

On the derivation of three-verb clusters in Old English

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Abstract. Word order in Old English has some properties in common with those in other Germanic languages, such as V2 in a main clause and Vf-final order in a subordinate clause. However, it had idiosyncratic traits that led to word order changes in the later stages of English. Focusing on the word order of three-verb clusters (modal+*have/be*+participle) in Old English, this paper argues that the rise of functional projections with the head in its initial position shaped changes in word order in the history of English.

Keywords. three-verb clusters; Old English; word order; evolutionary linguistics; hierarchical structure; functional projection; uniformity principle; grammaticalization

1. Introduction. Linear orders of verbs in a subordinate clause in English and German are quite different, as shown in (1).

- (1) a. that John must (1) have (2) been (3) elected (4)¹ *English*
 b. dass Hans gewählt worden sein muss *German*
 that John elected (4) become (3) be (2) must (1) (Wurmbrand 2017: 4612)

English has the modal-perfective marker-passive marker-main verb order, whereas German has the main verb-passive marker-perfective marker-modal order. Interestingly, Japanese has the same type of word order as German, as shown in (2).

- (2) a. John-ga erab are ta-ni chigainai to *Japanese*
 John-NOM elected (4) been (3) have-PART (2) must (1) that

Although the word orders of German and Japanese are the same, they are phylogenetically quite distant. Obviously, this is a result of typological differences. Both German and Japanese are assumed to be head-final languages. In contrast, Present-day English (PDE) is argued to be a head-initial language. However, as English and German belong to the same Germanic family, it is worthwhile to explore the reason for such divergence. Thus, this study aims to tackle this problem by adopting a generative approach and an evolutionary approach.

(3a) illustrates the subordinate clause word order in Old English (OE). Similar to the German example above (1b), it shows the typical head-final order. Meanwhile, (3b) an example of a main clause word order in OE, shows that a modal auxiliary *meahte* precedes the other verb clusters.

- (3) a. & sægde þæt he to biscope *gehalgad beon meahte*
 & said that he to bishop consecrated be might
 ‘and said that he might be consecrated bishop’ (cobede, Bede_4:1.254.20.2589)

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¹ Numbers are used to indicate the hierarchical relations of the verbs, with the structurally highest verb assigned the number 1.

- b. þonne *meahte* he ðara rime *geðeoded bion*
 then might he of those number joined be
 ‘then he might have been added to the number of those’ (cobede, Bede_5:14.442.1.4437)

However, since it can be regarded as the result of V2, the basic word order is assumed to be verb-final (*geðeoded bion meahte*). Nevertheless, there remain problems regarding the word order in OE. (4) presents an example of a main clause word order in OE.

- (4) Ac þæt Godes mæden ne *mihte beon bepæht* þurh ænige lyffetunge
 but that God’s maiden not might be seduced through any flattery
 fram hire leofan Drihtne,
 from her beloved Lord
 ‘But the virgin of God could not be allured by any flattery from her beloved Lord’
 (coaelive, æLA[Agnes]:85.1770)

Contrary to the above example, the modal-*be*-past participle order has been used here. (5) illustrates a subordinate clause word order in OE with the modal-*be*-past participle order.

- (5) . . . , þæt git *magon beon getealde* eac betwux þam godum.
 . . . , that ye two may be numbered also between the gods
 ‘. . . , that ye two may also be numbered amongst the gods’
 (coaelive, æLS[Agatha]:65.2050)

Both have the same word order as that found in PDE. Interestingly, this word order accounts for 88.7% of main clauses and 71.3% of subordinate clauses. This paper focuses on the linear order of such verb clusters found in OE.

The three research questions in (6) are investigated.

- (6) Q1 Why were the modal-*be/have*-participle orders attested so frequently in OE?
 Q2 What was the configuration of the hierarchical structures of verb clusters in OE?
 Q3 How did this hierarchical structure emerge in OE?

To explore these questions, we conducted a syntactic analysis of OE based on the data retrieved from the YCOE.² We also employed a methodology taking both generative and evolutionary approaches in order to obtain new insights into the cultural evolution of language.

2. Verb clusters in Old English.

2.1. PREVIOUS STUDIES. Word order in OE has long been studied both philologically and theoretically. However, research on verb clusters is limited. In particular, three-verb clusters in OE have not been explored fully. Before conducting data analysis, some previous studies related to three-verb clusters in OE, such as Koopman (1990), and Haeberli & Pintzuk (2012), will be reviewed.

However, it is necessary to first define the types of three-verb clusters. As mentioned in Mitchell (1985), Koopman (1990) and Denison (2002), there were three types of verb clusters in OE, as shown in (7).

- (7) a. modal + *be* (*beon, weorþan, wesan*) + past participle (PP)

² The York-Toronto- Helsinki Parsed Corpus of Old English Prose (YCOE), a grammatically annotated corpus comprising 1.5 million words of OE prose (Taylor et al. 2003).

- b. modal + *have* + PP
- c. modal + *be* + present participle (PrP)

Moreover, we can divide them into six types of word order, as shown in (8).

- (8) 1-2-3 (modal - *be/have* - PP/PrP) = *might be taken*
- 1-3-2 (modal - PP/PrP - *be/have*) = *might taken be*
- 3-2-1 (PP/PrP - *be/have* - modal) = *taken be might*
- 3-1-2 (PP/PrP - modal - *be/have*) = *taken might be*
- 2-1-3 (*be/have* - modal - PP/PrP) = *be might taken*
- 2-3-1 (*be/have* - PP/PrP - modal) = *be taken might*

The results of Koopman (1990) and Haerberli & Pintzuk (2012) are presented in Tables 1 and 2, respectively.

	1-2-3	1-3-2	3-2-1	3-1-2	2-1-3	2-3-1	Total
Modal+ <i>be</i> +PP	700 (80%)	73 (8%)	80 (9%)	6 (0.6%)	4 (0.4%)	0	863
Modal+ <i>be</i> +PrP	45 (78%)	9 (15%)	3 (5%)	1 (2%)	0	0	58
Modal+ <i>have</i> +PP	12 (53%)	2 (9%)	7 (30%)	1 (4%)	1 (4%)	0	23
Total	757 (80.2%)	84 (8.9%)	90 (9.5%)	8 (0.9%)	5 (0.5%)	0	944

Table 1. Old English constructions with three verbs (Adapted from Koopman 1990: 39-40)

1-2-3	1-3-2	3-2-1	3-1-2	2-1-3	2-3-1	Total
306 (71.2%)	48 (11.2%)	67 (15.6%)	7 (1.6%)	2 (0.5%)	0	430

Table 2. Linear order in OE subordinate clauses with three verbal elements, one finite and two nonfinite (Haerberli & Pintzuk 2012: 225)

In both the surveys, the 1-2-3 order makes up the majority, far exceeding the percentages of the 3-1-2 and 2-1-3 orders, while no example of the 2-3-1 order could be found. It should be noted that the rate of the 3-2-1 order is a little high in Table 2 because subordinate clauses alone were examined. OE examples are presented in (9).

- (9) a. 1-2-3 order
 we *magon beon getrymede* mid Iohannes cuide ðæs godspelleres,
 we may be strengthened with John's words the evangelist's
 'we can be strengthened by the words of the evangelist John' (cocura,CP:14.85.19.555)
- b. 1-3-2 order
 gif we *willað fulfremede beon*;
 if we will fulfilled be
 'if we want to be fulfilled' (cocathom2,æCHom_II,_29:232.72.5166)
- c. 3-2-1 order
 Ac ær þon þe he *gehadad beon meahte*,
 but before he ordained be might
 'but before he could be ordained' (cobede,Bede_4:24.336.19.3379)
- d. 3-1-2 order
 ær hit *geendad mehte beon*,

before it ended might be
 ‘before it could be ended’ (coorosiu,Or_5:11.125.19.2639)

e. 2-1-3 order

& swa ðeah ungetweogendlice heo *beon mæg ongyten* soð martyr
 & nevertheless undoubtedly she be may considered true martyr
 butan openlicre þrowunge,
 without open suffering
 ‘nevertheless undoubtedly she may be considered a martyr without open suffering’
 (cogregdC,GDPref_and_3_[C]:26.231.21.3230)

f. 2-3-1 order *Not attested*

It should be noted that each constituent in the verb cluster of (9c) is always adjacent. Furthermore, according to Mitchell (1985) and Koopman (1990), the word order of (9e) is attested only in a gloss to the Latin text. No example of (9f) is attested in previous studies.

2.2. THE ANALYSIS BASED ON THE YCOE. Both main and subordinate clauses are the target of the analysis in this paper.

	1-2-3	1-3-2	3-2-1	3-1-2	2-1-3	2-3-1	Total
Modal+ <i>be</i> +PP	558	63	73	5	2	0	701 (92.8%)
Modal+ <i>be</i> +PrP	23	9	2	0	0	0	34 (4.5%)
Modal+ <i>have</i> +PP	10	2	5	2	1	0	20 (2.7%)
Total	591 (78.3%)	74 (9.8%)	80 (10.6%)	7 (0.9%)	3 (0.4%)	0	755

Table 3. The word order of verb clusters in the YCOE

As shown in Table 3, the 1-2-3 order accounts for 78.3% of the examples found, whereas both the 1-3-2 and 3-2-1 orders account for about 10%. The 3-1-2 and 2-1-3 orders account for less than 1%. The 2-3-1 order was not identified in the data of this study. Overall, this result is similar to that of the two previous studies.

It is important to consider why the rates of the 3-1-2 order and 2-1-3 orders are extremely low. (10) and (11) are good examples to consider for this purpose.

(10) ær hit *geendad mehte beon*,
 before it ended might be
 ‘before it could be ended’ (coorosiu,Or_5:11.125.19.2639) ((9d) is repeated.)

(11) & swa ðeah ungetweogendlice heo *beon mæg ongyten* soð martyr
 & nevertheless undoubtedly she be may considered true martyr
 butan openlicre þrowunge,
 without open suffering
 ‘nevertheless undoubtedly she may be considered a martyr without open suffering’
 (cogregdC,GDPref_and_3_[C]:26.231.21.3230) ((9e) is repeated.)

As shown in Table 3, these word orders were quite rare. For the example from *Orosius* in (10), Koopman found a 3-2-1 order (*geendad beon mihte*) in the same line of another manuscript. As for (11), this study also found a 1-2-3 order (*mæg beon ongyten*) in the same line of another manuscript. This implies the possibility that these word orders were unnatural even in OE. However, these word orders are included in the analysis of this study.

Note here the differences in the rates depending on the clause types: main vs. subordinate, as shown in Table 4.

	1-2-3	1-3-2	3-2-1	3-1-2	2-1-3	2-3-1	Total
MC	268 (88.7%)	23 (7.6%)	10 (3.3%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	302
SC	323 (71.3%)	51 (11.3%)	70 (15.5%)	7 (1.5%)	2 (0.4%)	0 (0.0%)	453
Total	591	74	80	7	3	0	755

Table 4. Three-verb clusters in MC and SC in the YCOE

First, the 3-2-1 order (the participle-*be/have*-modal order) is used five times more frequently in subordinate clauses than in main clauses. This is natural since a modal verb stays in situ in a subordinate clause, which excludes the possibility of topicalization. Nevertheless, 15.5% is still unexpectedly low. Second, the 1-2-3 order (the modal-*be/have*-participle order) occurs in 88.7% of main clauses and 71.3% of subordinate clauses. Since V2 is not observed in a subordinate clause, the high rate of 1-2-3 order there must be explained. Furthermore, as for the 2-3 order (the *be/have*-participle order), as found in (12), cannot be explained if OE is a head-final language.

- (12) Gyf þu wylt *beon fullfremed*
if you will be perfect
‘if you want to be perfect’ (cowsgosp,Mt_[WSCp]:19.21.1288)

Next, we examine the diachronic change of word order in the OE period. Table 5 shows that the word orders of 1-3-2 and 3-2-1, which are typical in a head-final language, decreased in number, whereas 1-2-3 order, which is the norm in PDE, increased in the later stage of OE. In other words, the word order change had already begun in the OE period.

	1-2-3	1-3-2	3-2-1	3-1-2	2-1-3	2-3-1	Total
Early OE	113 (55.4%)	44 (21.6%)	42 (20.6%)	4 (2.0%)	1 (0.5%)	0 (0.0%)	204
Late OE	478 (86.8%)	30 (5.4%)	38 (6.9%)	3 (0.5%)	2 (0.4%)	0 (0.0%)	551
Total	591	74	80	7	3	0	755

Table 5. Three-verb clusters in early and late OE

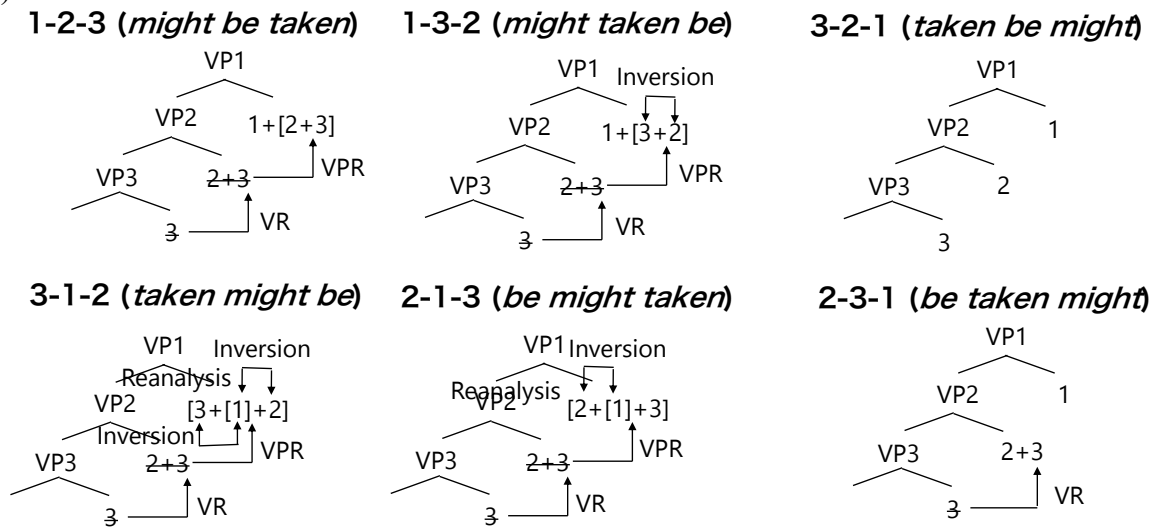
3. Syntactic structure of three-verb clusters in OE. In this section, we consider how each word order can be derived in previous studies and the present study’s proposal, as well as evaluate each assumption.

The first is the head-final assumption proposed by Koopman (1990), whereby the head always follows the complement. This assumption implies that OV and VAux are basic word orders. The second is the head-initial assumption proposed by Biberauer and Roberts (2005), whereby the head always precedes the complement. This assumption implies that VO and AuxV are basic word orders. The third is the double-base hypothesis proposed by Pintzuk (1999), according to which both head-final and head-initial orders are allowed. This implies that VO/OV and VAux/AuxV are all regarded as basic. The last assumption is a hybrid assumption proposed in this study, whereby a lexical projection is head-final, while a functional projection is head-initial. Therefore, this implies that OV and AuxV are basic word orders.

To evaluate these four assumptions, the following three criteria were considered. The first is the motivation for V(P)-movement. The Verb Raising (VR) and Verb Projection Raising (VPR) are sometimes referred to in assumptions regarding word order in OE.³ However, these operations are arbitrary in nature and should be removed from syntactic derivations as much as possible. The second criterion is the derivation of the 2-3-1 order. As discussed above, this word order is not attested in OE. Therefore, an assumption that does not derive this word order is favorable. The third criterion is adjacency in the 3-2-1 order. As explained above, the verbs in the cluster are always adjacent. Hence, it is desirable to keep them adjacent in its derivation.

3.1. HEAD-FINAL HYPOTHESIS. (13) illustrates how the head-final hypothesis derives each word order.

(13)

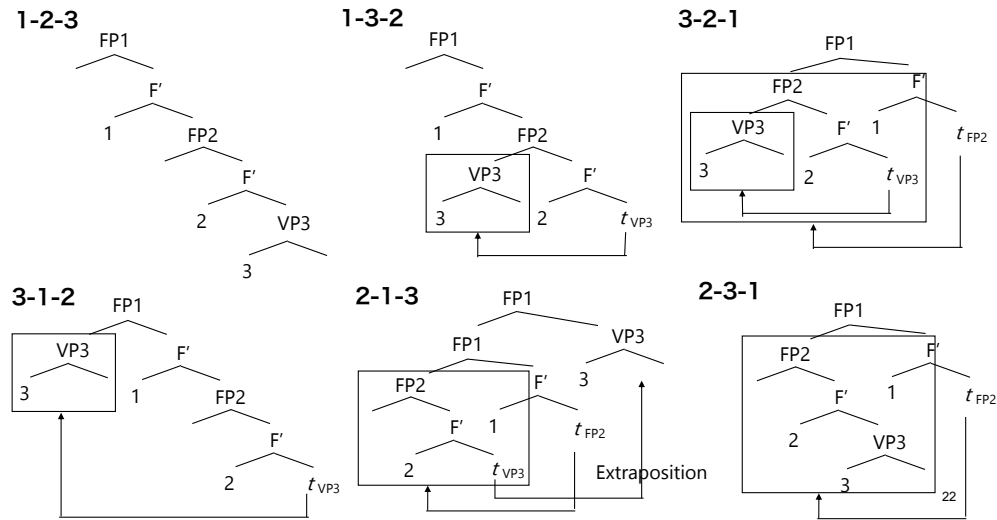


In the case of the 1-2-3 order, for example, 3 is raised to the above head and then 2 + 3 is raised again to the above head. As a result, a 1-2-3 order is produced. Under the first criterion of Motives of V(P)-movement, the operations of VR and VPR are undesirable. Furthermore, in the derivation of the 3-1-2 order and 2-1-3 order, reanalysis and inversion, which are also arbitrary rules, must be employed. As for the second criterion, the 2-3-1 order can be derived by VR, so the result is unfavorable. As for the third criterion, the 3-2-1 order is basic, so it is unproblematic.

3.2. HEAD-INITIAL HYPOTHESIS. As Biberauer & Roberts (2006) did not indicate the use of three-verb clusters in OE, this derivation is presumed based on their basic proposal. The most important point is the raising of VP to the specifier of a functional projection. This operation is motivated by the agreement of an EPP feature and is explained as an instance of pied-piping. Each derivation is shown in (14).

³ See van Kemenade (1987) for the details of VR and VPR in OE.

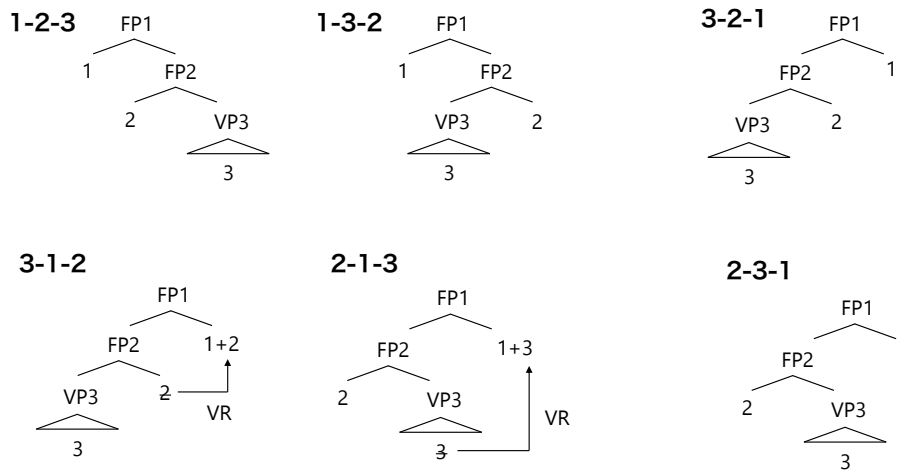
(14)



The 1-2-3 order is basic, as each projection has its head in the initial position. Other word orders must have pied-piping operations as well. For example, to derive the 3-2-1 order, VP3 must be moved to the specifier of FP2, and FP2 must then be moved to the specifier of FP1. These operations are assumed to be motivated by the EPP. However, in the case of the 1-3-2 order, VP3 is moved only up to the specifier of FP2, whereas in the case of the 3-1-2 order, VP3 is moved to the FP1 specifier. Such optionality must be given an adequate explanation. As for the second criterion, the 2-3-1 order can be derived, which is unfavorable. As for the third criterion, as seen in the derivation of the 3-2-1 order, the adjacency of each verb is not guaranteed.

3.3 DOUBLE-BASE HYPOTHESIS. Pintzuk (1999) proposed the double-base hypothesis, which assumes that the head of each phrase can be either final or initial. As she did not mention the derivation of three-verb clusters in OE, the structures in (15) are presumed to be based on her hypothesis.

(15)

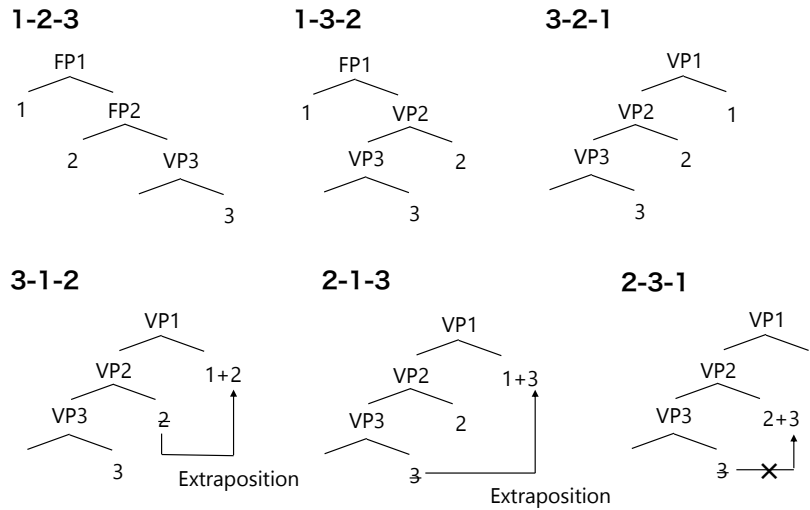


VR is necessary for deriving the 3-1-2 and 2-1-3 orders. As explained above, this operation is arbitrary and undesirable. As for the derivation of the 2-3-1 order, it can be a basic word order if

FP1 is head-final and FP2 is head-initial. Therefore, the results are unfavorable. As for the third criterion, if VP3 is head-initial, the adjacency of each verb is not guaranteed.

3.4. HYBRID HYPOTHESIS. The gist of this proposal is that some FPs emerged during the OE period. In fact, two functional projections are assumed in the 1-2-3 order; one functional projection is postulated in the 1-3-2 order, while no functional projection is assumed in the other word orders, as illustrated in (16).

(16)



The important tenet of this hypothesis is that functional projections are always head-initial, while lexical projections are always head-final. Under this assumption, V can remain in situ, except when extraposed in the 3-1-2 and 2-1-3 orders, which are very rare instances in OE. Therefore, the first criterion is satisfied. As for the second one, the 2-3-1 order cannot be derived because VR is not available. As for the third criterion, as seen in the derivation of the 3-2-1 order, the adjacency of each verb is maintained, which is a favorable consequence.

3.5. THE EVALUATION OF EACH ASSUMPTION. A summary of the three evaluations is presented in Table 6.

	Head-final	Head-initial	Double base	Hybrid
Motives of V(P) movement	NO	YES/NO	YES/NO	YES/NO
Derivation of 2-3-1	YES	YES	YES	NO
Adjacency of 3-2-1	YES	NO	YES/NO	YES

Table 6. The evaluation of each assumption

YES is the positive evaluation for the Motives of V(P)-movement. NO is the positive evaluation for the derivation of the 2-3-1 order, and YES is the positive evaluation for the adjacency of each verb in the 3-2-1 order. With these results considered, the hybrid hypothesis seems to be the most plausible. However, it would be preferable to add two more evaluations: learnability and uniformity. Table 7 shows the evaluation based on these five criteria.

	Head-final	Head-initial	Double-base	Hybrid
Motives of V(P) Movement	NO	YES/NO	YES/NO	YES/NO
Derivation of 2-3-1	YES	YES	YES	NO
Adjacency of 3-2-1	YES	NO	YES/NO	YES
Learnability	YES	YES	NO	YES
Uniformity principle	YES	YES	YES/NO	NO

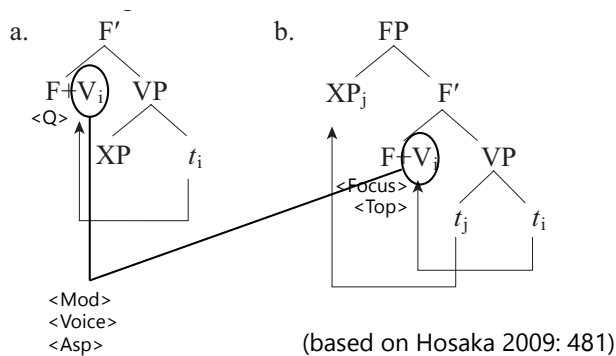
Table 7. The evaluation of each assumption based on the five criteria

Learnability is the criterion for determining the ease of acquisition. The directionality of the head assumed in the head-final, head-initial and hybrid hypotheses is steady and easy to acquire. However, in the double-base hypothesis, the directionality is unstable, which may cause difficulties in language acquisition. Another criterion is language uniformity. The hybrid hypothesis violates the uniformity principle because the existence of FP is assumed to be different in each language, both cross-linguistically and diachronically. This point will be pursued from an evolutionary perspective in the next section.

4. Emergence of FP.

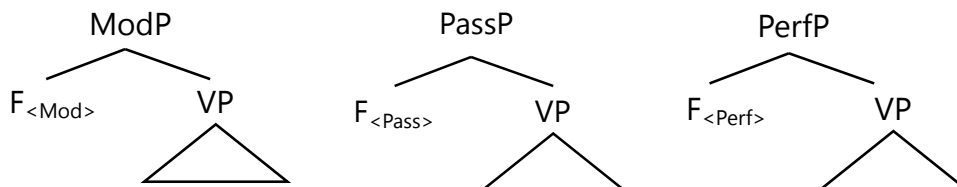
4.1. MECHANISM OF EMERGENT FP. The mechanism of the FP emergence is explained on the basis of Hosaka (2009), as illustrated in (17).

(17)



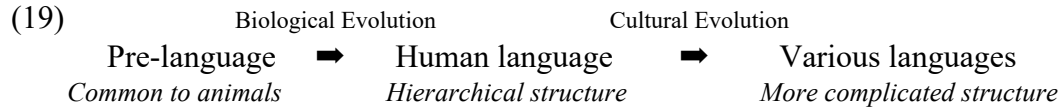
As discussed in Kiss (2014), the left periphery of a sentence plays an important role in the evolution of language. More specifically, the left periphery generally contains discourse-related features, such as the Q-feature, Focus-feature, and Topic-feature. A verb alone can move to the left ledge, as in (17a), whereas V2 can be observed in (17b). More importantly, features attached to verbs are transferred to F, which, as a result, splits into specific functional projections such as ModP, PassP, and PerfP, as shown in (18).

(18)

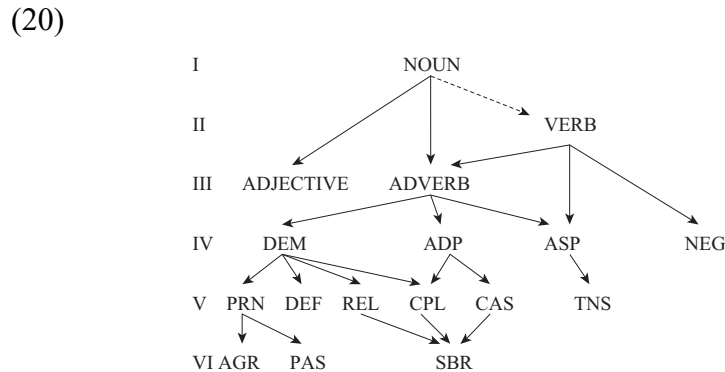


Such processes can be explained from the evolutionary perspective.

4.2. CULTURAL EVOLUTION OF LANGUAGE. Language evolution is one of the most controversial issues in linguistics. Evolution has two aspects: biology and culture, and language evolution involves both aspects. As shown in (19), if communicative systems common to animals are considered Pre-language, the emergence of human language, which has a hierarchical structure, is the result of biological evolution unique to only human beings.



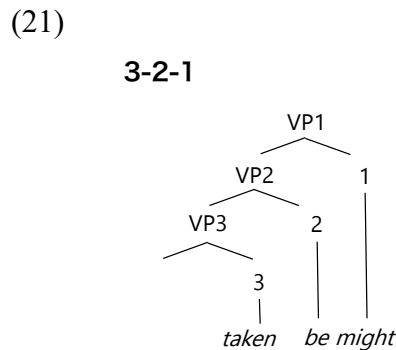
While discussing language evolution, Berwick and Chomsky (2016) argued that the rise of the operation Merge played a central role in producing a hierarchical structure of language. Then, through the process of cultural evolution, this hierarchical structure became more complicated, giving rise to various languages used in the present world. One such cultural evolution of language is assumed to be grammaticalization. As shown in (20), language is considered to have evolved from a simple language with only lexical items such as nouns and verbs to a more complicated one with functional items such as determiners, auxiliary verbs, subordinators, and relatives.



Layers of grammatical development (Heine and Kuteva 2007: 111)

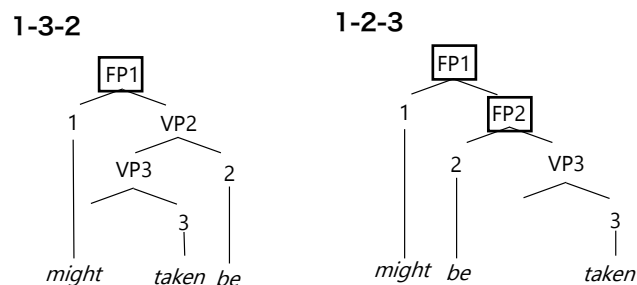
If this is on the right track, the emergence of FP explained above is the result of cultural evolution and the uniformity principle is no longer relevant.

4.3. THE EMERGENCE OF FP IN OE. To clarify the process of the FP emergence in OE, let us assume that a lexical projection is head-final and a functional projection is head-initial. As illustrated in (21), at the early stage, in which only lexical projections are postulated, the 3-2-1 order is considered as basic.



However, as was shown in Table 5, this word order was already less common in OE, which means that it is highly likely that the structures having one or two functional projections were already developed, as shown in (22).

(22)



This assumption is confirmed by the changing rate in Table 5.

5. Further implications. As already established, English has obtained more complicated hierarchical structures in the course of its historical change as shown in (23).

- (23) a. She thinks [that he *may/might/must/could* have been being bullied]
 b. CP > TP > MP > PERFP > PROGP > VOICEP > VP (Radford 2020: 241)

These multiple auxiliary combinations were developed in Middle English and Early Modern English.⁴ The results of this study can lead to the possibility that FP evolved dynamically to give rise to such hierarchical structures. Identifying adaptive factors in the process will be a topic of great interest in the field of cultural evolution. Furthermore, the asymmetrical directionality proposed in this study can provide some new insights cross-linguistically. As suggested by Fukui (2006), if Japanese has no functional category, it is easily explained why Japanese is strictly head-final. Moreover, as Carling & Cathcart (2021) claimed, if Proto-Indo-European is head-final, their assumption can be convincing evidence for the hybrid hypothesis. Further developments in these research fields are highly expected.

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⁴ See Denison (2002: 139) for the details of their historical change.

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