note also that the two reasons for assuming that not in finite clauses is a head in the spine are absent here. Those were (a) in finite clauses, not blocks realization of finite Tense on the V below it; and (b) not in finite clauses licenses VP Ellipsis.

Situation (a) does not hold, because there is no finite Tense to be realized; if we consider the licensing of VPE in nonfinite clauses, it looks like not does not license VPE here:

(44) *How can you ask me to wash the dishes, and then ask me not?
(45) *I asked Harvey to wash the car, but I expected him to not.

Compare (46), where the licenser is clearly to:

(46) I asked Harvey to wash the car, but I expected him not to.

---

14 A reviewer suggested that perhaps T can select across a Neg head, citing the fact that Modals in T require the Verb below Neg to be in the base form:

(i) Kim will not laugh/*laughs/*laughing/*laughed.
I do not regard the base form here as involving selection, however. Rather, the base form is a default that appears when nothing else is selected.

15 Pullum (1982:201-202) noticed that VP Ellipsis is not licensed after not when it is preceded by a nonfinite Auxiliar:

(i) *By three o’clock I will have finished but you will have not. [Pullum’s (30a)]
He observes also that VP Ellipsis is similarly notlicensed after not when it is preceded by infinitival to:

(ii) *You usually pay a lot of attention to what McCoy says, but you ought not. [Pullum’s (31)]
Both of these facts follow automatically if the not in these cases is constituent negation, and constituent negation is adjoined. In fact, constituent negation never licenses VP Ellipsis.
It is here that we can see that a postsyntactic lowering or local dislocation of *to* to the other side of *not* is implausible. VP Ellipsis is clearly licensed in the syntax, even before such syntactic operations as T→C movement:

(47) You won't sell that gorilla, will you?

So we must explore the possibility that *not* in infinitival clauses is an adjunct.

4.3 Adjunct to what?

Now we have to determine what *not* adjoins to in infinitival clauses. The first conclusion will be that it cannot be adjoined to a TP headed by *to*.

Consider the structure (49) of the clause (48), assuming that *to* is a T:

(48) for Harvey to have eaten the ice cream

(49)

```
CP
  C
     for
    DP
      Harvey
       T
        T'
         to
           VP
             have eaten the ice cream
```

The sentence we are interested in is (50):

(50) For Harvey not to have eaten the ice cream, the noises must have been very loud.\[16\]

Where could *not* be adjoined in such a structure? It is clear that it could not be adjoined to TP, for then the order of the subject and *not* would not be as observed. It cannot be adjoined to the VP complement of *to*, because then the order of the subject and *to* would not be as observed. If structure (49) is in fact correct, the only place *not* could be adjoined is to the T'. This would be impossible if we believe, as I did once, that there is no adjunction to intermediate bar-level constituents.

Another possibility, of course, is that *not* here is an adjunct to some higher functional projection above the *to* phrase (in which case I would assume it to be a silent nonfinite T, and *to* \[16\] I am carefully choosing an example where it should be clear that the DP between *for* and *not* is the subject of the embedded clause. For even more certainty, we could choose an example with a dummy subject there:

(i) For there not to have been any objections, the proposal must have been exquisitely worded.
something else). Eric Potsdam (p.c.) has pointed out to me, however, that there are apparent cases of adjunction of adverbs to T' in finite clauses:

(51) He probably will deny everything.
(52) He sometimes has broken promises.

Here the adverb, like the not in (50), is located between the subject and something that is generally assumed to be in T. This pattern is replicated in infinitival clauses, when the adverb is in the prescribed pre-to position:

(53) For Harvey suddenly to disappear …

So rather than invent otherwise unmotivated higher projections for these elements to adjoin to, I will assume that adverbs can in general adjoin to X’ constituents (at least to T’). In (50), I assume the not is similarly adjoined to the T’ headed by to.

4.4 What is to?

The head to, then, is a T. Pullum (1982) argued that to is a V, in which case the structure would presumably be as in (54):

(54)

```
        VP
       /\  
      Neg VP 
     /  
    V  VP
     ^
    to
```

There is a problem with this, though, and it shows up in finite clauses. Recall that there the structure is as in (55):

(55)

```
       TP
      /  
     T  NegP
    /    
   Neg VP
  /  
 V   ...
```
Here Neg is a head that intervenes between finite T and VP. Selectionally, this did not pose a difficulty because finite T does not appear to impose any constraints on the head of the VP below it, permitting any V that can appear there. But if to is a V, it should then be able to appear in finite clauses below Neg, as in (56):

(56)  *Harvey will not to go.

As we saw earlier, this does not work. For this reason, I think we must reject the possibility that to in infinitival clauses is a V. It is, as is generally assumed, a T.\(^{17}\)

4.5 Now what is the Structure?

We have concluded that to is a head in the clausal spine; that not in infinitival clauses is an adjunct; that to is a T; and that not is adjoined to the T’ headed by to.\(^{18}\)

(57)

```
CP
  C for
  TP
    for
    DP
      T'
      Neg
      T
      VP
      to
```

And the subject sits, as indicated, in the specifier of the TP headed by to. C for selects to as the head of its complement.

---

\(^{17}\) A fact to be noted about to is that if it is a T, it is a T that cannot be emphatically affirmed:

(i)  *We expected her TO eat the apple.

In fact there seems to be no way to emphatically affirm a nonfinite clause, while any finite clause can be emphatically affirmed, whether embedded or not. This may indicate that emphatic affirmation is associated with a Sigma projection, and that nonfinite Ts do not select for a Sigma projection. Note that subjunctives, which do permit a Sigma (Neg) projection, also permit emphatic affirmation:

(ii)  We request that you not eat the eggplant.

(iii)  We request that you DO eat the eggplant.

Thanks to Eric Potsdam (p.c.) for opening up this line of thought.

\(^{18}\) I assume, as should be obvious, that Neg here is both maximal and minimal, i.e. it is a head that does not itself project. This is not the place for it, but I assume the same thing for all adverbs.
Here is a summary of the conclusions of this section:

- *to* is a T.

- *not* in nonfinite clauses is adjoined to *to*’s T’ (i.e. syntactically a kind of constituent negation).

- Modals are still (finite) T. They don’t cooccur with *to* because both are instances of T. They don’t occur in participial clauses because there is no T there.

### 5. Conclusion

First a summary of the argument:

In section 2 of this paper, I gave reasons to assume that Neg in finite clauses is a head in the clausal spine.

In section 4, I showed that assuming the same status for Neg in infinitival clauses leads to apparently insurmountable difficulties, since there does not appear to be any way to insure the observed order of C - Subject - Neg - to - VP under that assumption. I argued then that since *to* clearly is a head, *not* must be an adjunct, and that it is adjoined to the T’ headed by *to*. The subject, then, sits in the specifier of the *to* phrase.

The chain of argument is long, and long chains of arguments are vulnerable to attacks on the weak links. Thus I invite anybody who does not like this analysis to try to break any of the links, and see where that leads. This problem is interesting precisely because it is so hard.

As I see it, here are the crucial turns where I have relied on a theoretical assumption which one might choose to abandon, and thus reach a different conclusion:

- I have assumed that VP Ellipsis must be licensed by a head.

- I have assumed that a head can select the head of its complement, but selection cannot reach past an intervening head.

- I have assumed that there is adjunction to intermediate bar-level constituents, at least to T’.

- I rejected the possibility that there are two Neg heads, differing only in that one exists only below finite T and the other only above nonfinite T.

This is the hardest paper that I ever wrote, and I happily dedicate it to Judith, who never shied away from hard problems.
References


