

Verbal inflection and overflow auxiliaries

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1 Introduction

The existence of auxiliary verbs, especially auxiliary BE, presents very general questions for the structural of clausal inflection. Broadly speaking, two types of explanation have been offered for why auxiliary verb constructions exist. The first is morphological: it is often claimed that auxiliaries are used when the morphological component is for whatever reason unable to fill some cell of a paradigm (Di Sciullo and Williams, 1987; Poser, 1992; Kiparsky, 2004, a.o.). This type of explanation has frequently been offered in morphological work on inflectional periphrasis, with reference to auxiliary patterns of the type seen in (1) for Latin. Though Latin has simple inflected forms for both the perfect and the passive in isolation (1a-b), an auxiliary is required when these categories co-occur in the perfect passive (1c), and morphological accounts suggest that this is because Latin's morphological system simply fails to generate the synthetic form that would be required for such sentences.

- (1) a. amavi
 love.1SG.PERF
 'I loved, I have loved.'
- b. amor
 love.1SG.PASS
 'I am loved.'

- c. amatus **sum**
love.PERF.PASS be.1SG.PRES
'I was loved, I have been loved.'

The other explanation sometimes offered for auxiliary distribution is syntactic: when the structural position of auxiliaries is directly addressed, it is often suggested either that they occupy a main or light verb phrase (Ross, 1969; Pollock, 1989; Kayne, 1993; Roberts, 1998, a.o.), or that they head or are selected by aspectual or voice-related phrases (Giorgi and Pianesi, 1997; Cinque, 1999, e.g.). This work has tended to focus on patterns of auxiliary distribution of the type seen in English, where certain inflectional categories are uniformly associated with an auxiliary, as with the progressive and passive in (2).

- (2) a. She **was** writing a book.
b. The book **was** written.
c. The book **was being** written.

Neither purely morphological nor purely syntactic explanations have been entirely satisfactory. Morphological explanations face general challenges levelled against lexical/phrasal blocking interactions more generally (Embick and Marantz, 2008): it is unclear how information about morphological well-formedness can be made visible within the syntactic component in order to trigger the correct pattern of auxiliary use. Syntactic explanations, however, cannot obviously account for languages like Latin, where no single inflectional category is consistently associated with auxiliary syntax.

In this article I argue for a hybrid approach to the distribution of auxiliary BE, framed within Distributed Morphology (DM: Halle and Marantz 1993, 1994; Harley and Noyer 1999; Noyer 1997). I argue that the pattern of auxiliaries seen in (1), what I call the “overflow” pattern, can only be accounted for if auxiliary verbs are neither projected nor inserted in the narrow syntax, but are instead a post-syntactic realization of inflection that the syntax

was unable to combine with a main verb—an extension to auxiliary periphrasis of Embick and Marantz (2008)’s general account of apparent lexical/phrasal blocking interactions in DM terms. In other words, *was* is nothing more than the realization of past features in a position that does not contain a verb.¹ Similar views of auxiliary BE have been previously developed by various authors, (Dik, 1983, 1987; Dechaine, 1993, 1995; Schütze, 2003; Cowper, 2010), but not extended beyond the English pattern of auxiliary use.²

If BE is a morphological repair for “stranded” inflection, the challenge is to describe the environments where inflectional features would be stranded. If auxiliaries realize “extra” or “stranded” inflection, then it follows that they diagnose increased inflectional complexity: cases where an otherwise-available relationship between inflection and an auxiliary is not available. From the perspective of compositional semantics, however, the three sentences in (1) are equally structurally complex, each expressing values for tense, aspect, and voice.

Semantic uniformity can be reconciled with morphological diversity, I argue, if auxiliaries occur not necessarily in response to increased structural complexity, but to increased featureal complexity. A major theoretical claim of this paper is that there is (constrained) variation in how languages syntactically encode inflectional categories via features. In some languages, one member of an opposition may be (contrastively) unspecified: a contrast in interpretation for a head X^0 can be encoded via two possible features $[\alpha]$ and $[\beta]$, but it can also be encoded by the use of either $[\alpha]$ or $[\beta]$ alone, with the other interpretation for X^0 arising in the absence of any more specific syntactic feature. In the latter case, only positively specified features could be morphologically “stranded”, requiring the presence of an auxiliary.

¹Auxiliary forms of verbs other than BE are discussed in section 3.3, where it is suggested that they reflect the presence of additional material in the position that would otherwise be realized as BE, as in Kayne (1993)’s nominal/prepositional analysis of auxiliary HAVE.

²This analysis of BE as a way to realize “stranded” inflection is also essentially the analysis of DO-Support in terms of something like a Stray Affix Filter (Lasnik, 1981). Section 3.3 of this paper discusses DO-insertion phenomena outside of English, and concludes that DO cannot be described as occurring to realize inflection stranded in T^0 .

The paper is organized as follows. Section 2 discusses the overflow pattern in more detail, and frames the problems it creates for both purely morphological and purely syntactic views of auxiliary distribution. Section 3 presents the analysis proposed in this paper, in particular the proposal that languages differ in the formal features they use to syntactically represent similar inflectional contrasts, and that this leads to differences in when features fail to combine with a main verb. This analysis is exemplified by a detailed discussion of overflow patterns of auxiliary use in Arabic and Latin. Section 4 discusses the relationship between contrastive non-specification of particular inflectional values and classical ideas of feature markedness, and section 5 concludes.

2 An overflow pattern of auxiliary use

This section discusses several instances of the overflow pattern, and discusses in more detail the puzzle this pattern raises for morphological and syntactic representations of auxiliaries. This sets up the analysis of auxiliary verbs adopted in this paper, which makes central use of the idea that inflectional features can be contrastively unspecified in the syntax.

What characterizes the overflow pattern is that auxiliaries occur only in certain combinations of inflectional categories. This contrasts with the perhaps more familiar pattern of auxiliary use seen in main clauses in English, where categories like the progressive and passive always require auxiliary BE. In the overflow pattern, exemplified again for Latin in (3), we find a quite different profile of auxiliary occurrence. As (3a-b) demonstrate, Latin has simple verb forms for both the perfect and the passive when they occur independently of one another. It is only when they co-occur, as in (3c), that an auxiliary verb occurs.

- (3) a. Puellae crustulum **consumpserunt.**³ *Perfect*
 girl-PL.NOM small.pastry-ACC eat-PL.PFV
 ‘The girls ate the little pastry.’

- b. Crustulum **consumitur.** *Passive*
 small.pastry-NOM eat-PRES.PASS
 ‘The little pastry is (being) eaten.’
- c. Crustulum **consumptum est.** *Perfect + Passive*
 small.pastry-NOM eat-PASS.PTCP **be.3SG.PRES**
 ‘The little pastry was / has been eaten.’

Though not common among familiar Germanic and Romance languages, this pattern of auxiliary use is found quite frequently. In Arabic, for example, both imperfective and past tense can be expressed independently on simple verbs, as shown in (4a-b), with present tense and perfective interpretations, respectively. To express a past imperfective, however, it is necessary to use a past tense auxiliary followed by an aspectually-inflected main verb, as shown in (4c). In this case it is clear that the auxiliary does not occur in response to a deverbal participial main verb: the main verb in (3c) is morphologically identical to its counterpart in (3b).

- (4) a. darasa
 study.PAST.PFV.3SGM
 ‘He studied.’
- b. ya-drusu
 3M-IMPF.study
 ‘He studies.’
- c. kaana ya-drusu
 be.PAST.3SGM 3M-IMPF.study
 ‘He was studying / He used to study.’ (Benmamoun, 2000, pp. 27-29)

From a descriptive perspective, it is natural to say that verbs in these cases are limited in the number of inflectional categories they can morphologically express. If the morphosyntactic context requires inflection beyond this limit, inflectional morphology “overflows” onto an auxiliary verb.

Another clear example of an overflow pattern of auxiliary use can be found in many

³Thank you to Jennifer Faulkner and Elena Innes for these Latin examples.

languages of the Bantu family, exemplified here by Kinande. Typically for the language family, Kinande has simple (analytic) forms that express either aspect or (past) tense alone. Clauses that express both pastness and some aspectual value, however, require a tense-marked auxiliary followed by an aspectually-marked main verb.⁴

- (5) a. *tw-á-húma*
 1PL-PAST3-hit
 ‘We hit (recently, not today).’
- b. *tu-nému-húma*
 1PL-PROG-hit
 ‘We are hitting.’
- c. *tw-á-bya i-tu-nému-húma*
 1PL-PAST3-be LNK-1PL-PROG-hit
 ‘We were (recently, not today) hitting.’

Once again, from a descriptive perspective it appears that the verb is able to support only one category of verbal (non- φ) inflection, with any additional categories requiring the addition of an auxiliary BE.

Looking at generalizations concerning fixed relative order among auxiliaries, Cinque (1999) proposes that auxiliary verbs themselves head functional projections associated with particular flavours of aspect or modality. Much subsequent syntactic work has adopted this representation of auxiliaries, though rarely focusing on the structural properties of auxiliary verbs. Associating auxiliary BE directly with functional heads, however, raises questions for compositional semantics, given that BE often occurs with more than one inflectional category in a language, in addition to its use as a copula. Rather than postulating several

⁴The Kinande data in this paper were supplied by Patrick Jones (p.c.), with some addition and clarification from consultation with Pierre Mujomba. Kinande in fact expresses at least four distances of past tense: recent hodiernal (recently today); remote hodiernal (a while ago today); recent non-hodiernal (recently but before today); and remote (longer ago). The language is also able to express a wide range of aspectual contrasts on the main verb, including general imperfective, completive, inceptive, and progressive. For simplicity, the examples in (5) are limited to the interaction of progressive aspect, marked by the prefix *nemu-*, and the non-hodiernal recent past, marked by the prefix *a-*. The non-hodiernal recent and remote pasts, it should be noted, are distinguished solely by tone marking at the word level.

different BE's, many authors, particularly those investigating the compositional interpretation of tense and aspect, assume that BE heads a semantically vacuous VP (or AuxP), and that this is selected by different functional heads. Examples include Rothstein (1999, 2004), Iatridou et al. (2003), Pancheva (2003), Embick (2004), and to some extent Deal (2009), among many others.⁵

The overflow pattern cannot be analyzed by directly associating auxiliary BE with specific functional heads, however. As Embick (2000) observes for Latin, the overflow pattern is characterized precisely by the absence of any one-to-one correlation between a particular inflectional category and the presence of an auxiliary, the kind of correlation we predict if auxiliaries are the heads of phrases like *Asp*⁰ or *Voice*⁰. It is only possible to account for the overflow pattern in these terms by postulating at least two “flavours” of the relevant heads, each occurring only in combination with specific values of other inflectional heads. This workaround is technically possible, but falls short of explaining why specific combinations of inflectional heads require the presence of an auxiliary in the first place.

The same point can be made even for auxiliaries in English, when we look at patterns of auxiliary use in reduced relative clauses. Though English appears in main clauses to be a language where categories like progressive and passive always occur with auxiliary BE, when a reduced relative contains only progressive aspect or passive voice, no auxiliary is required (6a-b), while progressive passive reduced relatives require a single auxiliary (6c).

(6) a. The woman [writing a book] ...

⁵The view that auxiliaries are semantically vacuous can also be inferred in Chomsky (1993), who proposes that auxiliary verbs BE and HAVE delete by LF for this reason, though Chomsky does not otherwise discuss semantic considerations relating to auxiliaries. This approach to auxiliaries faces the same difficulty as locating them directly in functional heads: in the case of the overflow pattern, auxiliaries could not be selected by any individual head, but would have to somehow be selected by two heads acting in concert. Chomsky's proposals might be better understood in the tradition of treating auxiliaries as main verbs, whether in a sequence of VP shells or full embedding structures (Ross, 1969; Pollock, 1989; Kayne, 1993; Roberts, 1998), which I do not discuss further here due to the crossing dependencies they require between functional heads such as *Asp*⁰ and *Voice*⁰ and the auxiliaries they apparently select.

- b. The book [written last year] . . .
- c. The book [being written at the moment] . . .

If auxiliaries are syntactically associated with categories like *Voice*⁰ and *Asp*⁰ in English, the facts in (6) difficult to explain—but they are an expected pattern if we assume that auxiliaries realize extra inflection in a clause, and that reduced relatives lack any tense inflection that would require an auxiliary to be expressed.

Indeed, syntactic work on auxiliaries often appeals to some kind of morphological explanation for the distribution of auxiliaries—but as we will see, such appeals introduce significant complications for the interaction between syntax and morphology.

The overflow pattern, specifically the Latin perfect passive, has most frequently been discussed as an apparent case of lexical/phrasal interaction in morphological blocking (Di Sciullo and Williams, 1987; Börjars et al., 1996; Sadler and Spencer, 2000; Kiparsky, 2004; Ackerman et al., 2011). The intuition most often developed in this literature is that overflow auxiliaries are a syntactic repair of a morphological problem, namely the absence of certain paradigmatic forms. Kiparsky (2004) in particular articulates the view that the absence of a finite perfect passive verb in Latin is a principled gap, arising due to an absolute limit in the number of (morphosyntactically marked) inflectional categories that can be expressed on a Latin verb.

The challenge for this kind of purely morphological approach to periphrasis is in explaining how information about morphological well-formedness comes to be visible within the syntactic component. Kiparsky (2004) explicitly assumes a lexicalist (pre-syntactic) morphological framework, which makes it possible to appeal directly to the non-existence of certain inflected main verbs—the absence of a finite perfect passive form in Latin, or of past tense aspectual forms in Arabic and Kinande—to explain the presence of overflow auxiliaries, which are projected in the syntax as the only way to introduce tense inflection

into the derivation. The question for this type of approach is not in explaining why auxiliaries can appear, but in limiting them to those environments where no simple inflected verb exists: if auxiliaries are a freely-available way to introduce inflectional features into a derivation, there is no syntactic reason why they could not do this even when there is an inflected alternative available. In English, for example, we might wonder why the simple past (e.g. *ate*) does not freely alternate with an auxiliary construction (e.g. *was eat*).

To correctly rule out such spurious auxiliaries the syntactic component would require information about available inflected forms of verbs, so that auxiliaries can be directly blocked by the existence of a synthetic inflected verb. Kiparsky (2004) attributes this type of blocking to an economy constraint that prefers morphologically and structurally simpler exponence whenever possible. Implementing this proposal requires an Optimality Theoretic computation with access to both the morphological and syntactic components. Embick and Marantz (2008) argue against this approach, as well as related proposals by Bresnan (2001), from a DM perspective, in the broader context of apparent lexical/phrasal interactions in blocking. Specific to the case of overflow auxiliaries, we can ask whether an account is possible that does not appeal to the transderivational comparison required by Kiparsky's proposal.

A different set of problems face the blocking approach to periphrasis if one adopts a realizational, rather than lexical, view of morphology. If syntactic representations contain only formal features, and not the morphological exponents of those features, then there is no way for an auxiliary verb to be projected in response to a paradigmatic gap without allowing the syntax to “look ahead” to the morphological component. Without such look-ahead, the syntactic component should be unable to detect whether a particular set of syntactic inflectional features can all be realized on a single verb. By the time the morphological component tries (and perhaps fails) to realize such a verb, it is too late to go back and project an auxiliary verb in the syntax—but neither can auxiliary insertion be

purely morphological (i.e. the result of an operation like Fission), given that auxiliaries are syntactically autonomous from main verbs.

The idea that auxiliary verbs are projected in the syntax thus faces significant challenges regardless of whether the projection is motivated by syntactic or by morphological considerations. The same problems do not arise if auxiliaries diagnose not a morphological inability to realize certain combinations of features, but instead a syntactic inability to ever combine those features in the first place. This is the natural view of apparent lexical/phrasal blocking interactions within DM, as discussed by Embick and Marantz (2008): alternations between synthetic and periphrastic forms reflect the availability of syntactic operations, rather than independent properties of the inflectional systems. Within the context of verbal inflection, once we assume that inflectional features originate on the functional heads with whose interpretation they are associated, general syntactic locality considerations determine which, and how many, features can combine with the main verb, and auxiliaries are the realization of features that do not combine with a main verb in the course of the derivation.

3 Towards a unified inflectional system

This section elaborates the proposed analysis of auxiliaries as the morphological realization of inflectional features that fail to combine with any lexical verb.⁶ The idea that a default or dummy verb can be inserted to morphologically realize stranded inflection is widely accepted, albeit generally for DO rather auxiliary BE.⁷ The view that BE is a default or

⁶In addition to similar previous analyses of BE already cited, this proposal resembles Roberts' (1998) proposal that auxiliary movement in English can be linked to the fact that HAVE and BE consist only of formal features, though his analysis was framed in lexicalist terms.

⁷The relationship between the analysis of BE proposed here and "support" DO in English is discussed further in section 3.3. To preview the discussion there, cross-linguistic evidence suggests that DO does not occur simply to realize stranded inflection, but instead has a somewhat more complex distribution (Schütze, 2004; Bruening, 2010; Bjorkman, 2011, chapter 4).

least-specified verb nonetheless recurs in the syntactic literature, and has been developed in some detail by a number of authors, notably Dechaine (1993, 1995), Schütze (2003), and Cowper (2010). These previous accounts have all proposed in one way or another that auxiliaries occur (in at least some cases) to satisfy a syntactic requirement for a verb; this article departs from this view in proposing that the appearance of auxiliaries reflects more purely morphological properties of stranded inflection.

This view of auxiliaries requires that the morphological component be both realizational and post-syntactic; here I assume the specific framework of Distributed Morphology (Halle and Marantz, 1993, 1994, et seq.). The crucial property of this type of theory, for the purposes of the proposed account of auxiliaries, is that inflectional information is syntactically introduced in a separate position from the verb,⁸ and so might fail to be united with a verb in the course of a derivation.

Central to the account here is the idea that the distribution of auxiliaries should be directly attributed to locality constraints on the mechanisms that manipulate inflectional information. In movement-driven approaches to inflection (Pollock, 1989, et seq.), locality between the verb and inflection is enforced by the Head Movement Constraint (Travis, 1984), and similar locality requirements apply to Lowering or Morphological Merger, used to account for *in situ* finite inflection in English (Bobaljik, 1994, 1995; Embick and Noyer, 2001). In much recent work verbal inflection is instead manipulated via Agree, specifically a “Reverse” Agree in which unvalued/uninterpretable inflectional features on a verb are valued via Agree with *higher* inflectional heads (Wiklund, 2007; Zeijlstra, 2012; Bjorkman, 2011; Wurmbrand, 2012a,b). In Agree-based approaches to inflection, it is requirement that

⁸The core of the proposal developed in this section would be compatible with a limited lexicalist view of verbal inflection, where (at least some) affixes are introduced higher than the verb, and verbs are united with inflection via head movement, as in Pollock (1989) and subsequent work. For general arguments in favour of entirely post-syntactic morphology, moreover, the reader is referred to the above-cited work in DM and much subsequent work; see also Zwicky (1985), Anderson (1992), Stump (2001), for more general arguments in favour of realizational (non-lexicalist) morphology independent of DM.

Agree target the structurally closest matching feature that will constrain the ability of verbs to combine with inflection.⁹ The choice between movement and Agree as a means of manipulating inflectional features is largely independent of our primary concern here, which is when features are syntactically represented in the first place. Where the two approaches make different predictions, this will be noted in the text.

Regardless of the mechanism involved in manipulating inflectional information, the general issue of locality between inflectional heads and the lexical verb becomes more complicated if we consider the clause structure underlying a compositional semantics for tense and aspect. The syntactic association of tense with a dedicated projection T^0 is well established, dating back at least to Pollock (1989). A dedicated aspectual projection Asp^0 appears less frequently in syntactic work, but has been well established in fine-grained compositional approaches to temporal clausal semantics, in which the relationship between tense and the verb phrase is necessarily mediated by viewpoint aspect (Tenny, 1987; Smith, 1991; Klein, 1994; Giorgi and Pianesi, 1997; Kratzer, 1998; Kusumoto, 1999; Demirdache and Uribe-Etxebarria, 2000, among many others). For the compositional semantics of tense to be consistent, every finite clause must be specified not only for tense but also for viewpoint aspect; the simplest semantic assumption is thus that the projection Asp^0 occurs in every clause.¹⁰

⁹The strongest advantage of Agree-based (or other feature-licensing) accounts of inflection is in their ability to account for cases where the same inflection appears on more than one verb. We find such cases in the domain of serial verb and “quasi-serial” constructions (Aikhenvald and Dixon, 2007; Zwicky, 1969; Pullum, 1990; Cardinaletti and Giusti, 2001; Bjorkman, 2009); in “parasitic participle” and other inflection doubling constructions in many Germanic languages (Den Dikken and Hoekstra, 1997; Wiklund, 2007; Wurmbrand, 2003, 2010, a.o.); and in some analyses of “sequence of tense” phenomena, where embedded past inflection appears to be dependent on the matrix clause (von Stechow, 2002; Zeijlstra, 2012). If inflection is a head that moves or is moved to, it should be unable to appear on more than one verbal head in a single clause, contra to what we see in these contexts.

If syntactic movement is dependent on Agree, moreover, as suggested by Chomsky (2000) and adopted in much subsequent Minimalist work, then movement-based approaches already require verbs to Agree with the inflectional heads they move to. Inflectional features provide an obvious candidate for this relationship, and so movement-based approaches may reduce to Agree-based approaches—though an alternative is that movement is triggered by, e.g., selectional features on the higher head.

¹⁰I set aside the question of whether the set and content of functional heads in a language is uniformly fixed

For languages with overt V^0 to T^0 movement, as in the French example in (7a), postulating an intervening Asp^0 projection requires only that head movement proceed in two steps, passing through the intermediate head, analogously to Pollock’s original proposal that V^0 -to- T^0 movement in French passes through an intervening Agr^0 projection. But for languages like English, where finite inflected verbs surface within vP , the postulation of Asp^0 requires that inflectional information on T^0 in sentences like (8a) be able to establish a relationship with V^0 across an intervening head. At the same time, other values of the aspectual head must be able to prevent T^0 from establishing a relationship with the verb, as in (7b), resulting in the realization of tense inflection on auxiliary BE.¹¹

- (7) a. Elle tombait.
 She fall-PAST.IMPF
 “She was falling / fell (imperfective).”
- b. Elle est tombée
 She is fall-PFV.
 “She fell (perfective).”

- (8) a. She wrote a book.
 b. She was writing a book.

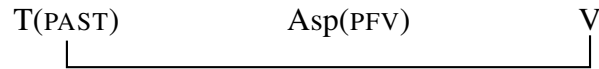
What, then, is the difference between the progressive and non-progressive in English (for example)? If we take seriously the semantic evidence that Asp^0 is present in all

by UG (Cinque, 1999; Rizzi, 2004; Kayne, 2010, a.o.), or whether the content or set of heads themselves is determined on a language by language basis (Chomsky, 2000; Borer, 2005; Ritter and Wiltschko, 2009, a.o), though the proposal advanced in this section, that for a given inflectional contrast a language can choose from among several different feature systems to represent that contrast, is perhaps more conceptually compatible with the latter option.

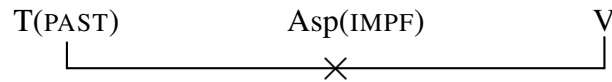
¹¹The French perfective past (*passé composé*) in fact shows alternation between BE and HAVE (depending approximately on the argument structure of the main verb). The relationship of auxiliary HAVE to BE is further discussed, though not in depth, in section 3.3, which appeals to Kayne (1993)’s proposal that HAVE results from the presence of an additional (perhaps prepositional) element in a position that would otherwise be realized as BE.

clauses, somehow only non-progressive values of this head allow T^0 to establish a relationship with V^0 , as represented schematically in (9):

(9) a. Simple Past: *wrote*



b. Past Progressive: *was writing*



In syntactic accounts of auxiliaries, going back at least to Chomsky (1957), it is the syntactic presence of auxiliaries as verbs that intervenes in structures such as (9b). We have seen already, however, that the overflow pattern of auxiliary use is incompatible with the idea that auxiliaries either head or are selected by particular inflectional categories.

I propose instead that though the presence of a particular inflectional contrast in a language requires the syntactic presence of an associated functional head, it does not require (though it does allow) both poles of the contrast to be represented as formal syntactic features. Instead, a language may represent only one member of the opposition with a syntactic feature, with the other value being contrastively underspecified. An inflectional contrast between α and β can be syntactically represented in at least three ways, shown in (10):¹²

- (10) a. $[\alpha]$ vs. \emptyset
 b. $[\beta]$ vs. \emptyset
 c. $[\alpha]$ vs. $[\beta]$ (vs. \emptyset)

Contrastive non-specification in the syntax, as in (10a-b), is in principle independent

¹²In principle, these features could be represented as bivalent (i.e. $[\pm\alpha]$). I use privative values to emphasize the idea that either value of an opposition can be syntactically specified, and to avoid the common association of $[-\alpha]$ with “unmarked” feature values.

of the morphological underspecification of individual morphemes or rules of exponence in realizational frameworks, including DM. Underspecifying syntactic contrasts is also in principle compatible with the assumption that morphological representations must be fully specified, as argued for from a different perspective by Calabrese (2008, 2011), so long as absent values are supplied in the course of morphological realization via feature redundancy rules, as proposed within DM by Noyer (1997).¹³ But while it is widely assumed that there is variation in which inflectional features are active in a language (e.g. in cartographic approaches, where some projections made available by UG may be syntactically inactive in an individual language), it is less common to propose that languages can vary in which values of their inflectional oppositions are syntactically represented.

Harbour (2007, 2011b), in particular, argues explicitly that inflectional features are always bivalent, making crucial use of three-way of the type in (10c) to account for the complex number system found in Kiowa. His empirical argument, however, requires only that Kiowa itself represent contrasts in number features bivalently ($[\pm singular]$, $[\pm augmented]$). This is consistent with the possibility that other languages make contrasts along the same dimensions, but represent those contrasts privatively: Cowper and Hall (2013a) make exactly this point, invoking privatively represented contrasts in number systems to account for variation in patterns of number syncretism cross-linguistically.

Contrastive non-specification of certain inflectional features has been widely invoked in work on the organization of features in the nominal domain, particularly accounting for certain persons or numbers in terms of the contrastive absence of relevant features (Harley, 1994; Harley and Ritter, 2002; Béjar and Rezac, 2009, though see Nevins, 2007 for a different view). These proposals have typically been developed, however, in geomet-

¹³Calabrese (2008) argues further that syntactic representations (not only morphological representations) are also fully specified in all languages, as part of his account of cross-linguistic systematicity in case paradigms. This proposal, if extended from case to verbal inflectional contrasts, is incompatible with the patterns of verbal inflection discussed here.

ric terms, where absence of contrastive specification arises due to implications between features (e.g. an element can be specified for person only if it is also specified for number). This is different from the contrastive non-specification proposed here, which is local to the representation of two values of a contrast, not to their relationship with other inflectional categories.

If inflectional heads can be contrastively unspecified for inflectional features, we can articulate a difference between progressive and non-progressive aspect, as in (9): verbs realize the inflection of the closest head that is positively specified for inflectional features (not necessarily a structurally adjacent head). For English, in other words, the contrast is not between Asp^0 (PFV) and Asp^0 (IMPF), but between Asp^0 (IMPF) and Asp^0 alone—in the former case, Asp^0 intervenes between T^0 and V^0 , but in the latter case this head is irrelevant for a relationship predicated on inflectional features. Auxiliary BE occurs in the past progressive to realize inflectional features of T^0 that are blocked from establishing a relationship with V^0 .¹⁴

This approach to the syntax of inflectional features allows an elegant account of overflow patterns of auxiliary use. The occurrence of auxiliary BE in general indicates the presence of at least two heads above the verb, both syntactically specified for some inflectional feature. Unless the verb moves, the higher of these two features will be stranded, and

¹⁴An anonymous reviewer observes that it is further necessary that heads without any specified inflectional features not be realized independently by a default form: that is, when V^0 establishes a relationship with T^0 across an intervening Asp^0 (possible when Asp^0 contains no specified inflectional features), Asp^0 does not appear to ever be realized as a default inflectional particle. This suggests that features, rather than heads themselves, are the input to morphological realization, as suggested by Noyer (1997)'s approach to Fission, in which realization rules apply to a position so long as it contains undischarged features—though it must still be the case that category-defining features such as [T] or [Asp] are not themselves visible to morphological realization, and if we assume that redundancy rules “fill in” syntactic representations in the course of morphological realization, redundancy rules must be constrained to apply only to positions that contain a verb or specified inflectional features already.

If movement (whether verb raising or morphological Lowering) is unable to “skip” heads, then this issue will not arise within movement-based approaches, so long as moving elements pass through any inactive intervening heads. Similarly, if “unspecified” inflectional heads are syntactically absent, then their morphological absence would automatically result—though with a perhaps equivalent addition of complexity at the interface with semantics.

require realization by an auxiliary. An overflow interaction will arise whenever both these heads have another value that is contrastively non-specified.

The same approach unifies auxiliary and copular uses of BE: while auxiliary BE occurs when inflection is not able to establish a sufficiently local relationship with a verb, copular BE occurs when there is no verb for inflection to establish a relationship with. In other words, there is no “main verb” use of BE in a language like English: while there may be a predicative head that relates two elements in a copular clause (Bowers, 1993; Rapoport, 1987, a.o.)—and which is responsible for the characteristic syntax of such clauses—that head should not be identified with the verbal element BE itself, which occurs only to realize tense or other inflection. Distinguishing BE from a predicational head also resolves the analytical difficulty of providing a single semantics for copular BE across predicational, equative, and existential contexts, just as distinguishing BE from inflectional functional heads resolves the difficulty of reconciling its “eventive” and “non-eventive” uses (as in Rothstein, 1987). On this view, copular BE is simply the prototypical instance of auxiliary BE.¹⁵

The remainder of this section demonstrates how variation in contrastive underspecification for tense, aspect, and voice features accounts for the overflow patterns introduced in section 2. This requires independent grounds for identifying certain inflectional values as syntactically “missing”.

The syntactic activity of a head can provide one type of evidence in this domain. If syntactic operations such as movement are dependent on relationships between features (e.g. movement is dependent on Agree, Chomsky 2000), then a head that is unspecified for

¹⁵This accounts naturally for languages that lack a verbal copula altogether, or lack one in the present tense—as in the case of Arabic, discussed below. Further to this, I do not claim that copular verbs never realize a predicational head: in languages with more than one copula (e.g. Spanish, languages of the Dene family, among many others), the fine structure of predication appears to play a role in the realization of copular verbs. Similarly, in languages where the copular verb has no use as an auxiliary, or where there are non-verbal copular elements, it may be that the copula more directly realizes a predicational head.

inflectional features should be unable to trigger or participate in movement or agreement. This predicts generally that V^0 -to- T^0 movement, for example, is possible only when T^0 contains specified inflectional features. We will see this kind of evidence for the non-specification of present T^0 in Arabic, which appears to trigger neither movement of the subject to its specifier nor movement of the verb.

Another type of evidence comes from morphological neutralization. If a contrast related to the interpretation a head X^0 is represented by the presence or absence of a feature [F], then a verb that realizes the featureally unspecified member of the opposition (the form that occurs when X^0 has no inflectional feature) could also occur in contexts where there is no relevant X^0 head in the structure at all. More concretely, consider the case of Romance pluperfect (past perfect) auxiliaries. These auxiliaries occur in a past tense form, and occur in clauses with an overall perfective interpretation (the event of the main verb is complete, not ongoing), but in matrix contexts they nonetheless show past *imperfective* morphology, as the following example from French illustrates:¹⁶

- (11) a. Les élèves avaient étudié.
 The students have.PAST.IMPF study.PTCP
 ‘The students had studied.’
- b. L’hiver était arrivé
 The-winter be.PAST.IMPF come.PTCP
 ‘Winter had come.’

The occurrence in (11) of imperfective morphology without corresponding imperfective syntax or semantics lends support to the view that such morphology does not generally reflect the presence of imperfective features (cf. Bjorkman and Halpert, 2013), and thus to the broader concept of syntactically unspecified inflectional values.

¹⁶It is possible for pluperfect auxiliaries to occur in a past perfective form, but only in temporal adjunct clauses: in French the *passé antérieur* or *passé surcomposé*; in Italian the *trapassato remoto*; in Spanish the *pretérito anterior*. We might expect that in such contexts, unlike in matrix clauses, there is a higher syntactic source for syntactic perfective features.

The remainder of this section illustrates how variation in the syntactic specification of inflectional features can account for overflow patterns via case studies of the overflow interactions seen already for Arabic and Latin.

3.1 Arabic

We saw in section 2 that Arabic exhibits an overflow interaction between tense and aspect, having simple (non-auxiliary-using) imperfective and past verb forms, but requiring an auxiliary *kaan* (BE) in the past imperfective.¹⁷ This is illustrated again in (12), repeated from (4).

- (12) a. darasa
 study.PAST.PFV.3SGM
 ‘He studied.’
- b. ya-drusu
 3M-IMPF.study
 ‘He studies.’
- c. kaana ya-drusu
 be.PAST.3SGM 3M-IMPF.study
 ‘He was studying / He used to study.’ (Benmamoun, 2000, pp. 27-29)

Assuming a consistent functional structure for tense and aspect, all three clauses in (12) involve both an aspectual head Asp^0 as well as T^0 , and the auxiliary in (12c) diagnoses the failure of tense inflection to unite with the main verb when aspect is specified as imperfective. The question is why the same failure is not found in (12a), with perfective aspect, or in (12b), with imperfective aspect but present tense.¹⁸

This pattern falls out naturally if in both (12a) and (12b), only one head is specified for inflectional features: perfective Asp^0 in (12a) is represented by the contrastive absence of

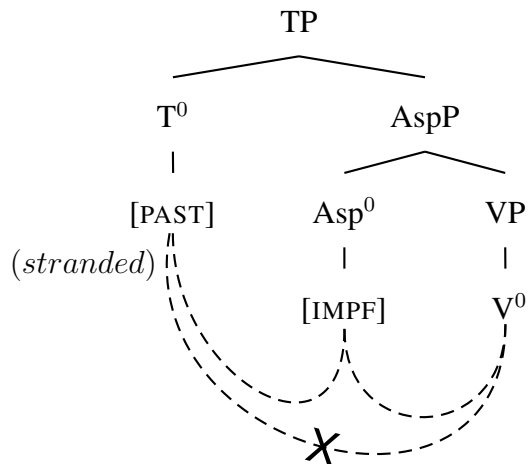
¹⁷The examples discussed here come from Standard Arabic, but the same pattern can be found across different varieties of Arabic.

¹⁸Following the morphological analysis in Noyer (1997), I do not assume that the difference in prefixal vs. suffixal inflection in (12) reflects any structural difference in the position where features occur.

(14) Past Imperfective

kaana ya-drusu

be.PAST.3SGM 3M-IMPF.study



Let us first consider independent evidence for the proposed non-specification of present tense features in Arabic. This proposal is made independently by Benmamoun (1999, 2000), drawing on several sources of evidence independent of inflectional patterns. To begin with, it is suggestive that Arabic does not require a copula BE in the present tense (15a), but does in both the past and future (15b-c).

- (15) a. ?ibnuh ʔaalib-un
son.his student-NOM
'His son is a student.'
- b. kaana ?ibnuh ʔaalib-an
be.PAST.3SG.M son.his student-ACC
'His son was a student.'
- c. sa-ya-kuunu ʔaalib-an
FUT-3M-be student-ACC
'He will be a student.'

(Benmamoun, 2000, p. 43)

If copular BE, like auxiliary BE, occurs in order to realize inflectional features that cannot be realized on V^0 —in the case of the copula, because there is no verb in the clause—

then the absence of a copula in the present tense suggests that there are no inflectional features to be stranded.

Benmamoun also observes that present tense T^0 does not appear to be active in Arabic for syntactic processes such as verb movement. Evidence for this is drawn from the position of the present imperfective verb with respect to negation and clausal subjects.

Negation in Standard Arabic can be expressed either by a particle *laa* (which has a past allomorph *lam* in (16b)), or by an inflected negative *laysa*. The particle *laa* occurs with verbal predicates only: it is compatible with the verb in (16a) and the copula in (16b), but not with the zero-copular present tense (16c):

- (16) a. *laa ya-lʔabu*
 NEG 3M-play
 ‘He does not play.’
- b. *lam ya-kun muʔalliman*
 NEG.PAST 3M-be teacher
 ‘He was not a teacher.’
- c. **laa muʔalliman*
 NEG teacher
 intended: ‘He is not a teacher.’ (Benmamoun, 2000, pp. 53-54)

The negative *laysa*, by contrast, occurs only with non-verbal predicates, or in the present imperfective. It is incompatible with the past tense (Benmamoun, 2000, 105, citing Fassi Fehri 1993).

- (17) a. *laysa ya-lʔabu*
 NEG.3SGM 3M-play
 ‘He does not play.’
- b. *laysa muʔalliman*
 NEG.3SGM teacher
 ‘He is not a teacher.’
- c. **laysa laʔiba*
 NEG.3SGM play.PAST.PFV.3SGM

intended: ‘He did not play.’

(Benmamoun, 2000, p. 53)

Benmamoun proposes that these negative expressions are both associated with a Neg⁰ head below T⁰, but differ in whether the verb head moves to Neg⁰ in the course of the derivation. In support of this, he observes that *laysa* can be separated from the verb by an intervening subject, as in (18a), but that *laa* cannot be. These data are from Benmamoun 2000, ex. (24b) and (12a), citing Moutaouakil (1993, 85).

- (18) a. *laysa xaalid ya-ktubu š-šifr*
NEG.3SGM Khalid 3M-write the-poetry
‘Khalid does not write poetry.’
- b. **lam t-tullaab-u ya-đab-uu*
NEG.PAST the-students-NOM 3M-go-M.PL
intended: ‘the students didn’t go’

This suggests that the present imperfective verb, which is compatible with *laysa*, remains lower than Neg⁰, and is not required to move to T⁰, but that the simple past verb (which is incompatible with *laysa*) always moves to T⁰.²⁰

Similar evidence that the present imperfective verb remains lower than the past perfective verb can be found in its position relative to the clausal subject. Standard Arabic is well known for allowing VSO word order, and this word order is often attributed to verb movement to T⁰ in the presence of a VP/*v*P-internal subject (Carnie and Guilfoyle, 2000, citing Mohammed 1988 and Fassi Fehri 1989).

Interestingly, post-verbal subjects are reported to be required in some cases with past perfective verbs, but dispreferred with present imperfectives. Benmamoun, with examples from Moroccan Arabic, shows that in idiomatic expressions subjects must be post-verbal

²⁰Benmamoun discusses similar facts from Egyptian Arabic, where negation is required to occur as a verbal affix *ma-* in the past tense, but can occur as an independent particle *miš* in the present imperfective.

in the past perfective, but that subjects are strongly preferred to be *pre-verbal* in the present imperfective.²¹

- (19) a. baraka llahu fii-k
 bless.PAST.3SGM God in-you
 ‘May God bless you.’
- b. llah y-barik fii-k
 God 3M-bless.IMPF in-you
 ‘May God bless you.’
- (Benmamoun, 2000, p. 57)

More so than the negation facts discussed above, these facts suggest that the imperfective verb in Arabic is quite low in the clause, below even the base position of the subject. This supports the view that this verb remains below not only Neg^0 , but below Asp^0 as well.

The presence of head movement in the past, and absence of head movement in the present, can be taken as evidence that present tense T^0 does not contain syntactically specified inflectional features, given the assumption that head movement is dependent on a pre-existing featureal relationship between two heads (via Agree), as proposed for phrasal movement in Chomsky (2000).²² If head movement is dependent on an inflectional relationship, then it should be impossible for V^0 to move to any position that does not contain inflectional features of a type that could establish a relationship with V^0 . The proposal that present tense features are not specified in the syntax thus interlocks neatly with independently observed facts regarding clausal word order more generally.

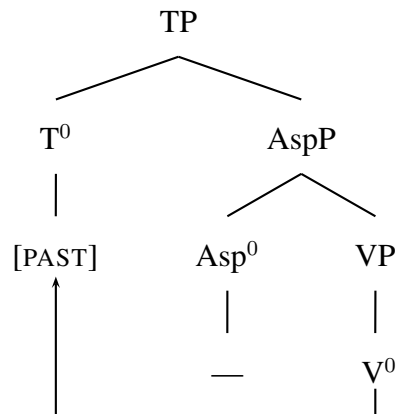
²¹Benmamoun reports that the judgements extend to other varieties of Arabic, and that the same (non-absolute) preference for pre-verbal subjects in the present imperfective extends to colloquial speech in Moroccan Arabic. Sam Alxatib (p.c.) reports that the word order preference holds for the present imperfective in Palestinian Arabic also.

²²I assume that head movement, like phrasal movement, occurs in the narrow syntax. This departs from Chomsky (2000), who proposes that head movement occurs post-syntactically on the branch to PF on the grounds that head movement appears to violate the Extension Condition and lacks semantic effects. Based on much subsequent work that has argued that head movement often does have semantic effects (Lechner, 2006; Matushansky, 2006; Hartman, 2010; Iatridou and Zeijlstra, 2010, among others), I adopt the view that head movement is, or at least can be, syntax-internal. If it is syntax-internal, we would expect that head movement could share with phrasal movement the requirement of being triggered by an operation such as Agree.

In the simple past perfective T^0 is specified for inflectional features (i.e. for [PAST]), and thus can attract the main verb.²³

(20) Simple Past (revised)

darasa
study.PAST.PFV.3SGM



In the (default present) imperfective, by contrast, T^0 has no visible features and therefore cannot attract V^0 .²⁴ What has been established so far is independent evidence that present tense is not represented as an inflectional feature in Arabic, but is instead represented as the contrastive absence of a tense feature on T^0 . The other half of the proposal, that perfective aspect is similarly unspecified, requires independent justification.

Evidence for the contrastive underspecification of perfective comes from morphological neutralization: “perfective” morphology occurs in several environments where there is

²³The head movement represented in (20) violates the Head Movement constraint as proposed by Travis (1984). If we assume that constraints on head movement arise from a form of Relativized Minimality (Rizzi, 1990), however, then heads unspecified for inflectional features should fail to intervene for inflectionally-motivated head movement just as they fail to intervene for Agree; alternatively, movement of V^0 to T^0 in such cases could be forced to proceed via the intervening empty head.

²⁴If inflection is manipulated by Agree, the stranding of T^0 's [PAST] feature in (19) relies on V^0 also not moving to Asp^0 , because a moved verb would be able to Agree locally with T^0 consistency requires that Asp^0 not attract V^0 in the simple imperfective either. Deriving the occurrence of auxiliaries in Arabic thus requires that V^0 is lower in the simple imperfective than it is in the past, the same conclusion arrived at above on the basis of word order.

reason to think no syntactic perfective features should occur. First of all, the past imperfective auxiliary is morphologically inflected as though it were perfective, though it conveys only past tense meaning (Comrie, 1991; Benmamoun, 2000; Halpert and Karawani, 2012, a.o).²⁵

- (21) kaana ya-drusu
 be.PAST.PFV.M3SG 3M-study.IMPF
 ‘He was studying / used to study.’ (Benmamoun, 2000, ex. (26a))

Similar facts have been discussed by a number of authors regarding the appearance of (apparently) past perfective morphology in past-marked counterfactual conditionals in Palestinian Arabic (Karawani and Zeijlstra, 2010; Halpert and Karawani, 2012).²⁶ Counterfactual “past” in conditionals can be marked on an auxiliary that, like the past imperfective auxiliary in (21), is morphologically perfective, even in counterfactuals that are interpreted imperfectively, as in (22).

- (22) [iza kanno b-yitlaʕ bakkeer kul yom,] kaan
 if be.PAST.PFV B-leave.IMPF early every day, be.PAST.PFV
 b-iwsal ʕa l-waʔt la l-muḥadaraat
 B-arrive.IMPF on the-time to the-lectures
 ‘If he were in the habit of leaving early, he would arrive to the lectures on time.’
 (Halpert and Karawani, 2011, ex. (19a))

The fact that morphologically “perfective” forms occur in environments in which there is no obvious source for perfective features is consistent with the view that this morphology is never dependent on the presence of perfective inflectional features, and that “perfective”

²⁵Benmamoun directly discusses Moroccan and Egyptian Arabic in addition to Standard Arabic. The same is noted for Palestinian Arabic by Halpert and Karawani (2012). Note that this is the reverse of the situation in Romance languages, for which I argued above that imperfective is featureally unspecified on the grounds that the pluperfect auxiliaries are morphologically imperfective.

²⁶The use of otherwise-past morphology to mark counterfactuality is widely attested, across many unrelated languages, and has been extensively described and studied. See Anderson (1951); Hale (1969); Isard (1974); Steele (1975); Lyons (1977); James (1982); Palmer (1986); Fleischman (1989); Iatridou (2000); Van Linden and Verstraete (2008, among many others).

morphology in Arabic simply indicates the presence of a [PAST] inflectional feature (in the absence of [IMPF]).

The next section discusses the overflow interaction between aspect and voice in Latin. This system similarly arises from contrastive non-specification of certain inflectional categories, though a more central role is played by head movement between lower heads in the inflectional domain.

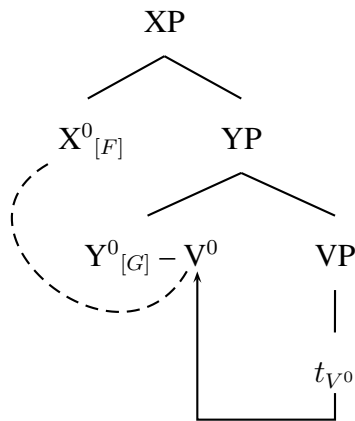
3.2 Latin

Recall from (3), repeated in (23), that the relevant pattern in Latin involves the interaction of three categories: tense, aspect, and voice. In the subset of its inflectional system under discussion, Latin uses an auxiliary only in the combination of the perfect and the passive, as in (23c).

- (23) a. Puellae crustulum **consumpserunt**.
girl-PL.NOM small.pastry-ACC eat-PL.PFV
'The girls ate the little pastry.'
- b. Crustulum **consumitur**.
small.pastry-NOM eat-PRES.PASS
'The little pastry is (being) eaten.'
- c. Crustulum **consumptum est**.
small.pastry-NOM eat-PASS.PTCP **be**.3SG.PRES
'The little pastry was / has been eaten.'

In contrast to Arabic, the main verb in Latin is marked for two specified inflectional categories in all of the cases in (23). Though locality prevents more than one head from establishing a relationship with an *in situ* verb, further inflectional categories on a single verb can result if the verb moves to at least one higher inflectional head, allowing it to establish a local relationship with the next higher head in turn (again, regardless of whether the second relationship is one of movement or valuation).

(24)

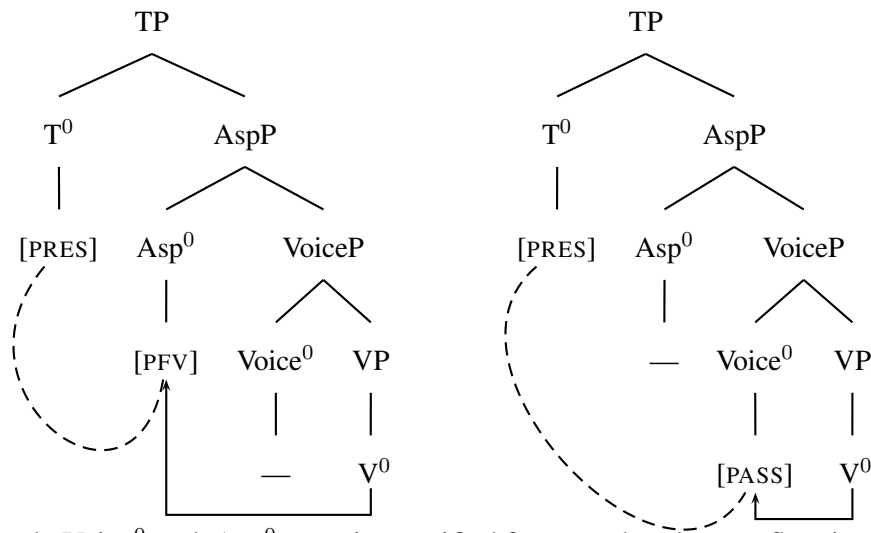


A central claim of this section is that the overflow pattern in Latin arises because of the absence of movement between two specific heads in the inflectional domain, Voice⁰ and Asp⁰, but that this absence has consequences only when both heads are inflectionally active. This is in line with independently proposed differences between languages in terms of head movement on a larger scale. We know that languages differ from one another in the surface positions of their verbs, and attribute this to differences between languages in terms of where they allow or require head movement. For example, English lacks generalized verb movement to T⁰, but has V⁰-to-C⁰ movement (in questions and other environments). French, by contrast, exhibits both V⁰-to-T⁰ and (more limited) V⁰-to-C⁰ movement, while the mainland Scandinavian languages have obligatory verb movement to C⁰ in main clauses (presumed to proceed via V⁰-to-T⁰), but clearly lack independent V⁰-to-T⁰ movement in non-V2 clauses, where the verb remains to the right of negation and low adverbs. We therefore cannot describe a language on the whole as either having or lacking verb movement. Instead head movement is specific to the relationship between two heads—or more specifically, assuming that movement is predicated on feature relationships, the presence or absence of head movement is specific to relationships involving a particular feature. The presence or absence of head movement between specific positions will directly influence the distribution of auxiliary verbs, and in the same way, the pres-

ence of head movement throughout the inflectional domain would prevent any inflectional features from being stranded, resulting in a highly agglutinative language.

In terms of feature specification, the distribution of auxiliaries in (23) suggests that active voice and imperfective aspect are featureally unspecified, but that both present and past tense are potential specified feature values for T^0 . The consequence of this system of features is that in both the perfect (24a) and the passive (24b), the base position of V^0 should be able to establish a relationship with either Asp^0 or $Voice^0$, but at least one step of head movement is necessary for the verb to establish a relationship with T^0 .

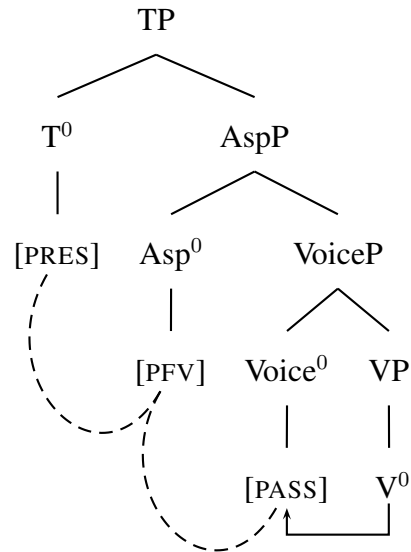
- (25) a. **consumpserunt** (Perfect) eat-PL.PFV b. **consumitur** (Passive) eat-PRES.PASS



It is when both $Voice^0$ and Asp^0 contain specified features that the overflow interaction arises. We can account for the presence of an auxiliary in this case if there is no movement from $Voice^0$ to Asp^0 ; if there were movement between these two heads, we would expect the relationship in (25a) between T^0 and Asp^0 to be available in the perfect passive as well. If the verb remains in $Voice^0$, however, it will be inaccessible to T^0 , and tense inflection

will be morphologically realized by an auxiliary form of BE: *est*.²⁷

- (26) **consumptum est** (Perfect Passive)
 eat-PASS.PTCP **be**.3SG.PRES



Initial converging evidence for the proposal that both present and past tense are specified in Latin is the fact that Latin has both present and past tense copular forms of BE, in contrast to a language such as Arabic where there is no verbal copula in the present tense. Along the same lines, finite verbs in Latin occur in the same high structural position in both the present and the past, which Embick (2000) argues is the result of verb movement to T^0 . This contrasts with the Arabic facts discussed in the previous section, where there are asymmetries in word order between tenses. If head movement is dependent on both heads being specified for inflectional features, such word-order facts provide evidence that both present and past tense are possible specified features of T^0 in Latin.

²⁷As Embick (2000) argues, it is significant that the Latin overflow pattern holds not only of regular passives, but also of deponents—verbs that are syntactically transitive but morphologically resemble passives. This argues against the possibility that BE’s occurrence is related to syntactic properties of a passive Voice^0 head (i.e. that this head selects an auxiliary directly). Adapting Embick’s proposal that deponent roots bear a syntactically visible (but uninterpreted) [PASSIVE] feature, we can state more generally that Asp^0 never attracts a verb with a passive inflectional feature, regardless of whether this feature originates on V^0 or on Voice^0 .

Turning to the claim that the contrast between imperfective and perfective aspect in Latin is represented by the presence or absence of [PFV] (with no corresponding [IMPF] feature), evidence for this comes again from contexts of morphological neutralization. Once again the relevant facts involve the form of the past-tense aspectual auxiliary. In Latin, as in the modern Romance languages, this verb shows imperfective morphology, though it occurs in a clause that as a whole is perfective. The perfective auxiliary is not generally possible in the same environment:²⁸

- (27) Crustulum **consumptum erat/*fuit.**
 small.pastry-NOM eat-PASS.PTCP **be.3SG.PAST.IMPF/*be.3SG.PAST.PFV**
 ‘The little pastry had been eaten.’ (cf. (23c))

Because the clause in (27) represents an environment in which only perfective features would be specified, it provides evidence that the morphological imperfective in Latin does not necessarily reflect the presence of imperfective inflectional features.

The analysis of the Latin overflow pattern developed in this section shares many features with Embick (2000)’s analysis of the Latin perfect passive. Embick argues specifically for Latin, as I have argued more generally for the overflow pattern, that the appearance of an auxiliary in the perfect passive could not be the result of basic structural differences between the perfect active and the perfect passive. His arguments for this focus on the fact that the Latin overflow auxiliary also occurs with deponents, verbs that occur with passive morphology even in contexts that are syntactically and semantically active. An example is given in (28) using the deponent verb *hortor* ‘to exhort’ (forms drawn from Embick, 2000, 191):

²⁸Perfective auxiliaries of this type are attested in some cases in Classical Latin. An anonymous reviewer observes that some may be best analyzed as adjectival passives; others may resemble the use of perfective auxiliaries in modern Romance languages in certain types of adjunct clauses. Describing this use of the perfective auxiliary is beyond the scope of this paper, but the proposal here predicts that it would occur only when the syntax provides an additional source for perfective features.

- (28) a. hort-or
 exhort-‘PASS’
 ‘I exhort.’
- b. hort-ātus sum
 exhort-PASS.PTCP **be**.1SG.PRES
 ‘I (have) exhorted.’
- c. *hort-āvī
 exhort-SG.PFV

Because deponents are not associated with the syntax of a passive Voice^0 projection in the syntax, the occurrence of an auxiliary cannot be attributed to properties of that head. Embick proposes that deponents are verbs whose roots are merged with an arbitrary morphological [PASSIVE] feature, a feature that is syntactically visible despite not contributing passive interpretation. Embick proposes that this feature, like a [PASSIVE] feature introduced on Voice^0 , prevents T^0 from attracting perfective Asp^0 .²⁹ It is the failure of the verb to move all the way to T^0 that, for Embick, results in T^0 's inflection being stranded, triggering the occurrence of an auxiliary BE.

This is a highly indirect constraint on movement: the passive inflectional feature blocks movement between two heads unrelated to the passive (Asp^0 and T^0), only in the presence of another inflectional feature, [PERFECTIVE]. This is necessary only because Embick assumes that all inflection combines with the verb via head movement, so that the perfect passive auxiliary must have moved to Asp^0 in order to exhibit aspectual morphology. If inflection can combine with verbs via Agree, rather than only through movement, we can say instead that Asp^0 never attracts a head that contains a [PASSIVE] feature: the relationship between T^0 and V^0 is possible in the imperfective passive because Asp^0 does not contain any inflectional features, and so transparent for inflectional relationships.

3.3 The Morphological Realization of Stranded Features as Auxiliaries

The focus of the previous sections has been on the syntax of inflection, specifically evidence for the idea that one pole of an inflectional contrast in a language can be contrastively unspecified. This section turns to the morphological realization of inflection via auxiliaries, proposing that auxiliary BE satisfies a morphological requirement on the realization of inflectional features: though a structure is syntactically well-formed even if inflectional features occur independently on a main verb, those stranded features cannot be pronounced unless they are provided with some verbal stem.

The idea that inflection that is in some sense stranded can trigger the insertion of a default verb in the morphological component is widely accepted, but generally for DO-support rather than for auxiliary verbs more generally. Halle and Marantz (1993), for example, propose that *do* occurs to satisfy a morphological well-formedness condition of the English Tns (T^0) node. If no verb is adjoined to Tns, a V^0 node with “no features other than its category identification” (137) is inserted, and this node is realized by the “least marked” verb *do*. Bobaljik (1995) similarly proposes that *do* is inserted in T^0 whenever T^0 is not adjacent to V^0 , and Embick and Noyer (2001) further develop an analysis of *do*-support along these lines, though framed in terms of structural rather than linear adjacency.

Halle and Marantz’s analysis of DO-insertion, though developed to account for a different range of facts, can be straightforwardly modified to account for auxiliary BE: the only change necessary is to identify BE rather than DO as the least marked verb, the verb with no properties other than the fact that it is a verb, and to define the contexts in which the empty V^0 node is inserted.

The auxiliary patterns described in this paper require that V^0 be added in the morphology to any head that contains morphologically interpretable inflectional features, but to which no verb has moved in the syntax. The morphological requirement that inflectional

features be realized on V^0 is what motivates the insertion of BE. Formulating this requirement requires that we be able to refer to the set of verbal inflectional features: I assume that there is a general feature [INFL:*val*], which can be valued as [INFL: PAST], [INFL: PRES], [INFL: IMPF], [INFL: PASS], etc.³⁰ In place of Halle and Marantz's well-formedness condition on Tns, we can now state as well-formedness condition on INFL features that they must be sister to a V^0 node. A V^0 node without any lexical material will be realized as BE.

If this morphological condition were not active in a language, stranded inflectional features would pose neither a syntactic nor a morphological problem, and no empty V^0 would be inserted. Such would be the case for the systems of inflectional particles found in some languages, for example the languages of the Kwa family (Aboh, 2009).

The occurrence of auxiliaries other than BE can be attributed, on this approach, to the presence of additional structure or features, properties that can be referenced by the vocabulary insertion rules that realize the empty V^0 node. Thus, Kayne (1993)'s proposal that HAVE results from the incorporation of a prepositional/nominal head to auxiliary BE, an account that has been successfully pursued in much subsequent work in the literature on auxiliary selection (Hoekstra, 1994; Mahajan, 1994; Den Dikken, 1994; Torrego, 2002; D'Alessandro and Roberts, 2010; Coon and Preminger, 2011, a.o.), can be viewed as incorporation not to BE itself, but to a head that otherwise would have been realized as BE. Motion verb auxiliaries, auxiliary BECOME, and so on, can similarly all be viewed as cases where some additional feature on an inflectional head triggers realization as a verb other than BE. None of these auxiliaries, on this view, directly realize a verbal root, but their contexts of insertion are nonetheless more highly specified than that of BE itself.

What is left unaccounted for here is "auxiliary" DO: if BE occurs to realize stranded

³⁰This implementation of verbal inflectional features is proposed by Adger (2003) as part of an Agree-based account of inflection: for such accounts it is necessary that a single feature on V^0 be able to be valued by any higher inflectional head.

inflection, we are apparently left without an explanation for the occurrence of DO.

In fact, though, analogues of auxiliary DO outside of English show that it cannot generally be described as a “last resort” means of realizing stranded inflection. Källgren and Prince (1989) and Platzack (2008) discuss data involving *gora*, the Swedish counterpart of DO, which occurs in VP topicalization as in (29) as well as in VP pronominalization. In Swedish, however, both DO and the fronted verb show finite inflection: DO cannot be explained in terms of anything like a stray affix filter.

- (29) och körde / *köra bilen gjorde han.
and drive.PAST / *drive car.DEF do.PAST he
“... and drive the car he did.” (Platzack, 2008, p. 1)

Benincà and Poletto (2004) discuss a quite different pattern of auxiliary DO in the Italian dialect Monnese which nonetheless makes a similar point. Monnese *fa* (=DO) occurs in clauses with V⁰-to-C⁰ inversion, in the absence of a finite auxiliary or modal.

- (30) a. fa-l majà?
does-he eat?
“Does he eat?”
b. ke fa-l majà?
what does-he eat?
“What does he eat?”
c. à-l majà?
has-he eaten?
“Has he eaten?” (Benincà and Poletto, 2004, p. 52)

What is striking about this pattern of DO insertion is that it occurs despite the fact that Monnese appears to otherwise exhibit V⁰-to-T⁰ movement (Benincà and Poletto, 2004), so the motivation for DO in (30) cannot be the failure to unite V⁰ and T⁰.

There is not space in this paper to fully develop an alternative analysis of DO insertion phenomena, but these facts suggest that the contexts in which “auxiliary” DO occurs are

not best described in terms of a failure to unite V^0 with the inflectional content of T^0 . Analyzing BE in these terms thus does not worsen our position with respect to the analysis of DO-support, despite the standard view adopted in work on English.

3.4 Summary

This section has developed an analysis of the syntactic underpinnings of auxiliary verb constructions, in which auxiliary BE is the morphological realization of inflectional features the syntax fails to unite with a main verb. I have argued that the contexts where we see auxiliary BE can be described uniformly as contexts where there is more than one functional head above the verb that is specified for inflectional features—but, crucially, that languages differ in their feature inventories, even when expressing semantically parallel categories (i.e. tense, viewpoint aspect, voice). It is variation in how inflectional contrasts are encoded that accounts for substantial differences in auxiliary systems. This variation is independently detectable in the syntactic activity of a head, and in the morphological neutralization of inflectional contrasts.

This section has remained largely agnostic about the syntactic mechanisms that unite inflectional features with verbs. This basic view of auxiliaries can be maintained whether inflection is uniformly manipulated via movement, or whether inflectional heads simply value features of the main verb, though section ?? below argues in favour of an Agree-based approach to inflectional syntax more generally.

A final question worth discussing here, however, is whether we find analogues of auxiliary constructions outside the verbal domain—whether there is a nominal counterpart of auxiliary BE. To the extent that much work since Abney (1987) has worked to uncover structural parallels between clauses and DPs, we would certainly expect to find such cases, contexts where categories such as case or definiteness or number are expressed on a “de-

fault” noun when they are unable to be realized on the head noun itself. We might further expect to find analogues of the overflow pattern, contexts where these categories are realized separately from the noun only when they co-occur.

Several phenomena have been suggested as possible nominal counterparts of DO-support— if the analysis proposed here is correct, these would be better understood as nominal counterparts of auxiliary BE. Determiners are perhaps most frequently identified in this context, particularly in the context of determiner alternations in Scandinavian languages.³¹ In Danish, for example, definiteness must be marked by a suffix with simple nouns, but by an independent determiner in the presence of an adjective (examples drawn from Hankamer and Mikkelsen, 2005).

- (31) a. hest-en
horse-DEF
b. *den hest
the horse

- (32) a. *gamle hest-en
old horse-DEF
b. den gamle hest
the old horse

Space does not permit a review of possible analyses of this phenomenon (see Roehrs, 2009 for a recent overview), but one possible analysis of these facts is that the presence of an adjective blocks an otherwise-available relationship between D^0 and N^0 , forcing independent realization of a determiner in order to realize definiteness (Santelmann, 1993; Embick and Noyer, 2001; Embick and Marantz, 2008, a.o.), though Hankamer and Mikkelsen

³¹Thank you to David Pesetsky (p.c.) and an anonymous reviewer for suggesting the relevance of the Scandinavian facts.

(2005) argue against a movement-based analysis of these data. Within a broader treatment of Scandinavian nominal syntax, Julien (2005) develops an analysis of both the Danish pattern and the phenomenon of “double definiteness” marking in Swedish and Norwegian, framed in terms of phrasal movement to Spec-DP rather than head movement of N^0 to D^0 , and thus less parallel to the verbal pattern of overflow auxiliaries examined in this paper.

Whether the correct analysis of Scandinavian determiners is as a kind of nominal auxiliary, this illustrates what we might expect the profile of nominal auxiliaries to look like. Closer examination of these types of interactions, beyond what is possible here, would be necessary to establish clear counterparts of the overflow pattern.

4 Contrastive non-specification and feature markedness

The final point to be discussed in this paper is the relationship between contrastive non-specification of inflectional features and traditional ideas concerning feature markedness.

Though these ideas are related there are also points of significant divergence. First and foremost, the absence of certain feature values in the syntactic component is entirely independent of both zero exponence in morphology and default or general interpretations in semantics, two traditional correlates of unmarked categories. Especially in earlier work, traditional perspectives on markedness have often assumed a correlation between morphological and abstract semantic markedness (Jakobson, 1939, Greenberg, 1966, Olsen, 1997, among others; though cf. Comrie, 1976, 114, Dahl, 1985, 19). As Harbour (2011a) observes, the existence of non-default $-\emptyset$ affixes goes against such a correlation, as do phonologically overt least-specified “elsewhere” forms. A particularly good example of the latter are instances of inflectional morphology that appear to occur for reasons of morphological (or morphophonological) well-formedness, precisely in the absence of any features that would mandate more specific inflection. Examples of this kind of overt default morphemes

the appearance in many languages of masculine singular agreement morphology on verbs that fail to agree with a nominal argument (Preminger, 2009, et seq.); or the default “final vowel” morpheme in the verbal morphology of many Bantu languages, which occurs across a non-homogeneous set of environments in which more specific morphemes are not required (Nurse, 2003, 2008).

Discourse around the “marked” status of certain categories also often assumes typologically fixed markedness relations: for example, that the dual is a cross-linguistically marked category, or that imperfective is marked relative to the perfective. If this type of typological markedness were reflected in the feature systems of individual languages, this would run directly counter to the proposal here that languages can choose one or the other member of an opposition to specify in the syntax. Here also, however, the evidence is unclear. Much of the focus in this paper has been on the interaction of viewpoint aspect (perfective vs. imperfective) with other inflectional categories, and I have claimed that some languages represent this contrast as [PFV] vs. \emptyset , while others as [IMPF] vs. \emptyset .³² Indeed, in the markedness literature it has been suggested that languages vary in whether they treat the imperfective or the perfective as the marked member of this opposition (Comrie, 1976, 114, Dahl, 1985, 19).

Strikingly, however, with respect to other inflectional contrasts there appears to be much less freedom in which pole is potentially left contrastively unspecified. In the domain of tense, for example, languages appear to make use of a contrast between a [PAST] feature and a featurally unspecified present (Arabic, Kinande), or to syntactically specify both [PAST] and [PRES]/[NON-PAST] (English, Latin, French), but there appear to be no languages that use a feature [PRES] while leaving past tense contrastively unspecified. Such a language might exhibit a verbal copula only in the present tense, for example—but no such system

³²The third possibility, where both poles are marked, may be exhibited by languages like Basque, which require a finite auxiliary in both perfective and imperfective contexts. Coon (2013) suggests that imperfective is always more marked than the imperfective, by which she means that it involves an additional layer of clause structure, but this proposal is not borne out by languages like French and Latin, discussed here.

appears to exist. In the domain of voice, similarly, passive appears to never be never the featurally unspecified member of a contrast between active and passive. If these generalizations are indeed robust, theories of typological markedness may provide some insight into constraints on the contrastive non-specification of particular inflectional values.

If individual languages select different inventories of inflectional contrasts, and represent those contrasts with different feature systems, we also face the question of where these features come from. A recent proposal by Cowper and Hall (2013b) suggests that formal syntactic features arise due to a generalized mechanism of contrast identification, of the type suggested to underly phonological feature systems by Dresher (2009). If this is correct, the question is what leads a learner to encode a two way contrast in (for example) viewpoint aspect in any one of the three logically possible feature systems. If the proposals of this paper are correct, one source of evidence for learners is the distribution of auxiliary verbs in the target language. This approach to inflectional systems suggests a way forward for systematically investigating variation in inflectional systems in a principled way.

5 Conclusion

This paper has argued that auxiliary verbs must be analyzed as a morphological response to failures of the inflectional system: cases in which inflectional information fails to unite with the main verb of a clause. The empirical motivation for this move has come primarily from what I have called the overflow pattern of auxiliary use. Though it has not been widely discussed in syntactic work on auxiliary verbs, I have argued that the overflow pattern imposes important limits on possible analyses.

In addition to the proposal that auxiliary verbs are morphologically repairs, and not syntactically projected or represented, the idea that some inflectional values are syntactically represented by the contrastive absence of inflectional features played a key role in

the analysis. This move harmonizes syntactic and semantic representations of clause structure, but also correlates the auxiliary pattern found in a language with other syntactic and morphological properties of its inflectional system.

The overall picture of inflectional syntax put forward in this paper is made up of components that are independently non-controversial: inflection is associated with functional heads above the verb; in some contexts it is unable to combine with the verb; and in those contexts an auxiliary occurs to allow morphology to be morphologically realized. What I have endeavoured to demonstrate is that these properties of inflection, investigated closely, have far reaching results for the representation of inflectional contrasts, and for accounts of cross-linguistic variation in inflectional systems.

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