

An HPSG approach to English Comparative Inversion*

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Summary. This paper proposes that we should take advantage of both the construction-based approach and the word order domain approach at the same time to account for English comparative inversion. That is, constraints on properties of lexemes participating in a phrase type for CI are governed by the construction-based approach, while the word order of CI is determined by rules that word order domain approach adopts. The reason behind this proposal is that CI does not reflect the constituency. At the same time, I suggest that CI should be analyzed with a new phrase type called *inv-focus cl* and [INV+] rule, which allow the subject to shuffle with elements in VP, unlike other phrases. In addition, these rules can be applied to explain the order of *nor*-inversion, *as*-inversion, and *so*-inversion.

Keywords: English comparative inversion, focus inversion, *inv-focus-cl*, [INV+] rule.

1 Introduction

It has been analyzed that the word order of English comparative inversion is analogous to that of other subject-auxiliary inversions in that only a finite auxiliary verb can be followed by the subject. However, English comparative inversion should be distinguished from other inversions because the subject can be located between a cluster of auxiliary verbs and the non-auxiliary verb phrase in English comparative inversion. Existing analyses on subject-auxiliary inversion cannot account for this special kind of inversion. This paper proposes a new phrase type for English comparative inversion within the construction-based HPSG. In addition, I suggest that constraints on properties of lexemes participating in the new phrase type are governed by the construction-based approach, while the word order of English comparative inversion is determined by rules that the word order domain approach adopts. Also, it will be shown that these proposals can capture the word order of *nor*-inversion, *as*-inversion, and *so*-inversion as well as that of comparative inversion.

2 Characteristics of CI

English Comparative inversion has been analyzed in the same way as other inversions (Merchant 2003 and Maekawa 2007). This is because both comparative inversion and other inversions seem to have the same word order: only a finite auxiliary verb can precede the subject as in (1).

- (1) a. Humans can climb trees more carefully than can monkeys. [CI]
b. Have you ever been to Seoul? [Interrogative inversion]
c. Not until the evening did John find his son. [Negative Inversion]

* I would like to thank Prof. Eun-Jung Yoo for her invaluable suggestions and advice. My gratitude also goes to three anonymous reviewers of this conference for their comments. All remaining errors are solely mine.

However, Culicover and Winkler (2008) provide some examples indicating that, unlike other inversions, CI allows the subject to be preceded by more than one auxiliary verb as in (2)¹.

- (2) a. Who was responsible for keeping the records would be a more reliable witness as to their accuracy as a whole than would be any of the original makers.
b. To her, thinking, as she ever was thinking, about Johnny Eames, Siph was much more agreeable than might have been a younger man.
c. In other words, once a storm has destroyed a residential area, the repair costs are higher than would have been the cost of preventing the release of green house gases.
(Culicover and Winkler, 2008)

Also, a host of authentic data showing this fact can be found from literature, the Web, and corpora such as the British National Corpus (BNC) and the Corpus of Contemporary American English (COCA) as follows.

- (3) a. It is no more expensive than would be the system you are proposing.
(Huddleston and Pullum, 2002)
b. White women in our study would have used relatively more IAAT than would have the black women. <The America Journal of Clinical Nutrition>
c. Her name on that list affected me more than would have divorces from a dozen Kathyrns. (COCA)

Even though this construction has been considered as a type of SAI, the subject cannot be located in the middle of auxiliary verbs unlike other SAI constructions as in (4) (Subjects of the sentences in (2) are located after finite auxiliaries).

- (4) a. *Who was responsible for keeping the records would be a more reliable witness as to their accuracy as a whole than would any of the original makers be.
b. *To her, thinking, as she ever was thinking, about Johnny Eames, Siph was much more agreeable than might a younger man have been.
c. *In other words, once a storm has destroyed a residential area, the repair costs are higher than would the cost of preventing the release of green house gases have been.

In addition, when more than one auxiliary verb is followed by the subject in CI, they can be elided as follows.

- (5) John might have been injured much more severely
a. than might have been Ben.
b. than might have Ben.
c. than might Ben.

The fact that the inverted subject is located at the sentence final position might lead us to regard this special inversion as HNPS. However, sentences in (6) illustrates that inverted subjects cannot be where heavy NPs can be located – between the last auxiliary and the non-auxiliary verb only when the non-auxiliary verb in comparative clause has the contrastive focus meaning (*made* in (6a) and *read* in (6b)).

¹ A reviewer is a little skeptical about the data. I think these data are rather marginal and Culicover and Winkler (2008) note that not all English native speakers consider those sentences grammatical. However, they mention that those sentences sound much better when certain context and intonation are properly controlled.

- (6) a. John might have eaten cookies much faster than might have Paul made.
 a'. *John might have eaten cookies much faster than might have made Paul.
 b. Mike wrote more books than would have John read.
 b'. *Mike wrote more books than would have read John.

Culicover and Winkler (2008) suggest that this peculiar word order results from the interaction between information structure and intonation. (7) demonstrates that the inverted subject should be interpreted only as the contrastive focus. The subject preceded by auxiliary verbs in the comparative clause cannot be replaced by an epithet which is co-referential to the subject in the main sentence, since the expression cannot have the contrastive focus interpretation.

- (7) Bill Clinton_i said more than could have the president_{j/*i}.

The inverted subject with contrastive focus meaning is accompanied by metrical prominence and contrastive foci are prone to be placed at the right edge of intonational phrase (ip) as in (8) (Capitalization signals the metrical prominence).

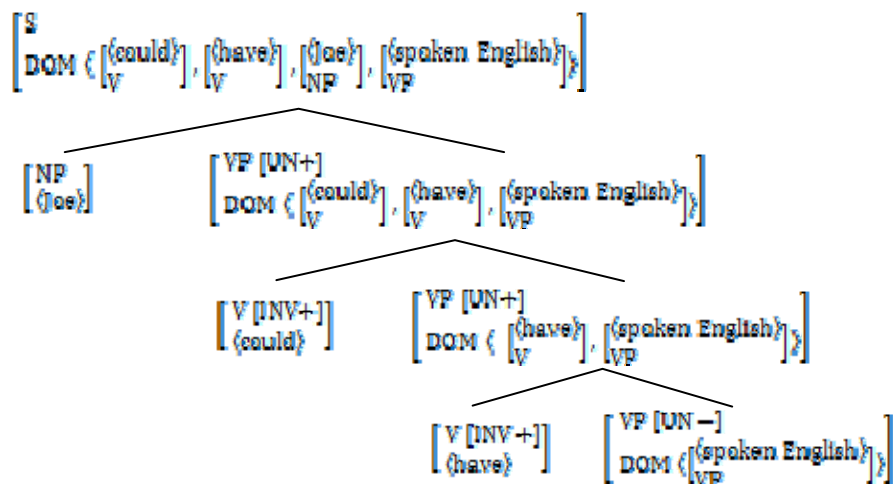
- (8) Anna ran much faster (than could have MANNY)_{ip}.

This discontinuous construction cannot be analyzed easily with the construction-based approach, since, in this approach, the word order is determined by the constituency and there is no phrase allowing the subject to be located between the non-finite auxiliary and the non-auxiliary verb.

3 Proposals

An alternative is to adopt the word order domain approach introduced by Reape (1994, 1995). Within this approach, in order to allow the word order of the sentence (9a), the domain structure should be represented as in (9b).

- (9) a. John read French more fluently than could have Joe spoken English.
 b.



(9b) illustrates that the subject is preceded by auxiliary verbs in the domain of S, even though the subject precedes auxiliaries according to the head-subject ID rule. In order to produce a sentence with the proper word order, all auxiliary verbs in (9b) should contain [INV+], since only elements with [INV +] can be followed by the subject. In addition, VPs

whose head is the auxiliary verb with [INV +] must contain [UN +] in order not to make itself frozen, allowing auxiliary verbs and the subject to be shuffled.

This analysis, however, has a non-trivial objection. The word order of (9b) is possible when a rule is assumed that the auxiliary verb with [INV +] should subcategorize for a certain complement. The complement should have [UN +] and its head must contain [INV +], when the head has [AUX +]. Otherwise, the subject could be located between auxiliary verbs, producing CI with the improper word order. If this rule is applied to all verbs with [INV +], we cannot properly rule out ungrammatical sentences. (10a) is an interrogative clause with the appropriate word order, while (10b) is ill-formed due to the position of the subject.

- (10) a. How might they have been produced?
 b. *How might have been they produced?

When the rule is applied to all auxiliary verbs containing [INV +] in (10), *have* - the head of the complement of *might* - should have [INV +] and its projection has to contain [UN +]. Besides, the complement VP of *have* should contain [UN +] and *been* must have [INV +]. And the subject is preceded by auxiliary verb with [INV +]. Then, (10a) cannot be produced, making (10b) grammatical unexpectedly.

The method I propose in this paper, is that the word order is determined not by constituency but by word order domain rules within the construction-based approach. In this approach, one thing I assume is that the default value of the UN feature is negative in the absence of any additional constraint. This assumption prevents word order domain rules from producing sentences with the improper word order by means of shuffling.

The first domain rule specifies the order between the head and the complement. In all phrases in English, the head is always followed by its complement. This basic rule can be represented as in (11).

- (11) Head-complement rule: $\text{DOM} \langle \{ \text{COMPS} \langle \text{HEAD} [1] \rangle \} \rangle \prec \text{DOM} \langle \{ \text{HEAD} [1] \} \rangle$

(11) illustrates that a head should be followed by its complement's head in the domain. If this rule is not present, we cannot rule out the phrase where the complement precedes the head.

Another rule essential to explain the order of phrase elements has to do with the position of the subject. A rule which can capture this word order is described as in (12).

- (12) Subject rule: $\left[\begin{array}{c} \text{INV} + \\ \text{SUBJ} \langle [2] \rangle \end{array} \right] \prec [2] \prec \left[\begin{array}{c} \text{INV} - \\ \text{SUBJ} \langle [2] \rangle \end{array} \right]$

(12) implies that all auxiliary verbs with [INV +] must precede the subject and that those with [INV -] should follow the subject.

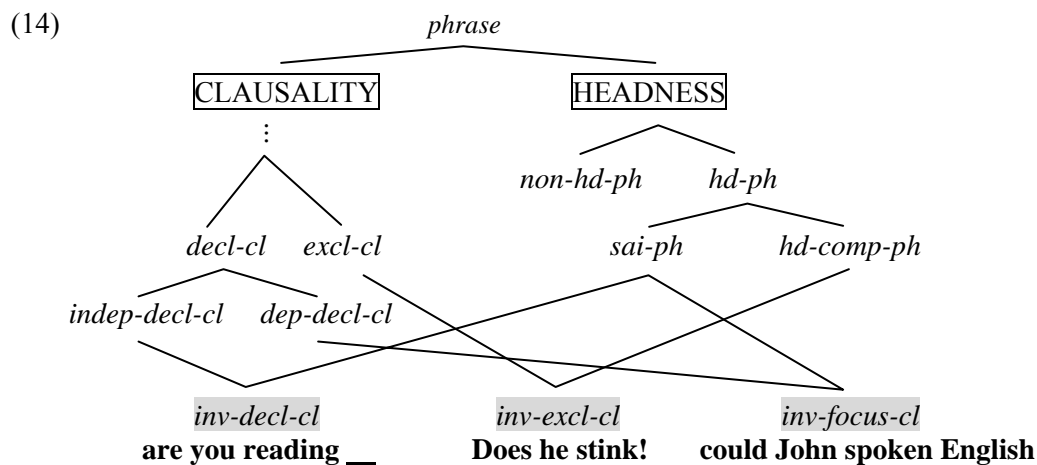
Given the word order domain rules above, a phrase type CI belongs to should be identified in terms of multiple inheritance hierarchy. In the construction-based approach in English, non-finite auxiliary verbs have [INV -] by default in the absence of any constraint, which assures that the non-finite auxiliary verb in every English phrase type has [INV -]. This means that CI cannot be analyzed with existing types of phrases, since all non-finite auxiliary verbs in CI should have [INV +], given the fact that all auxiliary verbs preceding the subject cannot contain [INV -] in any kind of inversions, according to (12).

This translates into the need to devise a new phrase type that forces non-finite auxiliary verbs participating in CI to have [INV +]. In addition, the prospective phrase type must allow the subject to shuffle with elements in the auxiliary verb phrase. If the subject merges with the auxiliary verb phrase with [UN -], the subject cannot be located between more than one auxiliary verb and the non-auxiliary verb phrase.

The phrase type should also evince that a finite auxiliary verb must subcategorize for one of two kinds of complements – VP with [INV +] and [UN +] or a phrase with [AUX -]. The former allows the subject to be shuffled with elements in the auxiliary verb phrase when CI has more than one auxiliary verb, while the latter can capture the word order of CI that has only one finite auxiliary verb.

All constraints for CI that should be taken into account are put together in a following new phrase type as in (13). I will name this *inv-focus-cl* and the location of *inv-focus-cl* in the phrasal type hierarchy can be sketched as in (14).

$$(13) \textit{inv-focus-cl}: [\quad] \rightarrow H \left[\begin{array}{l} \text{[SUB] } \langle \text{[FOC A]} \rangle \\ \text{COMPS } \langle \text{[INV +]} \mid \text{[AUX -]} \rangle \end{array} \right], \dots$$



Yet, *inv-focus-cl* is not sufficient, because this phrase type cannot control properties of the third auxiliary verb when a cluster of auxiliaries consists of three auxiliary verbs. This means that *inv-focus-cl* cannot force the third auxiliary verb to have [INV +], because all non-finite auxiliary verbs have [INV -] by default. Then, *inv-focus-cl* cannot guarantee the word order of (15).

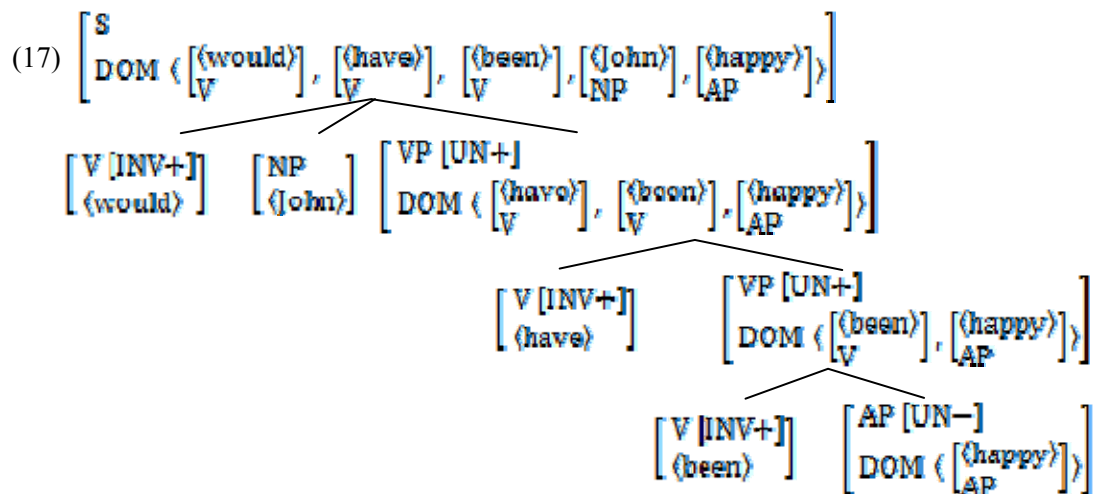
(15) ?Mary would have been angry much longer than would have been John, happy.

In order to capture the word order of CI that cannot be covered by constraints in *inv-focus-cl*, an additional rule is necessary. The rule must be able to guarantee that the complement of the second auxiliary verb should satisfy following condition: Either VP whose head is the auxiliary verb should contain [UN +] and its head should have [INV +] or a phrase must have [AUX -]. This constraint is represented as in (16).

(16) [INV +] verb rule
 When a non-finite verb with [INV +] subcategorizes for an auxiliary verb phrase, the phrase has [UN+] and its HEAD feature contains [INV +].

This rule implies that non-finite auxiliary verbs can have either [INV +] or [INV –]. Nonetheless, all non-finite auxiliaries in CI can have [INV +] through (16). This is possible because *inv-focus-cl* guarantees that the second auxiliary verb should contain [INV +] and then the [INV +] verb rule is applied to all non-finite auxiliary verbs in CI.

When constraints that have been mentioned so far are integrated, the word order tree for (15) can be represented as in (17).



4 Implication

In the previous chapter, I conclude that a cluster of auxiliary verbs can be followed by the subject in CI when the subject is interpreted as focus and the word order of this construction is licensed by *inv-focus-cl* and related word order rules. This conclusion makes us to predict that other inversion constructions which are under the same conditions CI has can have the word order identical to that of CI. This follows that those inversions can be subtypes of *inv-focus-cl*. The following constructions show how this prediction is borne out.

4.1 *nor*-inversion

In (18), only a finite auxiliary verb precedes the subject in *nor*-clauses, leaving its following auxiliary verbs in the original position.

- (18) a. Our man from Pernambuco had no inkling of this treachery, nor would he have given it his approval. (COCA)
 b. Edict 1 had been passed so long ago that most citizens of Spyre did not even know it existed, nor would they have understood its significance if it were described to them. (COCA)

Examples in (18) do not pattern with CI this paper focuses on in that the subjects are located between auxiliary verbs. This is not surprising since the subjects in sentences in (18) are co-referential with their antecedents in the main sentences and they can never be interpreted as focus. In (19), however, the subjects with focus meaning in *nor*-inversion are preceded by a cluster of auxiliary verbs. This means that examples in (19) cannot be analyzed with the phrase type for the inversion in (18). The examples come from American and British English corpora and the Internet.

- (19) a. A minor brawl between Arabs and Jews would have been nothing, nor would have been Israeli Arab demonstrators clashing with police in Arab townships, or Jewish

settlers and Palestinians attacking each other's persons and property in the occupied territories. (COCA)

- b. This harassment used the mechanisms provided by the research ethics industry on campus, and it seems likely that a private therapist would not have been such an easy target, nor would have a journalist. (BNC)
- c. I haven't been surprised by the rally, nor should have been my readers.
- d. As for the balancing of the flywheel to the driven plate, my friend wasn't familiar with that, nor might have been the guy who did the conversion originally.
- e. ?I have not seen Sobers play nor might have Harsha watched him in his pomp.
- f. He did not die on the cross, nor could have any man died on the cross in such a short period.

4.2 *as*-inversion and *so*-inversion

As Culicover and Winkler (2008) mention, *as*-inversion, *so*-inversion, and CI show the similar word order.

- (20) a. Blair fell down the stairs, as did her brother.
- b. John made his hair cut, and so did Tom.

At a cursory glance, sentences in (20) indicate that *as*-inversion and *so*-inversion can be analyzed with existing phrase types for inversions. However, it can be found that *inv-focus-cl* and related rules are essential to capture the word order of those two inversions in the sense that they also allow the auxiliary cluster inversion as in (21).

- (21) a. As the pyramid rose, the working space would have diminished, of course, and so would have the number of teams that could simultaneously work atop it
- b. Jane had been there, and so had been her boy friend.
- c. Sandy would have been very angry, as would have been all of the people who invested in the project. (Culicover and Winkler, 2008)

Sentences in (21) illustrate that each inverted subject has only focus meaning and it is preceded by a cluster of auxiliary verbs. Even though the non-auxiliary verb phrases do not follow the inverted subjects in *as*-inversions and *so*-inversions as in CI, the word order of two inversions also can be explained with *inv-focus-cl* and related rules.

Thus, from the examples above, a conclusion can be drawn that the inversion construction that *inv-focus-cl* and word order rules can cover is not confined to CI. Rather, they can be applied to *nor*-inversion, *as*-inversion, and *so*-inversion, even though syntactic properties of these inversions are not identical to those of CI.

5 Conclusion

I proposed that CI should be explained by the combination of both the word order domain approach and the construction-based approach, since the word order of CI does not follow the constituency. Based on this proposal, I introduced a new type of phrase, called *inv-focus-cl*. This new phrase has the following constraints: 1) the inverted subject should have the FOC value and 2) the head of this phrase subcategorizes for the complement which contains either [INV +] as the HEAD value and [UN +] or [AUX -]. In order to explain the word order of CI with three auxiliary verbs, the [INV +] verb rule was suggested. I also provided an implication that constraints for CI can be applied to other kinds of inversions – *nor*-inversion, *as*-inversion, and *so*-inversion – where the inverted subject is restricted to have the focus interpretation.

Given the new suggestions above, this paper makes some contributions toward HPSG as follows. First of all, *inv-focus-cl* and related rules can correctly account for the word order of CI which existing analyses fail to capture. In addition, this paper suggests a uniform way to explain

the word order of focus inversions including CI, *nor*-inversion, *as*-inversion, and *so*-inversion within the framework of HPSG. At last, this analysis provides the necessity to adopt the word order domain approach within the construction-based approach in English. This lays the foundation for scrutinizing other possible constructions with discontinuous constituency.

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