The Representation and Processing of Tense, Aspect & Voice across Verbal Elements in English

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Abstract

We consider the representation and processing of the English verb features tense, aspect and voice, within a computational cognitive model of human language processing. We assume that a collection of features is associated with each verbal element and that these features may project to the clauses in which they occur. When multiple verbal elements occur, it is possible for the features to conflict, necessitating mechanisms of feature blocking and overriding to determine feature projection. The alternative of having multiple entries in the mental lexicon for each verbal element with different feature sets is avoided due to the ambiguity that would be introduced, and the weak grammatical motivation for doing so. However, we do assume an ambiguity in the case of most v-ed and v-base verb forms, with the past tense v-ed form being distinct from the past participle v-ed form and the present tense v-base form being distinct from the non-finite v-base form. We assume that every finite clause expresses a tense and voice feature and many finite clauses express an aspect feature as well. We consider the case of transitive and intransitive verbs in combination with the auxiliary verbs "be" and "have" in finite clauses. For intransitive verbs, we introduce an active/inactive voice feature distinction which aligns with the transitive distinction between active and passive voice.

Keywords: grammatical feature, tense, aspect, voice

Introduction

We consider the representation and processing of the English verb features tense, aspect and voice, within the context of a *pseudo-deterministic* model of human language processing (Ball, 2011a) implemented in the ACT-R cognitive architecture (Anderson, 2007). The pseudo-deterministic model reflects the integration of a highly parallel, probabilistic, and context dependent, activation and selection mechanism and non-monotonic *context accommodation* mechanism (with limited parallelism) with what is otherwise an incremental processor which pursues the best analysis. The overall effect is a human language processor (HLP) which presents the appearance and efficiency of deterministic processing, despite the rampant ambiguity which makes truly deterministic processing impossible. Our non-monotonic context accommodation mechanism replaces the monotonic *look-ahead* mechanism of Marcus's deterministic parser (Marcus, 1980) and is argued to be more cognitively plausible (Ball, 2011a).

We assume that a collection of verb features is associated with each verbal element (cf. Gazdar et al., 1985) and that these features may project to the clauses in which they occur. We consider the composition of verb features across verbal elements within a clause. When multiple verbal elements occur, it is possible for the verb features to conflict. The context accommodation mechanism, which has been independently motivated (Ball, 2010a), is crucial for handling conflicts. In particular, we propose specialized mechanisms of *feature blocking* (i.e. a feature of a preceding verbal element precludes projection of a conflicting feature of a subsequent verbal element) and *feature overriding* (i.e. a feature of a subsequent verbal element overrides a conflicting feature of a preceding verbal element) to handle conflicts. Feature overriding is non-monotonic in that it changes the incrementally evolving representation.

Our non-monotonic approach can be contrasted with approaches which rely on monotonic unification of non-conflicting features (Gazdar et al., 1985; Sag et al., 1986; Sag, Wasow & Bender, 2003). To avoid feature conflicts, such approaches tend to posit alternative entries in the mental lexicon which are structurally ambiguous, often linguistically unmotivated and sometimes grammatically inadequate. For example, "a few books" is grammatical in English despite the fact that "a" is singular and "few" and "books" are plural. In a monotonic unification-based approach, the number feature of "a" must somehow unify with the number feature of "few" and "books". To handle this, one could posit a plural or number lacking version of "a". But this introduces ambiguity and lacks linguistic motivation. In our non-monotonic approach, the plural feature of "few" and "books" is allowed to override the singular feature of "a" (Ball, 2010b). Feature blocking and overriding are concerned with the composition of features across lexical items within constructions and differ from non-monotonic *default constraint inheritance* (cf. Sag, Wasow & Bender, 2003, 229ff.) which is concerned with defeasible inheritance of features within individual lexical items—which we also use (Ball, 2011b).

English has a highly restricted number of distinct verb forms which include the following:

- V–base (or V–plain) form (e.g. "give", "go")
- V–s form (e.g. "gives", "goes")
- V–ed form (e.g. "gave", "went", "kicked")
- V–en form (e.g. "given", "gone")
- V–ing form (e.g. "giving", "going")

"Goes" is a slightly irregular v–s form, "gave" and "went" are irregular v–ed forms, and "gone" is an irregular v–en form. We also treat the combination of the infinitive marker "to" and the base verb form as a distinct verb form, abbreviated as to+v–base (e.g., "to give"). Having a distinct infinitive form allows the model to unambiguously recognize infinitives as multi-word units and reduces overall ambiguity. In total, we claim the existence of six distinct verb forms. By comparison, Quirk et al. (1985, p. 96) claim only five regular verb forms

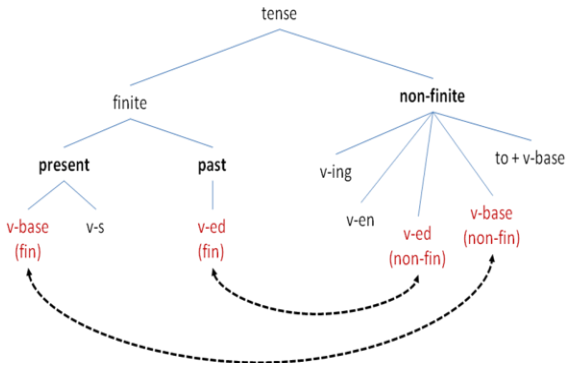
- Base form (v–base)
- -s form (v–s)
- -ing participle (v–ing)
- Past form (v–ed)
- -ed participle (v–ed or v–en)

not recognizing to+v–base as a distinct form, treating v–en as an irregular -ed participle, and calling v–ed the past form (distinct from the -ed participle). Huddleston & Pullum (2002, p. 74) recognize six verb forms, three primary forms and three secondary forms:

- Primary
  - preterite (v–ed)
  - 3rd singular present tense (v–s)
  - plain present tense (v–base)
- Secondary
  - plain form (v–base)
  - gerund-participle (v–ing)
  - past participle (v–ed or v–en)

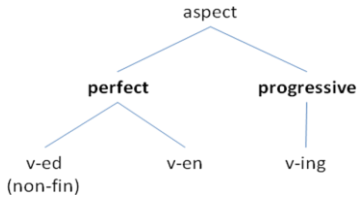
We follow Quirk et al. and Huddleston & Pullum in allowing the v–ed form to map to two distinct tenses: *past* tense and *non-finite* or untensed. We follow Huddleston & Pullum in allowing the v–base form to map to two different tenses: *present* tense and *non-finite*. Quirk et al. and Huddleston & Pullum treat the v–ed (*non-finite*) and v–en forms as alternative forms of the past participle. We keep them distinct since the v–en form is unambiguous. Huddleston & Pullum, like Quirk et al., do not recognize to+v–base as a distinct form.

In terms of the mapping from different verb forms to the tense feature, we propose the following ontology:



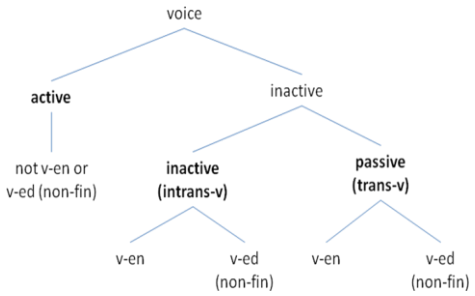
There are eight tense differentiated verb categories corresponding to the six different verb forms. The v–base (*present* tense and *non-finite*) and v–ed (*past* tense and *non-finite*) forms are ambiguous with respect to tense.

For aspect, we propose the following ontology:



We categorize *perfect* as a type of aspect in agreement with Quirk et al. (1985), but contrary to Huddleston & Pullum (2002) who treat *perfect* as a type of tense. Grammatically, there is a clear contrast in form between *progressive* and *perfect* aspect in English with the v–ing verb form corresponding to the *progressive* and the v–en or v–ed (non-finite) verb form corresponding to the *perfect*. *Perfect* aspect encodes the completion of an action in contrast to *progressive* aspect which encodes its continuation. However, *perfect* aspect is also closely associated with *past* tense since completed actions typically occur in the past, although the completion may be co-intensive with the present.

For voice, we propose the following ontology:



We assume that voice is a grammatical feature of intransitive as well as transitive verbs. *Active* voice indicates that the subject is actively involved in the action of the verb. *Passive* voice indicates that the subject of the transitive verb corresponds to one of the affected objects (object, indirect object) of the active equivalent. *Inactive* voice indicates that the subject is an inactive participant of an intransitive verb.

Combining features across the six forms and distinguishing transitive and intransitive verbs, the following feature combinations exist:

- V–base (fin): *present* tense, *active* voice
- V–s (fin): *present* tense, *active* voice
- V–ed (fin): *past* tense, *active* voice
- V–base (non-fin): *non-finite*, *active* voice
- To+v-base (non-fin): *non-finite*, *active* voice
- V–ed (non-fin, trans-verb): *non-finite*, *perfect* aspect, *passive* voice
- V–ed (non-fin, intrans-verb): *non-finite*, *perfect* aspect, *inactive* voice

- V–en (non-fin, trans-verb): *non-finite*, *perfect* aspect, *passive* voice
- V–en (non-fin, intrans-verb): *non-finite*, *perfect* aspect, *inactive* voice
- V–ing (non-fin): *non-finite*, *progressive* aspect, *active* voice

Any verbal entry in the mental lexicon will contain the features associated with one of these combinations. All forms of the auxiliary verb "be" encode *inactive* voice. All forms of the auxiliary verb "have" encode *active* voice. When used as a transitive verb, "have" follows the transitive verb pattern. Modal auxiliaries (e.g. "He *can* go") encode a modal feature in addition to *present* tense and *active* voice. V-base (*present* tense, *active* voice) is the combination associated with imperative (e.g. "*give* me it") and subjunctive uses (e.g. "I desire that he *give* me it").

We consider the combining of tense, aspect and voice across the verbal elements in a clause, restricting the discussion to main verbs and the auxiliary verbs "be" and "have" in finite clauses. A key assumption is that the features of verbal elements may conflict, necessitating mechanisms for feature *blocking* and *overriding*, and prohibiting unification as the primary integration mechanism (i.e., conflicting features cannot unify).

With respect to feature blocking, we assume that the grammatical features of the first of two immediately adjacent verbal elements normally suppress expression of conflicting grammatical features of the second. A preceding verbal element expressing *active* voice is incompatible with an immediately following verbal element expressing *passive* or *inactive* voice. For example, in "he has kicked the ball" expression of *active* voice by "has" suppresses expression of *passive* voice by "kicked" (i.e. "he" is actively involved in kicking), and in "he has gone" expression of *active* voice by "has" suppresses expression of *inactive* voice by "gone" (i.e. "he" is actively involved in going). However, the combination of "have" with "been" is special in that the *inactive* voice of "been" overrides the *active* voice of "have". In addition, the *inactive* voice of "been" is compatible with either the *inactive* voice of a main intransitive verb or the *passive* voice of a main transitive verb. For example, in "the ball has been kicked", the *passive* voice of "kicked" can project to the clause since the *inactive* voice of "been" overrides the *active* voice of "has", and the *passive* voice of "kicked" is compatible with the *inactive* voice of "been". Likewise in "he has been gone", the *inactive* voice of "gone" can project to the clause (i.e. "he" is not actively involved in going). Feature blocking and overriding are the most distinctive elements of the approach presented in this paper. Both are incompatible with monotonic unification of features.

Feature Projection for Transitive Verbs

We start by considering the encoding and projection of features in clauses containing the transitive verb "give" as the main verb. First, we consider clauses with a single main verb, starting with *present* and *past* tense "give".

1. He gives (**pres+act**) me the ball
2. He gave (**past+act**) me the ball

In 1, "gives" encodes and projects the *present* tense and the *active* voice features. In 2, "gave" encodes and projects the *past* tense and *active* voice features.

If we add the auxiliary verb "be" to "give", things start to get more interesting:

3. He is (**pres+~~inact~~**) giving (**prog+act**) me the ball
4. He was (**past+~~inact~~**) giving (**prog+act**) me the ball

In 3, "is" encodes and projects *present* tense and *inactive* voice and "giving" encodes and projects *active* voice—overriding the *inactive* voice of "is"—and *progressive* aspect. The overriding of the *inactive* voice of "is" by the *active* voice of "giving" is an exception to the rule that the competing features of the preceding verbal element block projection of the features of the following verbal element (specific to "be"+verb). Example 4 only differs in that "was" encodes and projects *past* tense.

5. He is (**pres+inact**) given (**perf+pass**) the ball
6. He was (**past+inact**) given (**perf+pass**) the ball

In 5, "is" encodes and projects *present* tense and *inactive* voice, allowing "given" to project *passive* voice to the clause. Allowing "be" to encode *inactive* voice which can be overridden by an immediately following verbal element, allows "giving" to project *active* voice and "given" to project *passive* voice. In addition to projecting *passive* voice, "given" also encodes and projects *perfect* aspect. There is a clear sense in which "He is given the ball" implies completion of the act of giving, which comes from the *perfect* aspect of "given". Example 6 only differs in that "was" encodes and projects *past* tense. One might think that completion of the act of giving comes from "was" and not "given" in this example. However, note that "he was giving me the ball" does not imply completion even though "was" is *past* tense.

7. He is (**pres+~~inact~~**) to give (**~~nonfin~~+act**) me the ball
8. He was (**past+~~inact~~**) to give (**~~nonfin~~+act**) me the ball

In 7, "is" encodes and projects *present* tense and *inactive* voice and "to give" encodes *non-finite* tense (i.e. the absence of tense) and *active* voice, but only projects *active* voice since *present* tense is projected by "is" and blocks the *non-finite* feature of "to give". The overall effect is that the clause is *present* tense and *active* voice similar to "he gives me the ball". However, "He is to give me the ball" also implies a modal obligation which is not captured by the current analysis. Example 8 only differs in that "was" is *past* tense.

Adding the auxiliary verb "have" to "give" also has interesting effects.

9. He has (**pres+act**) given (**perf+~~pass~~**) me the ball
10. He had (**past+act**) given (**perf+~~pass~~**) me the ball

In 9, "has" encodes and projects *present* tense and *active* voice. Projection of *active* voice by "has" blocks the possibility of "given" projecting *passive* voice. This leaves only *perfect* aspect to project from "given". In contrast with the more usual treatment in which "have" combines with a v–en or v–ed (non-finite) form verb to project *perfect* aspect, we propose that "have" instead has the effect of suppressing projection of *passive* voice from the immediately following v–en or v–ed (non-finite) verb form, by projecting *active* voice. Example 10 only differs in that "had" projects *past* tense. If there were separate entries for the passive and perfect variants of "given", then "have" could bias selection of the perfect entry, whereas "be" could bias selection of the passive entry and this ambiguity is manageable. However, with separate entries, it would not be possible to project both *perfect* aspect and *passive* voice from a single verbal element. Under our current approach, "have" suppresses *passive* voice, but allows *perfect* aspect to project, whereas "be" allows both *passive* voice and *perfect* aspect to project.

11. He has (**pres+act**) to give (**~~nonfin~~+act**) me the ball

In 11, "has" encodes and projects *present* tense and *active* voice. "To give" also encodes and can express *active* voice, but this is redundant (but not incompatible) with "has". Like "be", "have" combines with an infinitive to express a modal obligation to complete the act. In both cases, this effect appears to derive from the construction (e.g. "is" + "to give", "have" + "to give") rather than the individual lexical items. Constructional effects can become encoded in complex lexical items and it is likely that "have to" is encoded in the mental lexicon as a multi-word unit (in spoken language as the reduced form "hafta") and expresses an obligation as part of its idiomatic meaning as shown in example 12.

12. He has to (**pres+act+must**) give (**~~nonfin~~+act**) me it
13. He had to (**past+act+must**) give (**~~nonfin~~+act**) me it

Example 13 with *past* tense "had" expresses a past obligation rather than a present obligation.

The combination of *perfect* aspect and *passive* voice may also be realized across verbal elements. Consider

14. He has (**pres+~~act~~**) been (**perf+inact**) given (**perf+pass**) the ball

As an exception, the *inactive* voice of "been" overrides the *active* voice of "has" allowing the *passive* voice of "given" to project. Note that both "been" and "given" encode and may express *perfect* aspect. At the clausal level, we have *perfect* aspect whether it comes from one or more verbal elements.

As the preceding example shows, it is possible to combine verb features across verbal elements in ways that are not allowed within a single verb (e.g. present perfect), although one would like to assume that conflicting features cannot be simultaneously expressed, even across verbal elements. However, besides the combining of *present* tense and *perfect* aspect—which represent different dimensions of meaning that do not conflict—surprisingly, *perfect* aspect and *progressive* aspect can also be combined across verbal elements.

15. He has (**pres+~~act~~**) been (**perf+~~inact~~**) giving (**prog+act**) me the ball

In this example, "has" expresses *present* tense and *active* voice, "been" expresses *perfect* aspect, with *inactive* voice overriding the active voice of "has", and "giving" expresses *progressive* aspect and *active* voice which overrides the *inactive* voice of "been". It may be that the combination results in an iterative interpretation that is at once *progressive* in iterating and *perfect* in the completion of each iteration (e.g. "He has been giving me the ball over and over"). It is an open research question how to represent the projection of two aspectual features (i.e. *perfect* and *progressive*) in a single clause. The computational model currently supports projection of a single aspectual feature.

Progressive aspect can be combined with *passive* voice across verbal elements.

16. He is (**pres+inact**) being (**prog+inact**) given (**perf+pass**) the ball

In 16, "is" projects *present* tense, "being" projects *progressive* aspect, and "given" projects *passive* voice. It is unclear if "given" projects *perfect* aspect in this example—it appears not to (the gray font for **perf** indicates this).

Perfect aspect can combine with *progressive* aspect and *passive* voice across verbal elements.

17. He has (**pres+~~act~~**) been (**~~perf~~+inact**) being (**prog+inact**) given (**perf+pass**) the ball

In 17, "has" projects *present* tense and *active* voice, but *active* voice is subsequently overridden by the *inactive* voice of "been". "Been" projects *perfect* aspect, "being" projects *progressive* aspect (perhaps overriding the *perfect* aspect of "been"), and "given" projects *passive* voice, with *perfect* aspect questionable. This clause expresses a complex collection of tense, aspect and voice features across four verbal elements.

Feature Projection for Intransitive Verbs

When we consider intransitive verbs like "go", the introduction of the *inactive* voice feature becomes especially important. The intransitive v–en form is particularly revealing. Consider the verb "gone".

18. He has (**pres+act**) gone (**perf+~~inact~~**)

Like typical v–en forms of transitive verbs, "gone" expresses *perfect* aspect when preceded by "has". But why do we need *inactive* voice for intransitive verbs? Because intransitive verbs can occur with "be" just like transitive verbs:

19. He is (**pres+inact**) gone (**perf+inact**)

There is clearly an expression of completion in this example, reflected in the projection of *perfect* aspect from "gone", but the active involvement of the referent of "he" is de-emphasized. This de-emphasis is the intransitive verb equivalent of passivization in transitive verbs. In the intransitive verb case, there is no object available to be promoted to the subject function. Instead, the subject of the intransitive verb is demoted from active participant to inactive participant, but remains the subject.

Now consider a set of even more revealing examples:

20. He has (**pres+act**) tired (**perf+~~inact~~**)
21. He is (**pres+inact**) tired (**~~perf~~+inact**)
22. He is (**pres+inact**) very tired (**~~perf~~+inact**)

In "he has tired", "tired" is the v–ed (non-finite) verb form. Since "has" projects *active* voice, the *inactive* voice of "tired" is blocked, but *perfect* aspect projects. In "he is tired (all of a sudden)", it is unclear if *perfect* aspect projects. If it doesn't, then the clause is *present* tense and *inactive* voice. Since "tired" is an intransitive verb, *inactive* voice demotes the subject making it an inactive participant. We are left with an expression that has essentially the same force as an adjectival expression—a single subject argument that is an inactive participant, and an auxiliary + verb combination that lacks any aspectual feature. If we view *stative* force as the lack of any aspect (either perfect or progressive), then the expression is effectively *stative*. Many researchers, including Huddleston & Pullum (2002) and Quirk et al. (1985) treat "tired" in 21 and 22 as an adjective. Huddleston & Pullum (2002, p. 1436) claim that the ability of a word like "tired" to combine with the adverb "very" is a definitive test for an adjective. Quirk et al. (1985, p. 167) make a similar claim. However, it is hard to see how this test is definitive given that "tired" has the form of a v–ed verb. The assumption that "tired" is an adjective when combined with "be" and a verb when combined with "have" necessitates two entries in the mental lexicon to represent "tired". The approach advocated here requires a single verb entry, but allows the context to control the projection of grammatical features such that an intransitive verb can function very much like an adjective. As a challenge to the claim that "very" definitively identifies an adjective, consider

23. He is (**pres+inact**) very worn out (**perf+inact**)

It is atypical of adjectives, and typical of verbs to combine with prepositions to form verb-particle constructions. "Worn out" appears to be a typical verb-particle construction, except that it can be occur with "very". There is also a sense in which "worn out" implies completion of the process of wearing out as encoded by *perfect* aspect.

In general, we argue against the dual treatment of inflected verbs, including stative verbs, as adjectives since this introduces an ambiguity that does not facilitate processing. However, this does not mean that there is never an ambiguity between verbs and adjectives. Consider

24. The door is (**pres+inact**) open

"Open" appears to be a genuine adjective in that is does not have any verb inflection and it occurs after "is" where v-base verb forms do not occur. (Note that "*He is tire" is not grammatical.) If "open" is genuinely ambiguous, how does the incremental, pseudo-deterministic processor deal with it? If we restrict "is" to setting a bias for non-finite inflected verb forms (e.g. v–ing, v–en or v–ed (non-finite)), adjectives and prepositions, then "open" will be biased to the adjective, rather than the v–base verb form, in the context of "is". Note that this bias will not be sufficient if "gone" is both a v–en verb form and adjective, or "tired" is both a v–ed (non-finite) verb form and adjective.

Huddleston & Pullum (2002, p. 1436) note that expressions like "they were married" are ambiguous between an adjectival and a verbal interpretation. In "they were married last week" the verbal interpretation dominates, and in "they were married for ten years" the adjectival interpretation dominates. Is it possible to handle this ambiguity without positing distinct entries in the mental lexicon?

25. They were (**past+inact**) married (**perf+pass**)
26. They were (**past+inact**) married (**~~perf~~+~~pass~~**)

If the verbal interpretation corresponds to the projection of *perfect* aspect and *passive* voice, and the adjectival interpretation corresponds to suppression of *perfect* aspect and *passive* voice, then we can represent the distinction without positing separate entries in the mental lexicon. One immediate advantage of this approach is an ability to handle post verbal modification via feature overriding:

27. They were (**past+inact**) married (**perf+pass**) last week
28. They were (**past+inact**) married (**~~perf~~+~~pass~~**) for ten years

In the first example, the relatively punctual nature of "last week" encourages the expression of *perfect* aspect, whereas in the second example, the durative nature of "for ten years" discourages and perhaps overrides the expression of *perfect* aspect—although there still appears to be an implication that they are no longer married. The "adjectival" use also lacks *passive* voice. In the case of transitive verbs like "marry", *passive* voice applies to the event reading in which the agent of the event (e.g. the priest) is demoted from subject to optional oblique argument. In the case of "they were married for ten years", we have a durative event that is stative-like and lacking an agent. Note that at the processing of the word "married" we do not know what affect post verbal modifiers will have or even if there will be any. In an approach which has separate verb and adjective entries for "married", an incremental, pseudo-deterministic processor will run into problems. It is not possible to decide at "married" which entry is needed. Either both entries will need to be carried forward in parallel, or the processor must have some mechanism for backing up and trying the alternative. From an incremental processing perspective, neither of these is

attractive. The human language processor does not have sufficient resources to carry forward multiple options in parallel—at least not across multiple choice points where additional parallelism might be required. Backtracking is equally problematic. Resources are needed to store the alternatives to be considered on backtracking, and knowing when to backtrack is indeterminate. Our pseudo-deterministic processor eschews backtracking and constrains parallel propagation of alternatives, relying instead primarily on non-monotonic adjustment of the evolving representation via feature overriding and feature blocking to deal with many forms of ambiguity without positing multiple entries in the mental lexicon.

As a final example with "married", consider

29. They are (**pres+inact**) being (**prog+inact**) married (~~**perf**~~**+pass**) by a priest

In this example, "are" expresses *present* tense and "being" expresses *progressive* aspect. Since "are" and "being" are forms of "be", they express *inactive* voice. This allows "married" to express *passive* voice, but the *perfect* aspect of "married" is blocked by the *progressive* aspect of "being". The result is a clause that is *present progressive* and *passive*. There is an ambiguity here: are they in the act of being married by a priest or is the event just planned for the future? Since the *present* tense ranges over future events in English, this ambiguity may not be resolvable in terms of feature projection or suppression.

There is a related ambiguity in the meaning of expressions with *progressive* verb forms. According to Huddleston & Pullum (2002, p. 80)

30. Her parents are entertaining

is ambiguous between "entertaining" as a progressive verb form and "entertaining" as a stative adjective. If we allow the *active* voice feature of "entertaining" to be suppressed then these two uses can result from a single verb entry:

31. Her parents are (**pres+**~~**inact**~~) entertaining (**prog+ act**)
32. Her parents are (**pres+inact**) entertaining (**prog+** ~~**act**~~)

In 31, the parents are actively involved in entertaining, whereas, in 32, the parents are not actively involved. It does not seem necessary to suppress *progressive* aspect in this example since *progressive* aspect is already stative-like compared to *perfect* aspect. Note that this allows us to handle "her parents are entertaining tomorrow" and "her parents are entertaining to be around" via feature projection or suppression without multiple entries in the lexicon.

Summary

We described the representation and processing of the inflectional verb features tense, aspect and voice within the context of an incremental, pseudo-deterministic human language processor (Ball, 2011a). Diagrammatic trees generated during the execution of the processor which show verb feature projection on a broad range of different inputs are available at http://www.doublertheory.com/comp-grammer/comp-grammar.htm.

Verbs, including auxiliary and modal verbs, are encoded with tense, aspect and voice features in the mental lexicon and these features can project to, or be expressed by, the clauses in which they occur. When the verb group contains multiple elements, the grammatical features of the verbal elements must be reconciled. Monotonic unification of grammatical features is not possible when the grammatical features conflict. Mechanisms of feature blocking and overriding are needed to handle the reconciling of incompatible features and to minimize the amount of ambiguity in the mental lexicon—at least when localist representations (cf. Sag, Boas & Kay 2012) in which all verbal features compete for expression at the clausal level are assumed. A non-localist alternative of using hierarchically organized features (as suggested by a reviewer) such that in "He has been kicked", "has" takes "been" as a complement with "has" expressing *present* tense and "been" expressing *perfect* aspect on a second level, and "been" takes "kicked" as a complement which expresses *perfect* aspect on a third level, may handle the case of feature blocking, but doesn't explain how the overall expression is *passive*, which requires overriding the higher level *active* feature of "have" at the clausal level—if verbs express a voice feature as is assumed.

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