The Constraint-Based Externalization of Perfect(ive) Auxiliaries BE and HAVE

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1. Introduction

Although there is a general agreement that the alternation between the perfect(ive) auxiliaries BE and HAVE, known as *Auxiliary Selection* (hereafter AUX selection), almost disappears in the modern English (Sorace (2000), Legendre (2007)), it has been argued that perfect(ive) auxiliary BE is sporadically observed when a certain aspectual PP is attached to the matrix clause (hereafter BE-perfect (Toyota (2009))).[1]

(1) a. John is/has gone.
b. John had gone to the store/ on the interstate.
c. ? John was gone <u>to the store</u>.
d. ? *John was gone <u>on the interstate</u>.

(Lipson (1999:54-56))

Interestingly, the acceptability of sentence (1d) with *on*-PP degrades more sharply than that of sentence (1c) with a *to*-PP. The purpose of this study is to capture this gradient acceptability between (1c) and (1d).

This pattern cannot be fully explained by extensive accounts proposed in the literature from perspectives of argument structure and predicate property (e.g., lexical semantics). For example, Sorace (2000), who proposed the Auxiliary Selection Hierarchy (ASH), concludes that unergative verbs with an inherent telic property tend to select BE. Additionally, in several studies such as McClure (1993) and van Hout (2004), the telicity of the event (represented at either predicate or clausal level) is assumed to play a crucial role in AUX selection. Indeed, in some West European languages, the choice of BE is often forced by the telic property evoked by certain factors such as the adjunction of a PP or adverb, as well as the

[1] As Wegner (2019) points out, the notation "perfect(ive)" entails that it is a perfect "tense" and a perfective "aspect." The present paper prefers the notation "perfective" since in this study we address the relationship between the aspectual properties of predicate and selected auxiliaries.

semantic property of argument DPs (e.g., animacy, definiteness) (Lieber and Baayen (1997)). Below are examples of AUX selection in Dutch.

(2) a. Jan heeft gelopen.
John have walk.PTCP
'John walked.'

b. Jan is naar Amsterdam gelopen.
John BE to Amsterdam walked.
'John walked to Amsterdam.'

(van Hout (2004:72))

Nonetheless, in the English cases of (1c) and (1d), the inherently telic unergative verb *gone* prefers HAVE over BE, even when a telic PP is adjoined.

The contrast between English and the other languages raises the following two questions: (i) why does the adjunction of a telic PP leads to a degraded acceptability, and (ii) how is the gradient nature of the acceptability as in (1c) and (1d) derived? These questions pose significant challenges for the previous accounts of AUX selection, as they assume AUX selection to be categorical rather than gradient in that there is a one-to-one relation between grammatical devices (such as lexical semantic feature) and selected auxiliaries (BE and HAVE) (Perlmutter (1987), Sorace (2000), Legendre (2007), Ackema and Sorace (2017)). Thus, we need to adopt another grammatical architecture to capture the gradient nature of AUX selection. To achieve this, this report follows Optimality Theory (hereafter OT) (Prince and Smolensky (2004)) to propose a constraint-based system, in which grammatical constraints based on syntactic structures play a key role in selecting perfect(ive) auxiliaries BE and HAVE. Under our proposal, the gradient acceptability results from the violation of a specific constraint related to selecting AUX BE. The analysis is made possible through the assumption of a constraint ranking specific to English.

The organization of this paper is as follows. Section 2 reviews the basics of OT and syntactico-semantic approach to AUX selection in West European languages (Baker (2019)). Section 3 presents a set of grammatical constraints based on Baker's proposal and English-specific ranking of it. Section 4 provides an OT analysis of AUX selection. Section 5 concludes this report.

2. Theoretical Background and Previous Study

2.1. Optimality Theory

In the framework of OT syntax and morphology (Legendre et al (2001), Rolle (2020)), it is posited that the grammaticality and acceptability of linguistic phenomena are determined according to violation of grammatical constraints. In this paper, we adopt the following architecture, which is a basic and widely accepted approach in OT syntax.

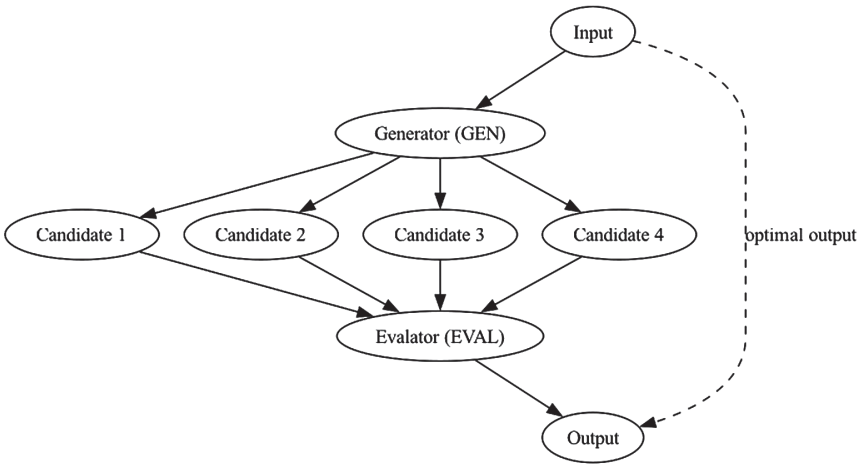

Figure 1. The Architecture of an OT Grammar (cf. Legendre et al (2001:3))

In the model adopted here, the generative component of a grammar (GEN in Figure 1) is responsible for syntactic computation and its representation, as discussed in the syntactic literature, including Chomsky (1995) and his subsequent works. After the computation component generates a set of possible candidates (described as Candidate 1 through Candidate 4 in the figure), these candidates are evaluated based on a set of grammatical constraints (EVAL). They are either numerically or categorically ranked, depending on individual languages. The candidate with the fewest violations is selected as an "optimal" output. More importantly, grammatical constraints assumed under OT are violable, and therefore a sole violation of a constraint does not lead to the ungrammaticality of candidates. Ultimately, whether a candidate is optimal or not is determined by the ranking of

constraints and the number of their violations. [2]

2.2 Functional Structure and Auxiliary Selection

Returning to the current topic, AUX selection, let us consider theoretical works on AUX selection in several West European languages (syntax: Kayne (1992), Bjorkman (2011), Amato (2022), Pietraszko (2022); semantics: Sorace (2000), van Hout (2004), Washio (2004), Bentley (2006); corpus studies; Vernice and Sorace (2018), Rastelli (2022)). In this paper, following Baker (2019), we assume that the choice of the perfect(ive) auxiliary is determined by the aspectual properties of the sentences in which it is embedded. As shown in Table 1, four West European languages (French, Dutch, German, and Italian) exhibit a significant pattern in auxiliary selection: the controlled process (e.g., *work*, *play*, *talk*, *swim*, *run*, *walk*) generally prefers the auxiliary HAVE, while change of state (e.g., *rise*, *decay*, *die*, *grow*) or change of location (e.g., *come*, *arrive*, *leave*, *fall*) prefer BE. Although there is a gradation in the distribution of auxiliary choice, the preference for a specific auxiliary is consistent across these languages.

	French	Dutch	German	Italian
Controlled process (non-motional)	HAVE	HAVE	HAVE	(BE)/HAVE
Controlled process (motional)	(BE?)/HAVE	BE/HAVE	BE/HAVE	(BE)/HAVE
Uncontrolled process	HAVE	HAVE	HAVE	(BE)/HAVE
Existence of state	HAVE	(BE)/HAVE	(BE)/HAVE	BE/(HAVE)
Continuation of a pre-exsiting state	HAVE	BE/HAVE	BE/HAVE	BE/(HAVE)
Change of state	BE/HAVE	BE/(HAVE)	BE	BE/(HAVE)
Change of location	BE	BE	BE	BE

Note: Parenthesis denote a more marginal option.

Table 1. Auxiliary Selection in Four Western European Languages (Baker (2019:585))

[2] Although numerous sub-theories of OT exist, such as Harmonic Grammar (e.g., Smolensky and Goldrick (2016)) and the Maximum Entropy Model (e.g., Hayes (2022)), this study adapts a classic approach rather than a stochastic one.

Furthermore, according to Baker (2019), each semantic property listed in Table 1 is reduced to formal aspectual (eventive) features as shown in Table 2. These features are interpreted by Logical Form (LF) after the completion of syntactic computation.

	[control]	[initiation]	[state]	[change]	[telic]
Controlled process (non-motional)	+	+	-	-	-
Controlled process (motional)	+	+	-	-	-
Uncontrolled process	-	+	-	-	-
Existence of state	+/-	+/-	+	-	-
Continuation of a pre-existing state	+/-	+/-	+	-	-
Change of state	+/-	+/-	-	+	+/-
Change of location	+/-	+/-	-	+	+

Table2. The Relations between ASH and the Features of the Functional Heads (Baker (2019:585))

Discussing several constructions related to these aspectual features, Baker proposes that these features are aligned in terms of the following hierarchical structure.

(3) [$_{\text{ControlP}}$ Control [$_{\text{InitiationP}}$ Initiation [$_{\text{StateP}}$ State [$_{\text{ChangeP}}$ Change [$_{\text{TelicP}}$ Telic]]]]]
(Baker (2019:558))

Notice that this cartographic structure consists of functional heads, each of which contains an aspectual property. These aspectual properties are assigned to not only individual verbs (traditional v or V) but also sentential parts such as PP and adverbs.[3] When an element is interpreted according to the structure in (3), each functional head requires the element to be generated at its specifier position (hereafter, Spec). For example, in *V one's way into* construction in (4a), the subject *Lucy* is interpreted as a *controller* and *initiator* of a talking event, while the direct object *her way* is interpreted as a changing element. In this

[3] Baker (2019) originally makes use of this hierarchical structure to provide a novel diagnostic for "split intransitivity", which is a long-standing issue in theoretical linguistic literatures. He argues, however, that this hierarchy is highly compatible with Sorace's (2000) ASH from the view of syntax-semantic interface.

case, each element falls under the functional structure shown in (3): the subject DP *Lucy* occupies the Spec-positions of InitiationP and ControlP, and the object DP *her way* occurs in the Spec position of ChangeP.

(4) a. Lucy talked her way into the room.

b. [$_{\text{ControlP}}$ [$_{\text{DP}}$ *Lucy*] Control [$_{\text{InitiationP}}$ [$_{\text{DP}}$ *Lucy*] Initiation [$_{\text{StateP}}$ State [$_{\text{ChangeP}}$ [$_{\text{DP}}$ *her way*] Change [$_{\text{TelicP}}$ Telic]]]]

(Baker (2019:575))

At LF, these DPs receive aspectual interpretation along with the functional head in which they are generated. Baker (2019) claims that various syntactic constructions (e.g., resultative, causative alternation, V *away* construction) and morphological phenomena (e.g., *er*-suffix, *out*-prefix, adjectival participle) can be captured by this functional structure.

It is worth to point out that Baker's (2019) insight is compatible with the influential idea that the argument structure of verbs does not necessarily affect the selection of auxiliary discussed in the recent literatures (Wegner (2019, 2021), Stefano (2022)). As discussed above, aspectual PPs and adverbs can be involved in the hierarchical structure and assigned aspectual properties by its functional aspectual heads. This implies that other factors than lexical semantics and argument structure of verbs can also play a role in selecting perfect(ive) auxiliaries, unlike approaches based on lexical semantics and argument structure.

In this section, we have reviewed Baker's (2019) suggestion that hierarchical structure containing aspectual features exists in syntax and it is involved with several constructions including the choice of auxiliary. This insight serves as a crucial hint for the current analysis in that this functional structure allows every sentential part (i.e., verb, PP, and adverb) to be generated at its Spec positions to determine an aspectual property of a sentence. It is considered suitable for analyzing examples where the acceptability undergoes significant changes with the adjunction of a specific PP, as in (1c) and (1d). Nevertheless, addressing this alone is not sufficient for capturing the "gradient" acceptability between (1c) and (1d) discussed in section 1. As mentioned in section 2.1, explaining the gradience requires an OT-based constraint-based system. The discussion on these constraints will be provided in the following section.

3. Proposal

We are now in a position to present our proposal: a certain set of grammatical constraints are associated with the input-output relationship between aspectual property assigned by the functional structure in (3) and selected auxiliaries (BE and HAVE). Based on Baker (2019), it is possible to translate the relationship into a set of grammatical constraints in OT. Our proposal includes a set of five constraints, C1, C2, C3, C4, and C5, that are pivotal in determining the choice of auxiliary.

(5) C1: Control head does not select auxiliary BE
C2: Initiation head does not select auxiliary BE
C3: State head does not select auxiliary BE
C4: Change head does not select auxiliary HAVE
C5: Telic head does not select auxiliary HAVE

Constraints C1, C2, and C3 are involved in the choice of auxiliary HAVE, whereas constraints C4 and C5 play a role in the choice of the auxiliary BE. Notice that these constraints highlight the complementary distribution, where each aspectual head in (3) prefers the selection of either BE or HAVE (indeed there is no constraint allowing the selection of both auxiliaries). Crucially, these constraints themselves are not language-specific set but rather universal one. Therefore, it seems that all natural languages share this set of constraints. Nevertheless, cross-linguistic and within-language variation comes from the ranking or reordering of constraints. As outlined in section 2.2, the ranking of constraints is generally determined by the strength of constraints: the strictest constraint is ranked highest and the least strict lowest. For AUX selection, we can establish the ranking for English as shown below (“>>” means “is stricter than”):[4]

(6) C1 >> C2 >> C3 >> C4 >> C5

[4] When it comes to the AUX selection in the West European languages mentioned in Section 2.2, a different order of constraint ranking would be imposed on each language, though the substantial contents of constraints are still retained.

This constraint rank implies that violating the constraints to avoid BE (i.e., C1, C2, and C3) is considered serious in English, whereas violating constraints to avoid HAVE (i.e., C4 and C5) is not as serious as the constraints ranked higher. This may be confirmed by the well-known fact that the selection of BE is rarely observed in contemporary English.[5]

4. Analysis

4.1 Syntactic Structures of BE-Perfect with PPs

In accordance with the proposal given in the last section, we examine the BE-perfect sentences in English. First, consider the syntactic representations of (1c) and (1d). As mentioned above, *to*-PP and *on*-PP obviously receive different interpretations respectively. *To*-PPs are generally interpreted as the goal of an event, focusing on the end of the event (telicity). On the other hand, *on*-PPs are interpreted as the path of an event with a primary focus on the intermediate process of the event (stativity). Thus, they are assumed to activate different functional heads in the hierarchical structure in (3). The syntactic representations are given below:

(7) a. John was gone to the store. (= (1c))

b. … [$_{\text{StateP}}$ [$_{\text{ChangeP}}$ [$_{\text{PP}}$ to the store]$_i$ [$_{\text{TelicP}}$ t_i] …

(8) a. John was gone on the interstate. (= (1d))

b. … [$_{\text{StateP}}$ [$_{\text{PP}}$ on the interstate]$_i$ [$_{\text{ChangeP}}$ t_i [$_{\text{TelicP}}$ t_i] …

In (7b), the *to*-PP is first generated at the Spec position of TelicP and then moves up to Spec-ChangeP, given its semantic property. In (8b), on the other hand, the *on*-PP moves to the Spec position of StateP via TelicP and ChangeP in a successive cyclic fashion.

4.2 Results

[5] From a formal perspective, this distribution of perfect(ive) auxiliaries could also be attributed to structural relationships: in English the rank of constraints is determined by the structural height of the functional projections, though it requires an empirical support.

The results of evaluating (7b) and (8b) in terms of the ranked constraints are as follows:

Candidates	C1	C2	C3	C4	C5
HAVE + *to*-PP$_{[telic, change]}$				*	*
BE + *to*-PP$_{[telic, change]}$	*	*			

Table 3. Evaluation of the AUX Selection with *to*-PP in (7b)

Candidates	C1	C2	C3	C4	C5
HAVE + *on*-PP$_{[stative]}$				*	*
BE + *on*-PP$_{[stative]}$	*	*	*		

Table 4. Evaluation of the AUX Selection with *on*-PP in (8b)

In both cases, the candidates which select auxiliary HAVE violate only lower-ranked constraints, whereas the candidates which select BE violate higher-ranked constraints. Let us examine the case of (7b) in more detail. When HAVE is inserted, only the lower-ranked C4 and C5 are violated, while the higher-ranked constraints C1, C2, and C3, which are related to selecting BE, are not relevant to the evaluation. On the other hand, the candidate inserting BE violated the higher-ranked constraints C1 and C2, though it does not violate the lower-ranked constraints. Similarly, in the case of (8b), the candidate inserting HAVE avoids the violations of higher-ranked constraints, compared to that selecting BE. Therefore, the auxiliary HAVE is preferably selected as an optimal output in both cases.

This study, however, pays particular attention to the "loser" of these evaluations, the candidates selecting BE, which is shown in the lower part of the tables. In both cases, C1 and C2 are violated given the semantic properties of each PP. It should be further noted that in Table 4 not only C1 and C2 but also C3 is violated due to the occurrence of PP at the Spec-StateP. This leads to the suggestion that the violation of C3 is a potential culprit of marginal difference in acceptability between (1c) and (1d).

From this analysis, it is evident that we can elucidate not only cases like (7b) and (8b) where aspectual PPs are adjoined but also normal examples like "be gone" and

"have gone" where they are not. As mentioned above, the violations of C1, C2, and C3 result from generating aspectual PPs in the Spec positions of ControlP, InitiationP, and StateP respectively. In the normal cases, however, C1, C2, and C3 are irrelevant to determining the choice of auxiliary because of lacking such an aspectual PPs. This results in avoiding the violations of them, and therefore both candidates selecting BE and HAVE can be selected as optimal. One might think that in the normal case (*be gone* and *have gone*) BE is optimal but HAVE is not, since C4 and C5 related to selecting HAVE are violated only in HAVE candidates. Indeed, under the categorical OT approach like ours, this could be perceived as a problem in that one of the optimal candidates is wrongly eliminated in the constraint evaluation. It is hypothesized, however, that C4 and C5 are lower ranked constrains, so the violations of them have minimal influence on the auxiliary selection. This perspective is further clarified within the framework of stochastic OT (cf. Kimura (2024)).

5. Concluding Remarks

We have reviewed the OT analysis of the gradient acceptability in English BE-perfects with certain aspectual PPs attached. Empirically speaking, the selection of AUX BE is almost disallowed when a path PP (e.g., *on the interstate*) is attached. On the other hand, when a telic PP (e.g., *to the store*) is attached, its acceptability does not degrade as sharply as a path PP. This contrast is naturally explained if we assume that the violation of a constraint specific to the selection of BE affects the acceptability of the *on*-PP case. We can conclude that the violation of C3 degrades the acceptability of (1d).

It seems, however, that there remain at least two issues to be solved: (i) why does English adopt a structurally aligned ranking while other West European languages designate a different ranking; and (ii) whether are there other factors affecting the gradient acceptability discussed in this study? As for issue (i), the ranking in English reflects the limitation of human cognition, as indicated in the recent Minimalist Program (Chomsky (1995) and his subsequent works). In this ranking, the lower the structural position of functional head is, the less strict the constraint is. This might be contributed to one of the domain-general Third-factor properties, called locality condition, which is related to Minimal Search (cf. Chomsky (2005)). More specifically, the limitations of computational load, which is related to working

memory, are reflected in the ranking of grammatical constraints. As for issue (ii), the analysis in this paper suggests that the telicity of event influences the acceptability to some extent. Nevertheless, we concede that it is not reasonable to conclude that the violations of C1, C2, and C3 are "the only factor" for the gradient acceptability in AUX BE + PP. For a better understanding of additional factors, it is necessary to seriously examine the factors influencing language comprehension through methods such as sentence processing (e.g., Self-paced Reading Task, Eye-tracking experiment) and large-scale acceptability judgment experiments.

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