Subjects, Tense and Verb Movement in Germanic and Romance[*]

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This paper takes a closer look at the attraction properties of T. It highlights an empirically attested distinction between rich agreement inflection, exhibited by null-subject languages, and rich tense inflection, found in Romance, but not Germanic, and argues for the syntactic relevance of the distinction. We propose a novel typology of the ways in which T's featural requirements can be satisfied, and, focusing on tense requirements, show how the typology enables us to understand the verb-movement behaviour of the Romance languages vis-à-vis their Germanic counterparts. We also show how the proposed analysis facilitates a new understanding of relevant aspects of the modern English verbal system and its diachrony.

1   Introduction

The goal of this paper is to provide a more complete basis for T's attraction properties by exploiting a neglected property of T, its Tense features. In section 2, we will argue on cross-linguistic grounds that the properties triggering V-to-T movement and licensing null subjects should be kept distinct, i.e. we reject the idea, first proposed by Roberts (1985), that "strong" agreement of some kind is always responsible for both. In section 3, we suggest distinguishing T's tense properties from its agreement/φ properties and propose a correlation between richness of tense inflection and V-to-T movement on the one hand and, following numerous researchers since Rizzi (1982), between richness of agreement inflection and the availability of null subjects on the other. We then construct a new typology on the basis of this proposal. In section 4, we first show how Modern English fits into this typology; in this connection, the auxiliary system is crucial, and we make some novel proposals in this regard (section 4.1). Section 4.2 deals with relevant aspects of the historical development of this system, focussing on the development of systematic V-to-T movement from the loss of V2, and showing how this was a rather short-lived option, as predicted by the typology of section 3. Section 5 concludes the paper.

2   TRIGGERING V-TO-T AND LICENSING NULL SUBJECTS

The first proposal regarding the relation between the strength of agreement and null subjects was made by Taraldsen (1979), and has become known as Taraldsen's Generalisation. This can be summarised as follows: "[t]he intuitive idea is that where there is overt agreement, the subject can be dropped" (Chomsky 1981:241). Similarly, V-to-T movement has been related to relatively "rich" verbal agreement inflection (Roberts 1985:32, 1993, 1999, Vikner 1997, 2001, Rohrbacher 1999, Kosmeijer 1986, Bobaljik & Thráinsson 1998). As Koeneman & Neeleman

(2001) point out, combining these two ideas leads to the postulation of three classes of languages as far as inflectional richness is concerned. These are given in (1):

(1) a. the rich: V-to-T and null subjects (Italian, Greek, Spanish, etc.);
     b. the middle class: enough "wealth" for V-to-T but not enough for null subjects (French, Middle English);
     c. the impoverished: neither V-to-T nor null subjects (Modern English, Mainland Scandinavian).

The implicational corollary of (1) is that no null-subject language lacks V-to-T movement. The connection between V-to-T movement and null subjects becomes still closer in the context of proposals such as those in Barbosa (1995) and Alexiadou & Anagnostopoulou (1998) to the effect that in null-subject languages T's EPP-property is satisfied by movement of a D-feature-bearing V.

Against this background, it is a tempting move to establish a relation between V-to-T movement and the null-subject parameter by supposing that wherever V raises to T, null subjects are licensed and overt expletives barred. The problem with this idea is that there is well known empirical evidence, notably from French, that V-to-T movement can exist in a non-null-subject language. Well-known examples like (2a) illustrate the operation of V-to-T movement in French (see Emonds 1978, Pollock 1989), while the obligatory expletive in what is clearly a non-V2 language illustrated in (2b) shows that French is not a null-subject language:[21]

(2) a. Jean embrasse souvent Marie
         John kisses   often   Mary
         'John often kisses Mary'
     b. *(Il) y une licorne dans le jardin
         there is a   unicorn in   the garden
         'There is a unicorn in the garden'

Standardly, directly relating V-to-T movement to the licensing of null subjects is ruled out by appeal to the relative weakness of French agreement marking, while at the same time positing that this inflection is strong enough to trigger V-to-T movement. Another possibility is to consider the relative strength of specific agreement features of T, e.g. Person vs. Number as in Roberts (1993). Such approaches seem to us to border on stipulation, and in any case to miss the potential relevance of another independently required property of T, namely its Tense features.

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[21] There is an enduring question as to whether Modern French is in fact a null-subject language. In an example such as *il parle* ('he speaks'), the pronoun *il* (as it is usually classified) would then be a subject clitic in the sense that it is phonologically dependent on the verb: no material except for other clitics can intervene between it and the verb, and it cannot be stressed, coordinated or modified (these characteristics were originally noticed in Kayne (1975) and are subject to close scrutiny and an interesting theoretical interpretation in Cardinaletti & Starke 1999). Certain authors (among them Jaeggli 1982, Roberge 1990, and Sportiche 1998) have in fact argued that there is little or no difference between French and Northern Italian dialects regarding the status of subject clitics. Since the subject clitics of Northern Italian dialects are typically analysed as agreement markers (see Brandi & Cordin 1989, Rizzi 1986) and the systems as null-subject ones, this implies that French may be a null-subject language too. Without going into the details of this debate, it is possible that at least some varieties of Modern French treat subject pronouns as agreement markers. One particularly interesting case is Algerian French, as reported in Roberge & Vinet (1989). Stylistic inversion constructions clearly lack overt expletives, as seen in examples like (i) (see Pollock 1986, Kayne & Pollock 2001):
(i)   J'exige   que -- soit procédé   au   réexamen   de cette question
         I require that --   be   proceeded to-the re-examination of this   question
         'I require that we proceed to re-examining this question'

3   AN ALTERNATIVE: T AND TENSE INFLECTION

In this section we will make a proposal regarding the relation between (finite) T and (finite) V. The proposal is open to a simple form of parametrisation, which we will illustrate by presenting a typology of the ways in which T's V-features can be satisfied. The discussion in this section is simplified in that we omit reference to v, in order to indicate more clearly the ways in which our proposals regarding T's V-features are related to properties of lexical verbs in various languages. In our discussion of the auxiliary system of Modern English in the next section, we will introduce v.

We propose as a universal property of simple finite clauses that T and V enter into an Agree relation. It is plausible to think that T has an unvalued V-feature since we take T to be inherently verbal (it is commonly thought of as the position into which auxiliaries are merged; see section 4.1 below), but to lack the fundamental semantic property of verbs, namely argument structure. Since finite verbs may bear tense morphology but have no temporal content of their own, we can think that V has an unvalued Tense feature. On the other hand, (main) verbs have argument structure, which we take to be intrinsically connected to having a valued V-feature (see Baker 2003).

These universal properties of T and V suffice to cause T to function as a Probe and V as a Goal in a simple clause, following the standard conception of this relation in Chomsky (2000, 2001). How the Probe-Goal relation results in feature-valuing varies parametrically. In English, Agree licenses V's tense morphology; this is how we conceive the traditional "Affix Hopping" relation of Chomsky (1957) and much subsequent work. Since we assume that in Continental Germanic V only moves in verb-second environments, and therefore only to C and never just to T, T and V Agree with no V-movement taking place, in non-V2 environments in these languages (see for example Vikner 2005).[22] In Romance languages (both in French and the null-subject languages Italian, Spanish, etc.), this Agree relation is associated with an "EPP"-like feature on T which triggers V-movement, whose precise nature we will describe in more detail below.

We propose that this difference between Germanic and Romance is correlated with the richness of the inflectional (i.e. synthetic) marking of tense distinctions. The Germanic and Romance languages differ noticeably in the number of synthetic tense paradigms that are typically found. The Romance languages are considerably richer, in a clear intuitive sense, than the Germanic ones in this respect, as the following contrasts show:

(4)   **Romance:**
       French: *parle* (present indicative/subjunctive), *parlerai* (future), *parlerais* (conditional), *parlais* (imperfect), [*parlai* (preterit), *parlasse* (past subjunctive)][23]
       Italian: *parlo* (present), *parlerò* (future), *parlerei* (conditional), *parlavo* (imperfect), *parli* (present subjunctive), *parlassi* (past subjunctive)
       Spanish: *hablo* (present), *hablarò* (future), *hablarei* (conditional), *hablaba* (imperfect), *hablé* (preterit), *hable* (present subjunctive), *hablase* (past subjunctive I), *hablara* (past subjunctive II)

(5)   **Germanic:**
       German: *spreche* (present indicative/subjunctive), *sprach* (past), *spräche* (past subjunctive)
       English: *speak* (present), *spoke* (past)
       Swedish: *snakker* (present), *snakket* (past)

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[22]   This statement implies that we disagree with the view that in subject-initial V2 clauses V moves only to T (cf. Travis 1984, Zwart 1997). See Schwartz and Vikner (1996) for arguments for why V must leave TP in V2 clauses.

[23]   The last two forms are in parentheses since they are not part of spoken French, existing only in the literary language and mainly learnt in school.

Our approach thus postulates that there are two quite distinct types of "richness" of verbal inflection **agreement inflection** and **tense inflection**. "Rich" agreement inflection has many of the properties which are standardly attributed to it: it triggers movement of a D-bearing category (perhaps V in a null-subject language, but crucially not in a non-null-subject language); and it licenses null subjects. "Poor" agreement inflection, on the other hand, determines the presence of overt expletives, perhaps for the reasons given in Richards & Biberauer 2005). On the other hand, "rich" tense inflection triggers V-movement and is irrelevant to subject-licensing. As we will see in section 4, it may also determine the possibility of VP-fronting and ellipsis.

Our proposal entails a new typology, and eliminates the "middle class" of semi-rich T noticed by Koeneman & Neeleman (2001). The typology is given in (6):

(6)   a.   Rich agreement and rich tense inflection: hence V-to-T and null subjects, e.g. Italian, Greek, Spanish, etc.

            b.   Poor agreement but rich tense: hence V-to-T, but no null subjects, e.g. French (and see section 4.2 on Middle English).

            c.   Poor tense and poor agreement: hence no V-to-T and no null subjects, e.g. Modern English, Mainland Scandinavian (see section 4.1 on Modern English).

            d.   Rich agreement and poor tense: null subjects, but no V-to-T; no clear example.[24]

Before proceeding further, we need to understand more clearly in what sense the "richness" of inflection may be connected to movement. In the context of a feature-strength-oriented model of syntax such as that of Chomsky (1995), the connection would be straightforward: rich inflection would correlate with a strong feature and, consequently, with the occurrence of overt/pre-Spellout movement. In an Agree-based model such as that of current minimalism, which entails numerous conceptual advantages over its checking-based predecessor (notably, not necessitating the postulation of non-interpretively motivated covert movement triggered by weak features), the connection is, however, less readily captured: in the Agree model, there is no longer any specific reason to assume a correlation between inflectional richness and the presence of a movement trigger (EPP-feature). It could, of course, be the case that inflectional richness constitutes an "extra" morphological cue (alongside the usual positional cues) as to the presence of an EPP-feature. Here we suggest a relatively informal, non-technical answer to this question which we, however, think is on the right track. Suppose that the presence of "rich" tense implies that finite verbs in the languages in question are not categorially simple Vs, but are instead compound elements consisting of V and a fully-specified T. This compound is formed in the Numeration; forming it is part of the process of presyntactic word-formation. Such a compound element must merge with both the V-complement, in order to form a VP, and the T-complement, forming a TP. The only way to satisfy the properties of the compound V+T element is to first merge it at V (thereby satisfying its V-/thematic component) and then to raise it, following the standard movement process, to project as what we usually think of as T. We are therefore proposing a

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[24]   Marc Richards (personal communication) points out that Icelandic may be an example of this kind of language. Certainly its morphological properties seem to indicate that it fits into this category: it has often been pointed out that Icelandic has an agreement paradigm which is as "rich" as that of some null-subject languages, e.g. Romanian, and it only has four synthetic tenses, like German. Icelandic is not, however, a null-subject language and has been argued to have V-to-T movement (see Vikner 2001, and the references given there). If, however, we assume that the V2 property of Icelandic somehow renders null subjects impossible for independent reasons and that the verb-movement pattern is the same as in other Germanic languages in not featuring movement to T but "symmetric" movement to C, then it may fit into this fourth type, with the usual pattern of behaviour associated with this type being obscured by the interaction of other parametric settings. We will not attempt to fully integrate Icelandic into our system here, however. On the relation between V-to-C movement the proposals made here, see section 4.

form of partial reprojection, in that the T-features of the compound element determine the formation of the TP (the V-features do not, as these have played their role in forming the thematic domain of VP, although they must move with T as part of the compound V+T element). Movement is thus triggered by the inherent features of the compound V+T element; and "richness" of tense morphology is what underlies the lexical requirement for the formation of such an element in the Numeration in the first place: the individual reflexes of "rich" tense morphology are assumed to be stored in the lexicon as independent lexical items (cf. Bobaljik & Thráinsson's 1998 parallel assumptions about the storage of rich agreement morphology in null-subject languages). A consequence of the proposal we have outlined here is that we do not in fact need to postulate an EPP-feature on T, V-to-T movement being triggered thanks to the intrinsic nature of the lexically-formed compound V+T.

The above sketch does not explain why the line between richness and poverty of tense-morphology lies exactly where it does; we suspect that this has to do with the presence of aspectual distinctions, at least in past tenses, in Romance. This therefore suggests that v-features may be relevant (see section 4.1 on the idea that aspectual features are associated with v). However, we will not speculate further on this here, but instead proceed to consider more closely the implications of our typology.

4   EXTENDING THE APPROACH: THE POSITION OF TENSE FEATURES

In the previous section, we established that the Romance languages, as a family, have rich tense inflection and V-to-T movement, and suggested why this may be. We implied that Germanic lacks both of these properties. Of course, all the Germanic languages except (Modern) English are verb-second (V2) languages. If we leave Modern English to one side for a moment then, we observe that the Germanic languages have impoverished tense inflection, but that they do show V-to-C movement in the relevant "root" environments.[25] Suppose then that this is related to a further aspect of the V-T Agree relation. More precisely, suppose that the V-movement component of V2 is triggered by a T-related feature of C and that full V2 languages in some sense involve a "hybrid" C, which is also the locus of Tense (cf. Vikner 1995 for overview discussion of proposals along these lines. We take it that the XP-movement component is triggered by an Edge Feature in the sense of Chomsky forthcoming; for arguments that V2 has these two components, *pace* Müller 2004, see Biberauer & Roberts 2004, forthcoming). Given the Head Movement Constraint, V-movement to C will have to pass through T (see Holmberg & Platzack 1995). Hence, independently of "richness" of tense-marking in Germanic, V2 entails V-to-T movement. We will not speculate on the trigger for the intermediate movement here, but note that this must in some sense be derivative of C (cf. Chomsky forthcoming for a possible interpretation of the connection between C and T, and Biberauer 2005 for an alternative proposal) since V-to-T in Germanic is generally unavailable independently of V2 (on Icelandic, see again n.4). Germanic V is therefore either in C (V2 clauses) or in V (elsewhere), but never in T, just as the inflectional richness-oriented proposal outlined in section 3 would lead us to expect.

The question we wish to concentrate on in this section, and indeed for the remainder of the paper, is where English fits into this picture. Earlier stages of English (up to roughly 1450; Fischer *et al* 2000:133f.) were V2, as is well known (see the references given by Fischer *et al ibid*). Presumably, then, we can treat English up to this period on a par with the rest of Germanic.[26] Early Modern English, on the other hand, appears to have had V-to-T movement

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[25]   On Icelandic, see n.4.

[26]   Old English and at least Southern dialects of Middle English allowed "verb third" orders if the item intervening between the initial XP and the verb was a pronoun and if the initial XP was not a *wh*-phrase, the negative *ne* or the discourse adverb *þa* (van Kemenade 1987, chapter 4). Following Roberts (1996), we take it that the verb is in C in these contexts (*pace* i.a. Haeberli 1999, Fuß 2003).

that has often been likened to that in Modern French (Roberts 1985, 1993, 1999; Pollock 1989), while Modern English, since the 17th century, lacks V-movement. In this section, we begin by providing a sketch of an analysis of the Modern English situation, which entails partial analysis of the auxiliary system, negation and the conditions determining the appearance of auxiliary *do* (section 4.1). We then proceed in section 4.2 to an analysis of the development of verb-movement in English since 1450.

4.1 "Affix-Hopping", "*do*-deletion" and T-V Agree in English

In this section we present our analysis of Modern English (NE). Here we want to propose that NE represents a third option in relation to those of Romance and the V2 Germanic languages as just described. In NE, Tense features are lexicalised in T as auxiliaries, there is no V-movement to T or C, and V's unvalued T-feature is licensed by Agree with T, as mentioned in the previous section. In other words, the T-V Agree relation does not involve V-movement in NE. Neither does it involve T-to-V movement ("Affix-Hopping"), as has frequently been proposed (Chomsky 1957, 1991, Pollock 1989, Lasnik *et al.* 2000, Bobaljik 1995, Freidin 2004). Instead, we propose that the close relation between an auxiliary and the form of the non-finite verb or auxiliary which immediately follows it is an instance of Agree. In (7) we give some examples of the Agree relation which holds between an auxiliary and a main verb:

(7) a. John **has** eat**en**
     b. John **is** eat**ing**
     c. John **was** eat**en**
     d. John **must** eat-**ø**
     e. For John **to** eat-**ø** …

In (7a), we take *have* (or, more precisely, the complex of formal features that corresponds to the lexeme HAVE) to be merged as a T bearing a valued Perfect feature, while V bears the unvalued counterpart of this feature. For concreteness, we take formal features to be attribute-value pairs of the general form [Attribute:Value]. Unvalued features lack a value, i.e. they have the general form [Attribute:__]. For this reason they cannot be interpreted at the interfaces. In (7a), then, T has the feature [Aspect:Perfect] and V has the feature [Aspect:__]. The Match component of Agree simply copies the value from the Probe to the empty slot in the Goal (the unvalued Aspect feature on the V-Goal can be thought of as the feature that makes it "active" here, parallel to the manner in which unvalued Case renders DPs "active", and T's feature-matrix will also, as outlined in section 3, include an unvalued V-feature, which is the basis for its Probe status.).

In (7b), T is specified as [Asp:Progressive] and V once again Agrees, taking on the Progressive value of this feature. In (7c), we can take T to be [Voice:Passive] and in (7d) and (7e) T has some Mood specification, with which V will Agree. Clearly, there is much more to say about the features we are working with here, but our main concern is not with the content of the features but with the dependencies they are associated with and which are mediated by the Agree operation. We will look a little more closely at the features themselves when we introduce v at the end of this section.

It is clear that this approach to the dependency between the form of the auxiliary (i.e. the form of T) and the form of the main verb in V almost exactly replicates the effects of traditional Affix Hopping, without recourse to downward movement or special morphological operations (beyond the usual conventions of phonological realisation of feature bundles which may be partially created in the syntax). This relation has been observed since Chomsky (1957) to be highly local (see in particular Emonds 1976) in that each auxiliary determines the form of just the following verb or auxiliary; there is no possibility of a relation holding between Aux$_1$ and V in a sequence like Aux$_1$-Aux$_2$-V, as shown by the ungrammaticality of examples like (8):
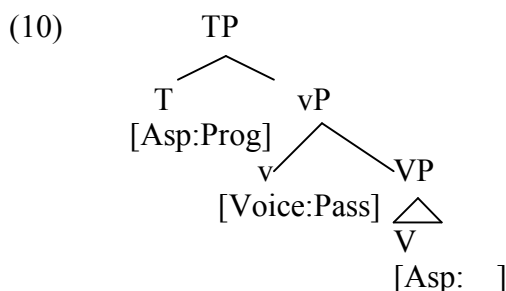
(8) a. *John is[Prog] been[Pass] smoking[Prog]

b.   *John has[Perf] being[Prog] smoked[Perf]

This locality is guaranteed by the non-intervention clause in the definition of Agree. We follow standard assumptions (Chomsky 2000, 2001) in taking the structural environment in which Agree holds to be defined as follows:

(9)   α Agrees with β where:
        (i)   α asymmetrically c-commands β.
        (ii)   there is no γ non-distinct in formal features from α such that γ c-commands β and α c-commands γ.

If we assume iterations of auxiliaries to involve at least one occurrence of vP, then (8a) would have a structure like (10):

(10)

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            TP
           /  \
          T    vP
     [Asp:Prog] / \
              v     VP
       [Voice:Pass]  △
                     V
                 [Asp:__]
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In (10) we can see that v is a structural intervener between T and V, in the sense that v c-commands V and T c-commands v. Thus, T corresponds to α in the definition in (9), V to β and v to γ. However, for v to function as an intervener as defined in (9ii), it must be non-distinct in formal features from T. We therefore must assume that formal features such as Aspect and Voice are not distinct from one another in the relevant sense, i.e. that they are all V- or T-features (we will clarify which of these is the correct option below).

We will not go into the question of the order of NE auxiliaries here. Cinque (1999:153ff.) shows that the basic order Mood > Tense > Perfect > Progressive > Voice is cross-linguistically very widespread, and, with the proviso that Tense and Mood are apparently collapsed into a single position (in that modals are inherently finite), this order is followed by the NE auxiliaries. If we take the Aspect and Voice features to be features of v, then this is arguably a case of the situation described by Chomsky (2005:18) in his remark that "the more elaborate structures revealed by the cartographic inquiries are based on linearization of features in [phase] labels".

Where an auxiliary appears V does not have an unvalued Tense feature. If it did, it would be too far from T to be valued under Agree, still assuming that v has features which make it an intervener (see above). This is in fact the correct result, since, whenever an auxiliary appears, V shows up in some non-finite form (participle or "bare infinitive"). We take it that these forms lack the unvalued Tense feature.

These remarks give an outline analysis of the basic cases of auxiliary-verb dependencies in NE, involving the aspectual and modal auxiliaries (and infinitival *to*). "*Do*-support" is of course a more complex phenomenon, and we now present an outline analysis of this. The first observation is that overt *do* Agrees with a bare verb (like modals and *to*, see (7d,e)).

We suggest that the appearance of overt *do* is regulated by the presence of an "extra" feature on T, in addition to Tense- and φ-features, with this "extra" feature (e.g. [+Aff] or an optional EPP-feature) necessarily resulting in a specific discourse effect.

Let us look first at negative *do*. In this connection, we wish to argue, following Zwicky & Pullum (1983) and Williams (1994:168), that the auxiliary+*n't* combinations of NE are lexical items, i.e. forms such as *won't, can't, shan't*, and, most importantly for our purposes, *don't*, are synchronically lexical items distinct from the positive auxiliaries *will, can, shall* and *do*. We will argue for this view by showing that the obvious alternative, cliticisation of *n't* to the auxiliary, is not a viable option. One possibility would be to claim that *n't* cliticises to the auxiliary, with the auxiliary in T. The problem with this is that it violates the generalisation, originally due to Kayne

(1991), that cliticisation always involves adjunction to the left of the host (in Kayne 1994, this is made to follow from the Linear Correspondence Axiom). An alternative is to propose movement of the auxiliary (presumably from v, see below) to *n't* (where *n't* occupies either Neg or T). An objection to this is that the presence of *n't* is not sufficient to trigger auxiliary movement, as we can see in "subjunctive" examples like (11):

(11) a. I require that he not have left when I get back
      b. *I require that hen't have left when I get back
      c. * I require that he haven't left when I get back

(11a) illustrates the <u>not</u>-auxiliary order, the input to the putative cliticisation process. (11b) shows that <u>not</u> cannot contract onto the subject (this is quite independent of segmental phonology, cf. *I require that Mr Wood*n't/not do it*). (11c) shows that the auxiliary-movement cannot be triggered purely by the presence of *not*; this further shows that the ungrammaticality of (11b) is not simply due to lack of auxiliary-movement.

Another objection to the cliticisation analysis is that certain auxiliary+*n't* combinations are not allowed in inverted position. This is true of counterfactual conditionals featuring what are historically past subjunctive auxiliaries (the observation that only *had, were* and *should* may invert in this context is originally due to Pesetsky 1989):

(12) a. *Hadn't I done that, everything would have been fine
      b. Had I not done that, everything would have been fine
      c. If I hadn't done that, everything would have been fine

These examples show that it is the combination of contraction and inversion that is not allowed in this context, which we will refer to as involving "counterfactual C". It is of course possible for forms such as *hadn't* to appear in C in interrogatives:

(13) Hadn't he finished when you got back?

One might interpret the contrast between (12a) and (12b) as indicating that some auxiliary+*n't* combinations (those which are permitted there) are formed in C, while others (those which cannot appear in C) are not. This would, however, have to be a kind of "long-distance" cliticisation of a type absolutely unattested elsewhere in NE, as the fact that non-contracted *not* is not allowed in or adjacent to C attests:

(14) *Did not John leave?

So, in order to maintain that auxiliary+*n't* combinations are formed by auxiliary-movement to *n't* in T, we have to maintain that T is the only position in which the combination can be formed, but that auxiliary movement is not driven by the need to form the combination and that some auxiliary+*n't* combinations cannot move on to C. We take these facts to show that the auxiliary-movement analysis cannot be maintained. On the other hand, these facts can be straightforwardly captured if we treat negative auxiliaries as directly merged in T as a single lexical item. The facts in (12) can be captured in these terms if we say that a negative auxiliary can only receive an **interrogative** interpretation when it raises to C, with the counterfactual interpretation not being available. In fact, this is true of all negative auxiliaries, not just those whose positive forms are able to appear in "counterfactual C" (i.e. C with an "extra" movement-triggering feature; see below). Distinguishing negative from positive auxiliaries makes this observation easier to state; if there were simply a syntactic auxiliary-movement rule, giving rise to blind, syntactic formation of auxiliary+*n't*, it would be very difficult to rule out T-to-C movement in examples like (12a).

A final argument in favour of a lexical treatment of negative auxiliaries comes from Zwicky & Pullum (1983), who observe that inflections, but not clitics, trigger stem allomorphy.

Since *n't* triggers stem allomorphy on the auxiliaries it combines with (e.g. *will/won't*), we must therefore conclude that *n't* is an inflection which attaches to auxiliaries (see also Spencer 1991:381f.). Our analysis therefore implies that NE has a class of negative auxiliaries, similar to the Uralic languages, Latin, Old English, Afrikaans and various other languages. Negative *do* (i.e. the forms *don't, doesn't, didn't*) is thus the form that corresponds to negative, non-modal, finite T with various Tense and φ-feature specifications.

If we claim that auxiliary+*n't* combinations are lexically-formed negative auxiliaries, then we must provide an analysis of "non-contracted" *not*, which we now see as an element synchronically independent of *n't*. In many contexts, *not* has an interpretation and a syntax distinct from *n't*. In fact, whenever, *not* is non-adjacent to the auxiliary, constituent negation results:

(15) a. John has always not smoked
      b. The kids have all not done their homework
      c. The kids must all not go out tonight
      d. *The kids need all not do their homework

The constituent-negation interpretation is clear in (15a), which can only mean "At all times, it is the case that John engaged in not smoking'. Negation only applies to the VP (or perhaps vP) *smoked*. Similarly, in (15b) and (15c), the relative scope of negation and the floated universal quantifier follows the surface order. The ungrammaticality of (15d) can be attributed to the fact that modal *need* is a kind of Negative-Polarity Item. As such, it must be in the scope of negation or similar affective operator, which it is not in (15d), since *not* occupies a structurally lower position than T and has scope only over its c-command domain, vP/VP and *all* has scope over *not* here. In all these examples, then, *not* does not have clausal scope, having instead a narrower scope, which we take to be a form of constituent negation. Contrast the examples in (16), where *not* has been replaced by *n't* throughout:

(16) a. John hasn't always smoked
      b. The kids haven't all done their homework
      c. The kids mustn't all go out tonight
      d. The kids needn't all do their homework

Here *n't* has clausal scope, entailing that it has wider scope than *always* in (16a) and than *all* in (16b-d). Furthermore, as with other possibility modals, it has scope over *need* in the context of the lexical form *needn't* (16d) (see Williams 1994:168, for further discussion of the relative scope of modals and negation). The scope contrasts in (15) and (16) support the idea that *n't* has not moved from a position following the adverb or floated quantifier, since, under that proposal, some special stipulation must be made in order to prevent "reconstruction" of this movement at LF, which would give rise to the same scope readings in (15) and (16).

 But *not* can, of course, have clausal scope. This happens when it appears adjacent to the auxiliary:

(17) John must/does not smoke

What forces *do* to appear in (17) (when *must* is absent)? We suggest that there is a "negative-concord" relation between T and *not* here. More precisely, T in this case is comparable to French *ne* and *not* to *pas*: T has an "affective" (polarity-related) feature which can act as a scope marker and license *not*, while *not* is the true negation. In NE this "affective" T, which we call T[+Aff] from now on, has no specific realisation comparable to *ne*, but it does have the requirement that the feature-bundle of which it is part must be overtly realised. This analysis is supported by the ungrammaticality of constituent negation without *do*-support (or some other auxiliary being present):

(18)   *John always not smokes

In (19), we give some examples of possible feature compositions of T (prior to Agree), and the various auxiliaries that realise them (once the relevant unvalued features have been valued):

(19)   a.   [uV, uφ, iTense, iAsp, (Aff)]: *have, has, had, be, is, am, are, was*
        b.   [uV, uφ, iTense, iM, (Aff)]: *can, will, must, might*, etc.
        c.   [uV, uφ, iTense, iAsp, Neg, (Aff)]: *haven't, hasn't, hadn't, isn't, aren't, wasn't*
        d.   [uV, uφ, iTense, iM, Neg, (Aff)]: *won't, can't, shan't*, etc.
        e.   [uV, uφ, iTense, Neg, (Aff)]: *don't, doesn't, didn't*
        f.   [uV, uφ, iTense, (Aff)]: *do, does, did*
        g.   [uV, uφ, iTense]: Ø

In (19a-d) we are using the features "Asp" and "M" as covers for a more fine-grained analysis of aspectual and modal features, a matter which we leave aside here (but cf. the brief discussion of Perfect and Progressive features above). (18) is ruled out, assuming that T must have an (activated) affective feature here in order to license *not*; an overt auxiliary must therefore be inserted. Furthermore, the [+Aff]-feature can be optionally activated in all cases in (19a-f).

As briefly described earlier, aspectual auxiliaries Agree with the first verb or auxiliary in their complement. Similarly, modals and *do,* both in their positive and negative forms, Agree with a bare-stem form of the verb. In (19g), we have posited a non-overt "*do*" (see Emonds 1976, Pollock 1989), which we represent as Ø. This element selects a V bearing Tense- and φ-features in addition to its thematic content and which has these features valued under Agree with T and consequently inflects for them.[27] Ø therefore appears where we have both the most impoverished feature-content of T, as (19) clearly shows, and it also imposes the weakest requirement on the form of the head of its complement.

There are four further contexts where *do* obligatorily appears: interrogatives, emphasis, ellipsis and VP-fronting.

(20)   a.   Does John smoke?
        b.   John DOES (so/too) smoke
        c.   John smokes Gauloises and Sam does -- too
        d.   He threatened to smoke and [smoke Gauloises] he did –

For the interrogative case (20a), we follow the standard analysis, which has its roots in den Besten (1983), in assuming that T moves to C. The movement is triggered by the presence of an optional (tense-related) EPP-feature on C. Because of its optional status, this feature must trigger an interpretive effect; cf. Chomsky's (2001:34) remark that "[o]ptional operations can apply only if they have an effect on outcome." Here the "new interpretation" which arises from movement is interrogativity, a canonical property of C. C is always overtly realised (via *do*-support in the absence of a more elaborately specified T; cf. (19)) owing to the presence of the EPP-feature on C; the maximally underspecified auxiliary, namely (19f), is not an option owing to the fact that the outcome of movement must be visible – hence the moved element must be lexically realised – in order for the interpretive effect to hold.

In (20b), T is obligatorily realised as *do* because [+Aff] is part of T's feature-bundle here, giving rise in this case to what we loosely call the "emphatic" interpretation. Thus one of the

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27   English has another null T, the "subjunctive", as in:
(i)   I require that he T not be disturbed until I get back.
(See Emonds 1976 on the "null-modal" analysis of such examples). This T certainly has some further mood feature and, like a modal, selects/Agrees with a bare verb. See Roberts (1993:324) for discussion of the apparent lack of otherwise obligatory inversion in:
(ii)   I require that under no circumstances he be disturbed

forms in (19f) is required; (19g) cannot be selected as a potential spellout form since it is a less specific form (cf. Panini's Principle).

We propose essentially the same for (20c) and (20d). Here again, the null form is barred owing to the presence of the optional [+Aff]-feature on T. The auxiliary in VP-ellipsis and VP-fronting contexts is emphatic (i.e. underscores positive polarity), and contracted auxiliaries cannot be emphatic (cf. the fact that emphatic *do* [*did*] can never be reduced to *'d*), hence the ungrammaticality of (21):

(21)   a.   *John has smoked Gauloises and Fred's --- too
          b.   *He said he had smoked Gauloises and [smoked Gauloises] he'd –

So we see that where [+Aff] is part of the feature bundle on T, the auxiliary must be spelled out as a lexically full form.[28] VP-ellipsis and VP-   fronting pattern alike as far as the auxiliaries are concerned, although it is well known that they differ, particularly in that VP-ellipsis can affect any part of a string of auxiliaries, while VP-fronting may only affect the lowest VP, as long as it is not passive (Ross 1969, Akmajian, Steele & Wasow 1979, Baker, Johnson & Roberts 1989):

(22)   a.   We thought the students might have been being arrested and …
                    [being arrested] they might have been –
                    *[arrested] they might have been being –
                    *[been being arrested] they might have –
                    *[have been being arrested] they might –
          b.   The students might have been being arrested, and the workers definitely could
                    ((have (been (being arrested)))).

This concludes our analysis of "*do*-support."

The final question we address here brings v fully into the picture. Up to now we have been assuming for simplicity that all auxiliaries are merged in T. We have already mentioned that sequences of auxiliaries involve v; see (8) and (10). But, if the second auxiliary is merged in v when more than one is present, what about the single auxiliary when only one is present? We consider it very plausible that aspectuals and, possibly, root modals are always merged in v. They Agree with V and (in finite contexts) move to T, which is associated with an obligatory EPP-feature.[29] The Agree relations we discussed in connection with (7) are now more properly seen as T-v-V relations. T attracts a v which has M or Asp features. *Do* and epistemic modals are merged in T in NE.

A consequence of all this is that "VP-fronting" is really vP-fronting. Evidence for this comes from the anti-reconstruction effects discussed by Huang (1993). Assuming, as is standard,

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[28]   There are (Northern) varieties of British English in which an auxiliary can contract with a non-contracted negation, as in (i):
(i)   I've not finished yet
In Standard English, this is not possible, the relevant form being (ii):
(ii)   I haven't finished yet
We observe that the relation of the [+Aff]-feature to auxiliary contraction is different in these varieties. This is probably linked to the fact that negative auxiliaries of the *haven't, didn't* type are not really found in the relevant varieties. We might therefore conjecture that Negation is always realized on a head distinct from T in these varieties.
[29]   In fact, at least aspectuals plausibly select another *v*P. See Biberauer & D'Alessandro (2006) and D'Alessandro & Roberts (2006) on this. In a way, this is the obvious updating of the approach to auxiliaries in Ross (1969).

that the subject is merged in a specifier of vP, then the fact that a trace of the subject appears to bind an anaphor under vP-fronting can be accounted for:[30]

(23) a.   Which pictures of himself does John think Bill will like best?
      b.   Vote for himself, John thinks Bill might

The general conclusion of this section is that in NE T is always realised by an auxiliary, either null or overt, subject to the conditions given in (19). We have seen how this approach gives rise to a general, and rather novel, account of "*do*-support" and we have sketched an outline analysis of the rest of the auxiliary system, as well as of negation.

The NE system therefore represents a third option in relation to Romance and Germanic as described in the previous section. In this system, T's uninterpretable V-feature is licensed by the realisation of a verbal element (i.e. an auxiliary) in T, either as a consequence of merger or movement.

4.2   Middle English

One language that appears problematic for the proposals we have made here is Middle English (ME). This is because it is usually thought that ME had general V-to-T in finite clauses, this option having been lost in Early Modern English (ENE) (cf. Roberts 1985, 1993, 1999, Pollock 1989).

(24) a.   My wyfe rose nott   (Mossé 1968 cited in Roberts 1985:23)
      b.   Se ye not how his herte is endured .. ?
            See you not how his heart is hardened .. ?
      (Anon. *The Examination of Master William Thorpe*, 44 cited in Roberts 1993:239)

ME was, however, like NE in distinguishing only two synthetic tenses, present and past.[31] Therefore, according to our proposals, V-to-T should not have existed.

One possibility would be to argue that ME was like the other Germanic languages we have discussed in having V2, but not V-to-T. However, whilst this is probably correct for Old English (OE) and Early ME, there are two reasons to think that this is not the case for Late ME. One is that V2 was lost in the Late ME period; this is in fact usually thought to have happened in the 15th century (van Kemenade 1987:219f., Fischer *et al.* 2000:133f.). Another is that we find subordinate clauses which are known to resist embedded V2 with the order Subject-Finite Verb-*not*, such as the following:

(25) And gif he be noght so, then …
      and if he be not so, then …
      (1420s: James I, *Kingis Quair*, 62 – Gray 1985: 73 cited in Roberts 1993:323)

If V2 is not possible, and if the relative positions of the finite verb and *noght* are taken as a diagnostic for V-movement to a position external to vP/VP (see Emonds 1978, Pollock 1989),

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[30]   Heycock (1995) points out certain empirical difficulties for Huang's approach and proposes an alternative analysis.

[31]   The subjunctive was arguably still available in Late ME and ENE, as seen in (24a). However, the present indicative and present subjunctive were barely distinct (other than in the 2sg and 3sg forms), and so we feel justified in collapsing these as we did in the case of both French and German. The past subjunctive may have still been productive, but was morphologically distinct from the indicative only in the singular of *be*, which was *were*. For this reason, we leave this form aside here.

then V must have moved to T to create the order seen here. Similarly, V3 orders featuring a lexical verb preceding a floated quantifier signal the same movement operation:

(26)   a.   In doleful wise they ended both their days
              (1589: Marlowe, *The Jew of Malta,* III, iii, 21 cited in Roberts 1993:253)
        b.   for the panes and pottes garnisseth wel the ketchyn …
              (1531: Elyot, *The Boke Named the Gouernour* cited in Roberts 1993:258)

We therefore conclude that Late ME, at least, had V-to-T movement independently of V2. So how should we analyse this in relation to the proposals made above? The answer, we suggest, lies in a closer consideration of the diachronic facts.

As just mentioned, OE fits fairly straightforwardly with our proposals. We analyse this stage of English as being, in the relevant respects, exactly like Modern German and Dutch. Thus we take it that OE lacked V-to-T (see Biberauer & Roberts 2005 for a detailed analysis of OE word order, and see again Vikner 2005 on German and Dutch). By Late ME, as we have just seen, English had V-to-T. So how did this operation emerge historically?

We propose that V-to-T emerged with the reanalysis of subject-initial V2 orders. The reanalysis is schematised in (27) (see also Adams 1987, Roberts 1993 on Old French, Willis 1998 on Middle Welsh):

(27) $[_{CP}$ DP $[_C$ V $]$ $[_{TP}$ t_{DP} $[_T$ t_V $]$ $[_{vP}$ t_{DP} $[_v$ t_V $]$ VP $]]]$
        ➔ $[_{TP}$ DP $[_T$ V $]$ $[_{vP}$ t_{DP} $[_v$ t_V $]$ VP $]]$

So we propose that V-to-T emerged as a consequence of the loss of V2, through the reanalysis of subject-initial V2 clauses as shown in (27). The result of this reanalysis was a system with V-to-T movement and relatively "impoverished" tense inflection. As we have seen, French has between four and six synthetic tense forms (see (4)), while Late ME had only two (see n.11). We are forced to conclude that in the period following the reanalysis in (27), English verbs, despite their relatively impoverished tense inflection, were analysed as compound V+T elements in the manner described in section 3. The consequence of this is that very frequently the Tense element had a null realisation, and it always had an impoverished feature content (marking only past vs. present; compare the Romance languages where, in addition to past vs. present, aspectual distinctions are made among past tenses).

The evidence for the compound V+T element in Late ME/ENE was therefore clearly rather slight. We suggest that this contributed to the reanalysis of the modals and <u>do</u> as auxiliaries, which took place in the early 16th century (it is usually said to have taken place by 1530: see Lightfoot 1979, Roberts 1985, 1993, Warner 1997). Following Roberts & Roussou (2003:41-2) and Biberauer & Roberts (2005), we take the reanalysis of the modals and *do* to have involved the reduction of a formerly biclausal structure in which the modal/*do* acted as a restructuring verb with a defective (TP) complement to a monoclausal structure in which the modal/*do* is merged outside of VP (here we have indicated the merge position of the new auxiliary as T, but see below for a refinement):

(28) $[_{TP}$ Subj $[_{T'}$ T $[_{VP}$ V_R (=modal) $[_{TP}$ t_{Subj} $[_{T'}$ $[_T$ V+v T $]$ $[_{vP}$ t_{Subj} $[_v$ t_V $]$ VP $]]]]]]$ ➔
        $[_{TP}$ Subj $[_{T'}$ $[_T$ modal $]$ $[_{vP}$ t_{Subj} v VP $]]]$

Roberts & Roussou (2003:41-2) suggest that the loss of infinitive morphology around 1500 meant there was no trigger for V-movement in the lower clause, or indeed for the lower functional T-v system; hence the reanalysis in (28) in the early 16th century.

In terms of the idea put forward at the end of the previous section that root modals and aspectual auxiliaries are merged in v and raise to T in NE, we could reconstrue (28) as reanalysing some auxiliaries, in particular root modals, as merged in the **matrix** v (aspectual auxiliaries may have been matrix v-elements prior to the reanalysis).

After the reanalysis in (28), English therefore had a class of auxiliaries, in that it had a class of elements, including both root and epistemic modals, aspectuals and <u>do</u>, which were merged in either v or T and which ultimately had to surface in T. This reanalysis contributed to the conditions for the loss of V-to-T movement later in ENE (from around 1575 onwards; see Kroch 1989, Roberts 1993). However, V-to-T movement still applied to main verbs in clauses where no auxiliary was present for at least this period (and it has been suggested that in fact it survived through the 17th century; see Warner 1997). For us, this continued incidence of V-to-T is difficult to account for. However, it is worth emphasising how different the 16th-century English situation was from the Modern French one. One important factor concerns the apparent general availability of *do* after the reanalysis in (28); *do* could seemingly appear in any context, except where a modal or aspectual was present. Thus, *do* was always available as an alternative to verb-movement. It is unclear, in fact, why *do* did not emerge as the general default lexicalisation of T in all environments, giving rise to a situation in NE in which all tenses are periphrastic and there is never any form of tense or agreement marking on the verb.

A second factor was the availability of Subject-Adverb-Verb orders, something which is impossible in French (see Pollock 1989). Such orders are attested in ME (see Kroch 1989:226, Roberts 1993:254), where they have often been analysed as instances of Icelandic-style stylistic fronting (see for example Platzack 1995).[32] By the middle of the 16th century, when stylistic fronting-type structures are no longer attested (cf. Biberauer & Roberts 2006 and Biberauer 2006), Adv-V order is quite common: Kroch (1989:226) quotes the following figures from Ellegård's (1953:184) study of the relative order of *never* and a main verb:

(29)   Period 3 (1475-1500):   80 *never*-V   102 V-*never*
             Period 4 (1500-1525)   80 *never*-V   28 V-*never*
             Period 5 (1525-1535)   151 *never*-V   16 V-*never*
             Period 6 (1535-1550)   125 *never*-V   13 V-*never*

We observe a dramatic decline in the relative occurrence of V-*never* order after 1500, and a continued decline after 1525. If we follow Kroch in taking V-*never* order to be an indication of V-to-T movement (i.e. we take *never* to be adjoined to vP), then this indicates a decline in V-to-T movement during the early 16th century. This is consistent with the predictions made here, and again indicates a major difference as compared with Modern French (where the order *jamais* – finite verb is completely impossible).

We suspect that two factors contribute to the continued attestation of orders indicating V-to-T movement in the later 16th and indeed 17th centuries (see Warner 1997, on the latter point). One is stylistic factors: certainly by the 17th century V-to-T orders were seen as characteristic of a literary style (see the evidence from Milton and the 1611 translation of the Bible briefly discussed in Roberts 1993:249). A second factor may be the requirement to lexicalise C when it bears an EPP-feature, or T in negative contexts as discussed in the previous section. We speculate that the incidence of V-to-T movement may be higher in what are usually seen as the diagnostic contexts for this operation than in simple, positive declaratives where the basic diagnostic is adverb placement. In fact, the discrepancy between the Kroch/Ellegård data on the incidence of V-*never* vs *never*-V and the figure of 68% V-*not* orders in 17th century English reported in Warner (1997:381, once again drawing on Ellegård's study) suggests that this may be the case. We leave this question open, pending further empirical investigation.

We have seen how *do* became an auxiliary in the 1520s owing to the reanalysis in (28). It is important to keep in mind that this gave rise to the optional, "exuberant" *do*, found also in positive declaratives in the 16th century. The following are examples of this kind of *do* from Shakespeare:

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[32]   Biberauer & Roberts (2006, 2008) present an alternative analysis, which they argue to be empirically superior to the stylistic-fronting one.

(30) a.   Where eyes did once inhabit   (from *Richard III* cited in Barber 1976: 164)
      b.   Rough windes do shake the darling buds of Maie   (from *Sonnet* 18)

But the modern *do*-support system does not emerge until later. In fact, it does not appear until after the development of contracted negation. This last development took place around 1600, according to Jespersen, who says:

The contracted forms seem to have come into use in speech, though not yet in writing, about the year 1600. In a few instances (extremely few) they may be inferred from the metre in Sh[akespeare], though the full form is written. (Jespersen 1909-49, V: 429 cited in Roberts 1993:305).

In the late 16th and early 17th centuries, *do*-insertion is not connected to negation. In negative clauses, V-to-T and *do*-insertion are apparently options. It is also possible for neither of these operations to take place in a negative clause:

(31) a.   Or if there were, it not belongs to you.
            (1600: Shakespeare *2 Henry IV*, IV, i, 98 cited in Battistella & Lobeck, 1988:33)
      b.   Safe on this ground we not fear today to tempt your laughter by our rustic play.
                  (1637: Jonson *Sad Shepherd*, Prologue 37 cited in Kroch 1989:235)

Probably by the middle of the 17th century (Roberts 1993:308), sequences of auxiliary+contracted negation are reanalysed as negative auxiliaries of the NE kind (see the discussion in the previous section). Once the negative auxiliaries, crucially including *doesn't, don't, didn't*, are established as the unmarked expression of clausal negation, the modern system of *do*-support comes into being. The above accounts for the development of *do*-support in negative contexts, but what about the other NE contexts discussed in the previous section?

We assume that *do*-support became obligatory in questions where no other auxiliary is present as a consequence of the loss of V-to-T movement, making V-movement to C impossible, the existence of a dummy auxiliary and the continued lexicalisation requirement associated with a EPP-bearing C. In such a system, the only option for lexicalising C involves the dummy auxiliary.

In terms of the idea that the reanalysis in (28) gave rise to a subclass of auxiliaries that was merged in v, we can maintain that, although V-to-v-to-T was lost by the end of the 16th century, v-to-T remained. We can thus think of the development of *do*-support in the 17th-century as a shift from the earlier obligatory v-to-T movement (first fed by V-to-v movement, and as such moving a main verb to T, but later only moving an auxiliary merged in *v*) to optional v-to-T movement creating a discourse effect (cf. Chomsky 2001:34). The difference between the two systems concerns the status of phonologically empty v, which in the earlier grammar, until the 17th century, moved to T (i.e. in examples like (31)). In the later grammar, only v containing an auxiliary moved to T. This is a natural simplification of the grammar, given that movement of empty v to T could never be directly observed in the input available to acquirers.

In order to summarise our proposals regarding the development of the auxiliary system, let us reconsider the list of features of the NE auxiliaries given in (19) above:

(19) a.   [uV, uφ, iTense, iAsp, (Aff)]: *have, has, had, be, is, am, are, was*
      b.   [uV, uφ, iTense, iM, (Aff)]: *can, will, must, might*, etc.
      c.   [uV, uφ, iTense, iAsp, Neg, (Aff)]: *haven't, hasn't, hadn't, isn't, aren't, wasn't*
      d.   [uV, uφ, iTense, iM, Neg, (Aff)]: *won't, can't, shan't,* etc.
      e.   [uV, uφ, iTense, Neg, (Aff)]: *don't, doesn't, didn't*
      f.   [uV, uφ, iTense, (Aff)]: *do, does, did*
      g.   [uV, uφ, iTense]: Ø

Prior to the reanalysis in (28) only the aspectual auxiliaries in (19a) existed. The reanalysis in (28) created the modals and *do*, as in (19b) and (19f), although they, like the aspectuals, lacked the modern optional [+Aff]-feature. The post-1600 reanalysis of auxiliary+*n't* as negative auxiliaries created the classes in (19c-e). Finally, the loss of V-to-T in the latter part of the 16th century gave rise to a null (v-)auxiliary of the kind represented in (19g); in the 17th century, when the modern system of *do*-support emerged, the optional [+Aff]-feature was added to (19a-f), and the null auxiliary was reanalysed as a (discourse-neutral) T-element, where it had previously been a v-element.

In this section we have sketched an account of the development of the NE auxiliary system, building on and slightly refining the proposals in Biberauer & Roberts (2008). We have left certain important questions regarding the status of V-to-T in 16th- and possibly 17th-century English open for further empirical investigation.

5 CONCLUSION

In this paper, we have proposed a new account of the cross-linguistic trigger for V-to-T movement, focussing on tense rather than agreement morphology as a potential trigger. We have seen how this simplifies the relation of V-to-T movement to the null-subject parameter, and how it gives a relatively clean distinction between the Romance languages and the Germanic languages. The typology that this approach facilitates should of course be extended further; in particular, it may naturally apply to the Celtic languages (see Roberts 2004, 2005 for a related proposal). Our cross-linguistic proposal led us to a detailed analysis of the NE auxiliary system and of its historical origins. The proposals made in this connection are quite novel, but we believe that they are theoretically interesting and empirically on the right track.

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