The Dependency Status of Function Words: Auxiliaries

Thomas Groß
Aichi University
`tm.gross@yahoo.de`

Timothy Osborne
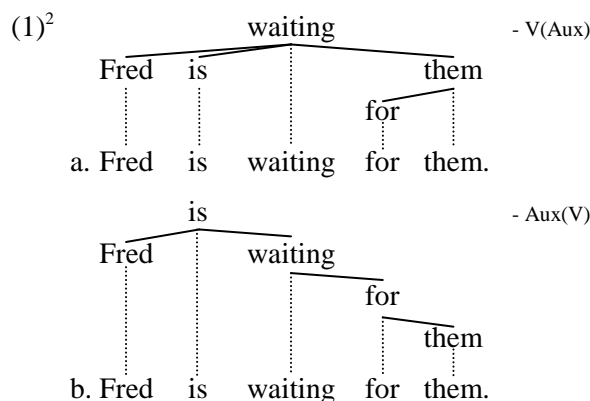Zhejiang University
`tjo3ya@yahoo.com`

Abstract

The Universal Stanford Dependencies (USD) subordinates function words to content words. Auxiliaries, adpositions and subordinators are positioned as dependents of full verbs and nouns, respectively. Such an approach to the syntax of natural languages is contrary to most work in theoretical syntax in the past 35 years, regardless of whether this work is constituency- or dependency-based. A substantial amount of evidence delivers a strong argument for the more conventional approach, which subordinates full verbs to auxiliaries and nouns to adpositions. This contribution demonstrates that the traditional approach to the dependency status of auxiliary verbs is motivated by many empirical considerations, and hence USD cannot be viewed as modeling the syntax of natural languages in a plausible way.

1 The dependency status of function words

The Universal Stanford Dependencies (USD), as presented in de Marneffe et al. (2014), advocates a scheme for parsing natural languages that categorically subordinates function words to content words. Auxiliary verbs, adpositions (prepositions and postpositions), subordinators (subordinate conjunctions), etc. are subordinated to the content words with which they co-occur. A more traditional dependency-based analysis assumes the opposite, i.e. most function words dominate the content words with which they co-occur.[1] The following diagrams illustrate both approaches:

(1)[2]

The USD analysis (1a) subordinates the auxiliary *is* to the full verb *waiting* and the preposition *for* to the pronoun *them*, whereas the traditional analysis (1b) does the opposite.

While the USD approach is still novel, it is based on the Stanford Dependencies (SD) by de Marneffe et al. (2006) and de Marneffe and Manning (2008). SD is available for English, Chinese, Finnish, and Persian.

The assumption that function words should be categorically subordinated to content words stands in stark contrast to work in theoretical syntax in the last 35 years, which has been pursuing an approach to syntactic structures that is more congruent with the analysis shown in (1b). Most phrase structure grammars – e.g. HPSG (Pollard and Sag 1994), Lexical Functional Grammar (Bresnan 2001), Categorial Grammar (Steedman 2014), Government and Binding (Chomsky 1981, 1986), Minimalist Program (Chomsky 1995) – and most dependency grammars (DGs) – Lexicase (Starosta 1988), Word Grammar (Hudson 1984, 1990, 2007), Meaning Text Theory (Mel'čuk 1988, 2003, 2009), the German schools (Kunze 1975, Engel 1994, Heringer 1996, Eroms 2000) – assume that function words are heads over content words as shown in (1b).

There are, however, also exceptions. Hays

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[1] Determiners are one area of disagreement among linguists.

[2] Whenever two tree representations are contrasted, their respective preference on dependency direction is indicated at the top.

(1964: 521) assumes that non-copula auxiliaries, such as *are* in *They are flying planes*, are dependents of full verbs. Matthews (1981: 63), too, argues for subordinate auxiliaries. On the other hand, DG sources that directly motivate the status of the finite verb as the root of the clause are plentiful: Starosta (1988: 239ff.), Engel (1994: 107ff.), Jung (1995: 62f.), Eroms (2000: 129ff.), Mel'čuk (2009: 44f., 79f.).

The next section addresses the difficulty of delineating function words from content words. It looks at semi-auxiliaries, light verbs, and functional verb constructions. Section 3 produces evidence that support the view that auxiliaries are heads over their full verbs. Section 4 briefly outlines the importance of functional hierarchies, and argues for a token-based morphological account.
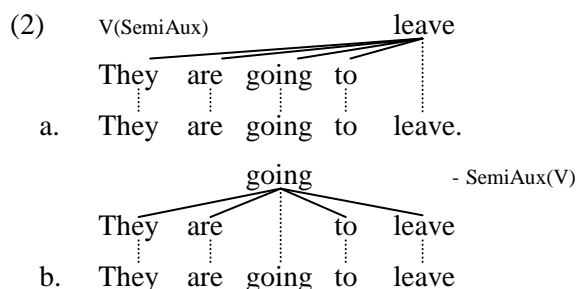
2 Degrees of content

The parsing scheme that USD advocates takes the division between function word and content word as its guiding principle. One major difficulty with doing this is that the dividing line between function word and content word is often not clear. The next three subsections briefly examine three problem areas for USD in this regard: semi-auxiliaries, light verb constructions, and functional verb constructions.
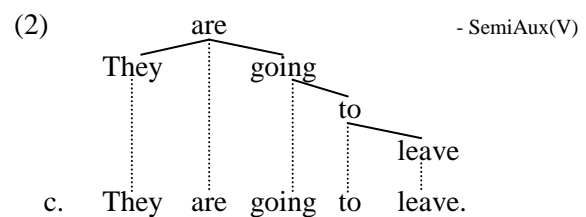
2.1 Semi-auxiliaries

Many constructions in natural language distribute functional meaning over varied syntactic units. Semi-auxiliaries in English – e.g *be going to*, *be able to*, *be about to*, *ought to*, *used to*, etc. – are a case in point. The meaning contribution of these expressions is functional, yet their distribution and subcategorization traits are more like that of full content verbs. USD therefore faces the dilemma of having to value the one aspect of these expressions more than the other when deciding upon an analysis.

The point is illustrated with an example of *be going to*:

(2)   V(SemiAux)   leave
          They   are   going   to

       a.   They   are   going   to   leave.

                        going   - SemiAux(V)
          They   are   to   leave

       b.   They   are   going   to   leave

If USD wants to be consistent, it should choose the (a)-analysis because that analysis is most in line with the distinction between function word and content word. The (b)-analysis foregoes this consistency by taking *going* as the root. It is motivated by a syntactic consideration (distribution). Either way, USD is challenged; no matter which of the two analyses it chooses, it has to ignore an important fact that speaks for the other analysis.

The traditional approach favors the following analysis:

(2)   are   - SemiAux(V)
          They   going
                              to
                                   leave

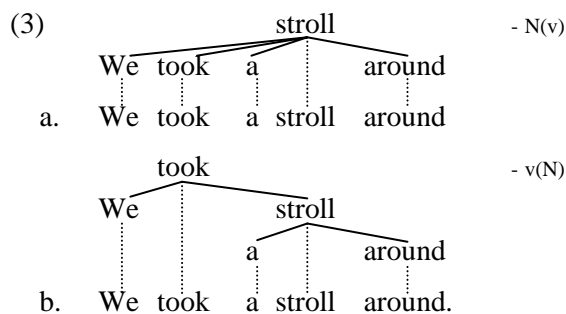   c.   They   are   going   to   leave.

The hierarchy of verb forms here is motivated by various syntactic criteria, such as the ability to topicalize (e.g. *...and going to leave they are*;*...and leave they are going to*) and the ability to elide (e.g *...and they are*; *....and they are going to*).

2.2 Light verb constructions

The challenge of distinguishing function word and content word is perhaps most visible with light verb constructions. Typical light verbs in English are *do*, *give*, *have*, *make*, *take*, etc.; in German: *geben*, *haben*, *machen*, *sein*, etc.; in Japanese: *s-uru* 'do', *tor-u* 'take', *yar-u* 'do/give', etc. The defining trait of a light verb is that it co-occurs with a content noun, whereby it is the noun that is semantically loaded. Examples from English of light verb constructions are *to take a shower* (vs. *to shower*), *give a hug* (vs. *to hug*), *have a smoke* (vs. *to smoke*), etc. Many light verb constructions have a simple verb that they correspond to, as with the examples just given; other light verb constructions do not correspond to a simple verb, e.g *make a mistake*, *have fun*, etc.
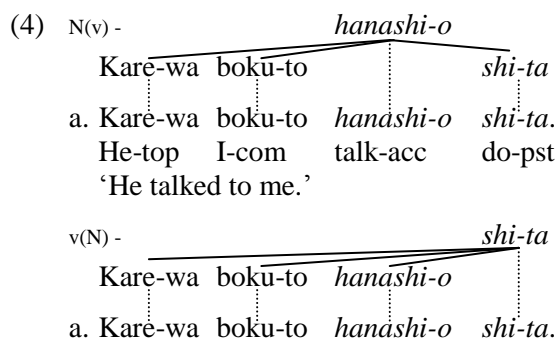
Light verbs straddle the function vs. content division. They are more like function words from a semantic point of view since they lack semantic substance, but they are more like content verbs from a syntactic point of view since their distribution is that of a full content verb.

Consider the following analyses of sentences containing the meaning 'stroll':

(3)
```
                      stroll              - N(v)
        We  took    a        around
```
a.   We took a stroll around

```
            took                          - v(N)
     We            stroll
                 a       around
```
b.   We took a stroll around.

If USD chooses the analysis in (3a), then it has to ignore the fact that *took* distributes like a normal content verb, but if USD chooses the analysis in (3b), then it has to ignore the fact that *took* is largely devoid of semantic content and should therefore be treated like an auxiliary, auxiliary verbs of course lacking semantic content.

The problem just illustrated with English examples is now solidified with an example from Japanese, using the light verb construction *hanashi-o shi-ta* 'talked'.

(4)   N(v) -   *hanashi-o*
```
       Kare-wa  boku-to              shi-ta
```
a. Kare-wa boku-to *hanashi-o* *shi-ta*.
He-top I-com talk-acc do-pst
'He talked to me.'

v(N) -   *shi-ta*
```
       Kare-wa  boku-to  hanashi-o
```
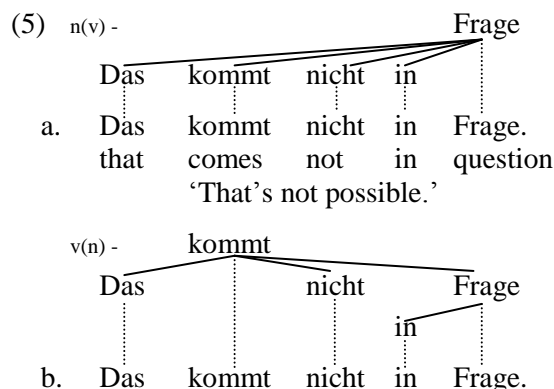a. Kare-wa boku-to *hanashi-o* *shi-ta*.

USD should choose the (4a)-analysis, since it positions the noun *hanashi-o* as the root. In so doing, it would be consistently subordinating function words to content words. The (4a)-analysis is implausible, though, mainly because Japanese is widely judged to be a strict head-final language. The traditional analysis shown in (4b) accommodates the head-final nature of Japanese syntax. Therefore the example illustrates that the traditional analysis is more in line with broad typological generalizations that have been used to characterize the syntax of the world's languages.

2.3   Functional verb constructions

German is known for its many *functional verb constructions* (*Funktionsverbgefüge*). These constructions involve a verb combined with a prepositional phrase, whereby varying degrees of semantic compositionality are involved, e.g. *in Kraft treten* 'come into force', *in Frage kommen* 'be possible', *in Kauf nehmen* 'accept', etc. Functional verb constructions differ from light verb constructions insofar as the verb in the latter is bleached but the noun is loaded with full semantic content; in the former, in contrast, the entire expression is bleached. There is no strength present in *in Kraft treten*, no question in *in Frage kommen*, and no buying in *in Kauf nehmen*.

Given the inability to identify the one or the other part of these constructions as the semantic center, the analysis that USD chooses becomes arbitrary. Consider the following possibilities:

(5)   n(v) -   Frage
```
        Das     kommt   nicht   in
```
a.   Das   kommt   nicht   in   Frage.
that   comes   not   in   question
'That's not possible.'

v(n) -   kommt
```
        Das              nicht       Frage
                                   in
```
b.   Das   kommt   nicht   in   Frage.

Since it is implausible to view either *kommt* or *Frage* as being semantically more loaded than the other, USD cannot provide a convincing reason why the one or the other of these two analyses should be preferred. If it chooses the (b)-analysis because *kommt* is a verb, then it is reaching to a syntactic criterion, and has thus departed from its guiding principle, this principle being that the distinction between function word and content word is decisive.

Functional verb constructions reside closer to idiomatic expressions than to light verb constructions, but both construction types are located on an *idiomaticity* cline. USD, as well as its precursors, can hardly acknowledge this idiomaticity cline; its guiding principle sees it shoehorning all complex expressions with somewhat non-compositional meaning into the multi-word-expression box. The problem with doing this is that it tends to view all structures with non-compositional meaning as fundamentally different from compositional ones. Consider in this area that, disregarding how one labels the dependency branches between nodes, the dependency structures of an idiom like *He kicked the bucket* and the similar, but non-idiomatic sentence *He kicked the car* should be isomorph. The need for such syntactic isomorphism is problem for USD, though, because it would have to depart from its guiding principle to accommodate the isomorphism.

3 Auxiliaries

The following subsections provide evidence from subcategorization, the subject-verb relation, valency change, VP-ellipsis, string coordination, and sentential negation that challenge USD's analysis of auxiliaries.

3.1 Subject-verb relation

In many languages, the finite verb enjoys a special relationship with the subject. One expression of this is agreement. The salient property is the correlation of nominative case with tense/mood markers. Tense/mood is marked only on finite verbs. Consider the following examples from German:

(6)
                     gesagt   - V(Aux)
     Du hast   das

  a. Du hast   das gesagt.
      you have.2sg   that said
      'You have said that.'

          hast   - Aux(V)
     Du   gesagt
           das

  b. Du hast das gesagt.

The USD structure in (6a) does not accommodate the correlational property of tense/mood – nominative, whereas the conventional DG analysis (6b) does. The analysis in (6b) expresses this relationship by subordinating the subject directly to the finite verb. One finds the same issue in Hebrew, where agreement is present in every verb:

(7)
               ba-bait   - P(Aux)
     Hi haiita

  a. Hi haiita   ba-bait.
      she was.3sgf   at.the-house
      'She was at home.'

         haiita   - Aux(P)
     Hi   ba-bait

  b. Hi haiita ba-bait.

Example (7a) sees the pronoun *Hi* depending on *ba-bait*, even though tense and person/number is marked on the verb. The conventional DG structure (7b) assumes again that subject and finite verb enter a special relationship.

One of the most salient reasons for assuming such a special relationship is that verbs not marked for tense/mood cannot govern the nominative. This insight is the main motivation for the assumption of IP/TP (inflection phrase/tense phrase) in Chomskian grammars. Attempts at subordinating auxiliaries fail to provide an account of the cross-linguistically salient subject-verb relationship. In particular, it fails to account for nominative case assignment to the subject.

3.2 Sentential negation

Whenever negation and auxiliation coincide, the canonical situation is that the (topmost) auxiliary is negated, rather than the lexical verb. If the lexical verb were truly the root node, then the expectation would be that the lexical verb is where negation takes place. A look across English, Hebrew, Japanese, and French shows that this expectation is not met. In English, contractions of the auxiliary and the negation are common at the top of the verb chain, but not in between:

(8) a. He won't have gone by then.
      b. *He will haven't gone by then.

The full negation is marginally possible: *He will have not gone*.

In Hebrew, *lo* precedes the expression it negates, and in the case of an auxiliary, *lo* precedes it:

(9) a. ata   **lo**   jaxol li-sxot?
        you.msg **neg** pot   inf-swim
        'You can't swim?'

      b. *ata   jaxol **lo**   li-sxot?

In Japanese, negation is usually present as a suffix. Canonical negation requires that the top-most word in the verb chain to be marked with it:

(10) a. oyog-u   koto-wa deki-**na**-i-no?
        swim-npst that-top pot-**neg**-npst-int
        'You can't swim?'

      b.*oyog-**ana**-i   koto-wa deki-ru-no?
        swim-**neg**-npst that-top pot-npst-int

Negation in French requires two items. This two-part negation straddles the finite verb, the root of the clause, as is shown in (11):

(11)
                ont   - Aux(V)
      linguistes n-   pas lu
  Les   littérature
                            la

  Les linguistes   n'ont pas lu   la   littérature.
  the linguists   n-have not read the   literature
   'The linguists haven't read the literature.'

This analysis speaks to intuition, since it has the negation straddling the only hierarchically singular word, i.e. the root of the clause.
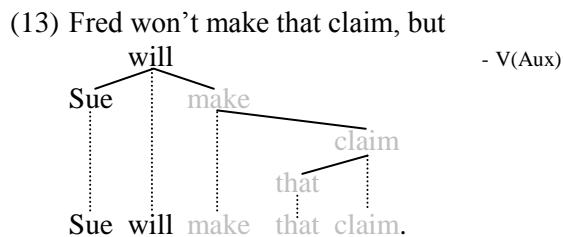
The USD analysis produces a much less intuitive analysis:

(12)

| | | | lu | | - (V)Aux |
linguistes		ont		littérature	
Les		n-	pas	la	
Les	linguistes	n'ont	pas lu	la	littérature.
the	linguists	n-have	not read	the	literature
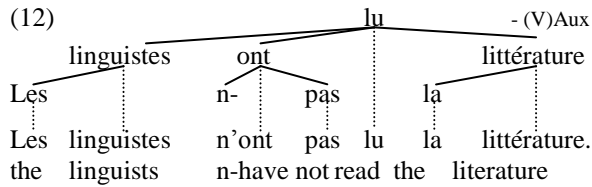
The negation *ne...pas* is now no longer straddling the root word of the clause, a situation that would seem to complicate the account of the distribution of the negation. Note that *ne...pas* can also attach to a nonfinite verb, but when it does so, it no longer straddles the verb, e.g. *ne pas lire* 'not read'.

3.3 VP-ellipsis

The traditional approach easily accommodates core aspects of the distribution of VP-ellipsis in English. The finite auxiliary verb is the root of the clause, which means the elided VP of VP-ellipsis is (usually) a complete subtree, i.e. a constituent, e.g.

(13) Fred won't make that claim, but

will   - V(Aux)
Sue   make
                claim
        that
Sue will make that claim.

The elided string *make that claim* is a complete subtree. Given the treatment of function words that the USD analysis pursues, one would expect to find the following structural analysis of VP-ellipsis:

(14) Fred won't make that claim, but

make   - Aux(V)
Sue will   claim
        that
Sue will make that claim.
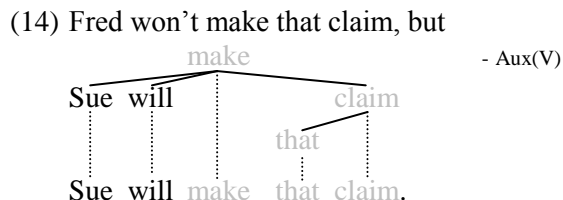
The elided string *make that claim* is now no longer a complete subtree, a situation that complicates the analysis and distribution of VP-ellipsis.

But in fact de Marneffe et al. (2014: 4588) do not produce an analysis of VP-ellipsis that is consistent with the principles they have laid out; they assume instead that in cases like (13-14), the

auxiliary is in fact the root of the clause. In other words, they assume the analysis shown in (13), not the one in (14). Their solution is thus *ad hoc*; it reveals the difficulties they are having making their approach work.

3.4 Subcategorization

Another problem facing USD's analysis concerns subcategorization. When auxiliaries accompany a lexical verb, the lexical verb takes on a specific form that is subcategorized for by the auxiliary, e.g.

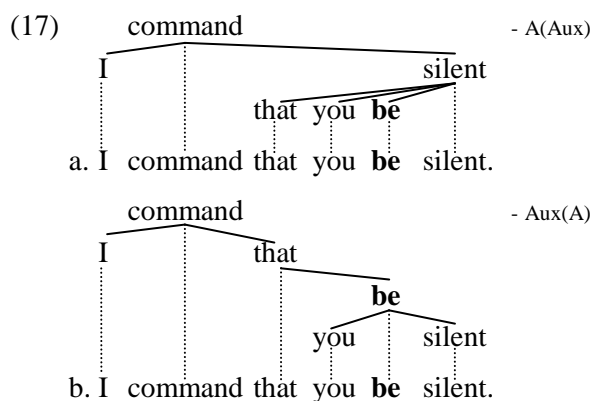(15) The proposal was reexamined.

The lexical verb *reexamined* appears in the past participle subcategory because in this subcategory it can express the passive together with the auxiliary *BE*. The subcategory of the content word *reexamined* depends on the appearance of the function word *BE* (here *was*). Note that the opposite reasoning does not work, i.e. one cannot view the subcategory of *was*, a finite form, as reliant on the appearance of *reexamined*, because *reexamined* can appear without the specific form *was*, e.g. *The proposal has been reexamined.* This asymmetry indicates that the content verb is subordinate to the function verb. Section 4 considers multiple auxiliation with the framework of token-based morphology.

In German and Hebrew (and many other languages), modal auxiliaries govern infinitives, but infinitive verbs do not govern the form of modal auxiliaries:

(16) a. Er   *(muss)   komm-**en**.
        he   must   come-**inf**
        'He must come.'

    b. Hu   *(rotse)   **li**-shon.
        he   wants   **inf**-sleep.
        'He wants to sleep.'

The brackets denote optionality, and the asterisk indicates that optionality is ungrammatical. This means that the presence of a modal auxiliary subcategorizes for the form of the content word. This is a reliable, surface-grammatical criterion.
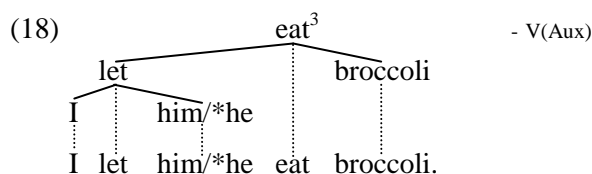
Finally, when languages distinguish between indicative and subjunctive mood, they require an auxiliary in a complement clause to be marked for the subjunctive. The full verb is marked for the subjunctive only in the absence of an auxiliary:

(17)

```
        command                      - A(Aux)
      I            silent
            that you be
```

a. I command that you **be** silent.

```
        command                      - Aux(A)
      I         that
                  be
              you     silent
```

b. I command that you **be** silent.

Compared with (17a), the traditional analysis in (17b) can argue for the subcategorization of the subjunctive auxiliary by demonstrating that the branch *command that* immediately above the auxiliary can elicit the subjunctive. In (17a) the subordinate conjunction and the subjunctive auxiliary are not in one another's domains, nor are they in the immediate domain of the verb *command*.

3.5 Valency change

The occurrence of auxiliaries with valency potential can override the valency potential of the full verb:

(18)

```
              eat³             - V(Aux)
        let         broccoli
      I     him/*he
      I let him/*he eat broccoli.
```
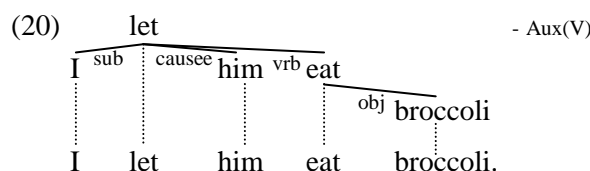
The ungrammaticality of *he*, even though it is retained as the semantic subject of *eat*, cannot be explained on the assumption that the causative auxiliary *let* is subordinate to the full verb *eat*. At the same time, *I* is clearly the matrix subject, but it should depend on the auxiliary *let*, because it is not the subject of *eat*. The causee *him* should also depend on *let*. If, however, *let* is indeed subordinate to *eat* then (18) lacks a matrix subject.

An account more in line with valency theory assumes two valency structures:

(19) a. $N1_{nom}$ *eat* $N2_{obj}$
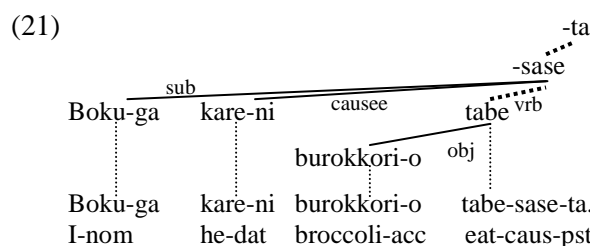   b. $N0_{nom}$ *let* $N1_{obj}$ V_{binf}

(19a) shows the valency of *eat*. (19b) shows the valency of the causative auxiliary *let*: N0 designates a newly introduced subject. The causee N1, i.e. the demoted subject from (19a), must appear in the object case, and a bare infinitive verb must

appear. Since the auxiliary overrides the lexical valency of the full verb, the expectation is that the auxiliary resides in a structurally higher position, which is associated with the potential to override grammatical functions. A tree that assumes higher position of the auxiliary is shown below:

(20)

```
        let                          - Aux(V)
      I  sub  causee him  vrb eat
                              obj broccoli
      I    let    him    eat    broccoli.
```

Example (20) shows the words *I*, *him*, and *eat* as dependents of the auxiliary *let*, which corresponds with (19b). The full verb *eat* in (20) continues to dominate its object, but it has relinquished its subject dependency to the auxiliary.

The assumption on the dependency structure between valency-bearing auxiliaries and full verbs is cross-linguistically valid, as the Japanese translation of (20) demonstrates:[4]

(21)

```
                                       -ta
                                   -sase
              sub
      Boku-ga   kare-ni   causee  tabe vrb
                      burokkori-o  obj
      Boku-ga   kare-ni   burokkori-o   tabe-sase-ta.
      I-nom     he-dat    broccoli-acc  eat-caus-pst
```

Example (21) exhibits exactly the same dependency structure of a causative auxiliary, its full verb, and their dependents. In fact, the current account has already accomplished what the USD try to achieve, namely a cross-linguistically valid representation of dependency structure.

3.6 String coordination

String coordination is constrained with respect to the material that can be shared by the conjuncts. While the exact principles that constrain sharing are at present not fully established, data are available for comparison. Material preceding the coordinate structure can be shared by both conjuncts if the conjuncts are constituents (22a), but sharing is ungrammatical if the conjuncts are non-constituents (22b):

(22) a. He treats the old [women] and [men].
     b. * He treats the old [women for free],
          but [men for $10].

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[3] It is unclear how USD would structure (18). The term causative does not appear in de Marneffe et al. (2006, 2014), or de Marneffe and Manning (2008).

[4] The verb *tabe-sase-ta* is shown as three nodes in (14), according to a dependency morphological account that is the topic of Section 4.

On the intended reading that the men are also old, (22b) is ungrammatical.

A second observation concerns the dependency status of the shared material. If material is not subordinate to the root of the first conjunct, then it can be shared (23a). However, if the material is subordinate, sharing is ungrammatical (23b):

(23) a. <u>He met</u> [Pete on Friday]
       and [Jane on Saturday].

   b. * He met <u>young</u> [Pete on Friday]
        and [Jane on Saturday].

The string *He met* in (23a) can be shared. The verb *met* immediately preceding the coordinate structure is dominating every constituent inside the two conjuncts. In (23b), however, the adjective *young* cannot be shared across the conjuncts. The adjective is dependent on *Pete*. (23b) is, thus, grammatical only on the reading that Jane is not necessarily young.

Applying these observations to auxiliaries, the expectation is that auxiliaries should not be shared across non-constituent conjuncts as long as they are viewed as dependents of the full verbs. That expectation, however, is not met, as the next example demonstrates:

(24)   <u>He has had</u> [to grade papers since March]
       and [to write an essay since April].

On the assumption, that *has* and *had* are dependents of the full verb *grade*, they should not be able to be shared. The auxiliaries should behave like *the old* in (22b), and *young* in (23b). The fact that the auxiliaries do not behave in the same manner, and that sharing is grammatical, supports the assumption that they are not subordinate to the full verb.
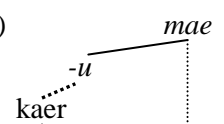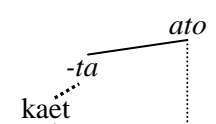
4 Functional hierarchies

De Marneffe et al. (2014: 4585) take a lexicalist, i.e. word-based, position. Such a stance comes naturally to dependency grammars, which are by their very nature word-based grammars. Regarding lexicalism, however, three issues must be considered. The first one is that lexicalism does not advocate or imply the subordination of function words to content words. The previous section produced a number of arguments that do not empirically support the proposal made by de Marneffe et al. (2014). This section adds to these arguments by addressing functional hierarchies.

Secondly, not all linguists who support the Lexical Integrity Hypothesis regard morphology as futile. Quite to the contrary, we believe that a

token-based morphology can shed light on intra-word and inter-word structure. Under "token-based" morphology, we understand a morphology that acknowledges pieces, but that restricts these pieces to surface forms. Such an approach can account for functional hierarchies, while staying loyal to dependency-based approaches to linguistic structure. Below we follow the proposals made in Groß (2011, 2014), Osborne & Groß (2012), and Groß & Osborne (2013).

Finally, regarding the Lexical Integrity Hypothesis, several versions of differing strictness constrain how blind syntax is to derivational (weak hypothesis) or inflectional (strong hypothesis) suffixes (Lieber and Scalise 2007). The following Japanese data are a counterexample against the strong hypothesis:

(25)   *mae*   (26)   *ato*

   -*u*   -*ta*

  kaer   kaet

a. kaer-*u*   *mae*   a. kaet-*ta*   *ato*
   return-npst   front   return-pst   rear
   'before [he] returns'   'after [he] returns'

b. *kaet-ta mae   b. * kaer-u ato

The nominal *mae* 'front' subcategorizes non-past tense (25a), and past tense is ungrammatical (25b). Conversely, *ato* 'rear' subcategorizes past tense (26a), while non-past tense is ungrammatical (26b). This behavior cannot be explained if the strong hypothesis were correct.

The discussion now turns to functional hierarchies. Research in morphology (Bybee 1985), on clause structure (Chomsky 1986; Rizzi 1997), on adverbs (Cinque 1999), and on verbs (Rice 2006) has produced substantial evidence that functional hierarchies must be assumed to exist above the lexical material, rather than beneath it. This necessity becomes evident when one is faced with multiple auxiliation. The earliest discussion of such a case can be found in Chomsky (1957: 39):

(27) That has been being discussed.

The complex predicate *has been being discussed* expresses 'perfective', 'progressive', and 'passive'. Chomsky realized that the functional meanings are expressed by two items, respectively:

(28) a. perfective: *has + en*
   a. progressive: *be + ing*
   c. passive: *be + ed*

The discontinuous surface order of these items led him to the notion of affix hopping:

(29) That (has t₁) (be-t₂)-en₁ (be-t₃)ing₂ (discuss)-ed₃.

(Example 29 shows a dependency/movement diagram.)

The first bracket expresses the perfective, and the suffix *-en* dislocates and attaches to the end of the next auxiliary, i.e. the second bracket, asf.
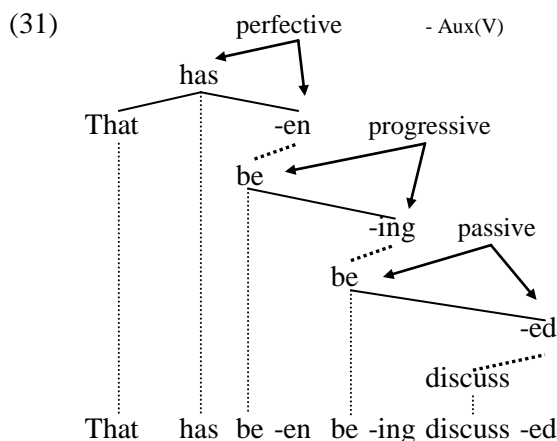
Chomsky also realized that there is a hierarchy, i.e. perfective > progressive > passive, that may not be scrambled, e.g. *That was had being discussed*, *That was been having discussed*, etc. Bybee (1985: 196f) expands on this work when she posits the hierarchy: valency < voice < aspect < modality < tense < mood < person < number. Cinque (1999) tries to identify these categories, and possible subcategories, by looking at adverbs related to these notions. Rizzi (1997) tries to establish a phrase structure framework that can account for topic, focus, and force expressions.

Hierarchies of any type lend themselves to a dependency-based expression because hierarchies and dependencies are directed. A view that the auxiliaries in (27) are dependents of *discussed* not only forfeits the spirit of dependency, but it is also useless in explaining functional hierarchies.

(30)

V(Aux) discussed
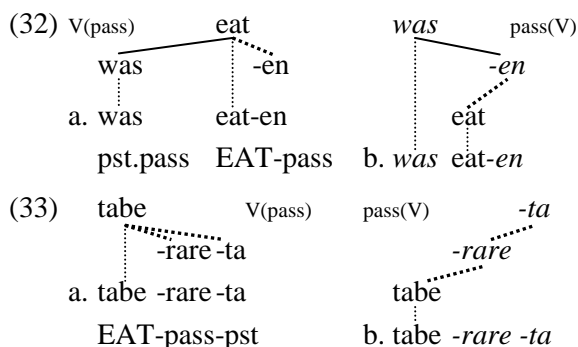That has been being
That has been being discussed.
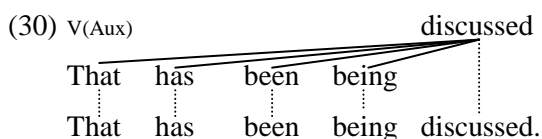
Tree (30) assumes that auxiliaries are daughters, i.e. functionally equidistant to the full verb. But the perfective always dominates the progressive, and never vice versa, and the progressive always dominates the passive, and never vice versa. An attempt to view word order, rather than dependencies, as the critical ingredient, faces problems in more synthetic languages, e.g. Hebrew *katuv* 'written", where the transfix ˉaˉuˉ expresses the passive participle. Finally, it incurs the typological problem that the right-branching, i.e. head-initial, English predicate is now viewed as left-branching, i.e. head-final.

A dependency-based morphology overcomes these challenges by assuming node status for morphs, and that the relationships between morph nodes are directed, i.e. are dependencies. The result is a transparent representation of the structural relationships between morph nodes. This allows reading complex functional meaning directly off the tree structure. Finally, such an account succeeds in acknowledging functional hierarchies in spirit and form. The next example, taken from Groß (2011), illustrates these points:

(31)

perfective   - Aux(V)
has
That   -en   progressive
be
-ing   passive
be
-ed
discuss
That   has   be -en   be -ing   discuss -ed.

Compare (28a-c) to the meanings ascribed to the respective catenae in (31). (31) should also be compared to example (30). In (31), not only syntactic, but also morphological dependencies are accounted for, as well as the functional hierarchy.

One central motive in de Marneffe et al. (2014: 4589) is to provide "a uniform treatment of both morphologically rich and poor languages". In more synthetic languages the functional meanings tend to occur inside one word, whereas they tend to occur as distinct words in more analytic languages:

(32)

V(pass)   eat   *was*   pass(V)
was   -en   *-en*
a. was   eat-en   eat
pst.pass   EAT-pass   b. *was* eat-*en*

(33)

tabe   V(pass)   pass(V)   *-ta*
-rare -ta   *-rare*
a. tabe -rare -ta   tabe
EAT-pass-pst   b. tabe *-rare -ta*

Example (32) shows the more analytic English past passive of *eat*, and (33) the corresponding synthetic construction in Japanese. The (a)-examples show an analysis that subordinates functional material to lexical material, i.e. V(pass), and the (b)-examples show the alternative approach, i.e. pass(V). Analyses similar to the (a)-examples are few in dependency grammar, with Anderson's (1980) study of Basque verbs the most famous example. Since dependency grammar tends towards granting lexical material higher priority due to valency-based considerations, analyses such as the (a)-examples naturally match preconceptions. The problem is, however, that these analyses do not offer any insights into the morphological or morpho-syntactical structure of language. Analyses such as the (a)-examples have been taken as proof against the

attainability of a dependency-based morphology. As a result, dependency grammar stands apart from rival theories not only in their inability to acknowledge functional hierarchies, but also in the obvious lack of a dependency-based morphology. However, the (b)-analyses illustrate that it is not only possible to produce accurate structures, but they also account for functional hierarchies (here: content verb < voice < tense), and furthermore, they are compatible with the majority cross-theoretical research on these issues.

5   Conclusion

This paper has produced diverse observations, all of which support the conventional wisdom that lexical verbs are subordinate to auxiliaries, rather than vice versa. In Section 2, the paper argued that the distinction between function words and content words is not discrete, but rather gradient. Section 3 provided evidence from the subject-verb relation, sentential negation, VP-ellipsis, subcategorization, valency change, and string coordination supporting the assumption that auxiliaries are heads over their full verbs, which is therefore contrary to the position de Marneffe et al. (2014) adopt. Section 4 argued that a lexicalist stance does not support the assumption that function words are subordinate to content words. The Lexical Integrity Hypothesis was also shown to be less solid than it appeared. In conjunction with the possibility of a token-based approach to morphology, an account of the dependency relationships between function words and content words is attainable that not only is consistent with acknowledged research on functional hierarchies, but that also honors the dependency-based view of language.

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