English Locative Inversion: A Constraint-Based Approach[*]

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Abstract

English locative inversion (LI) constructions exhibit various intriguing properties. Central concern includes how to capture the mixed properties of the preverbal PP and the postverbal NP: the preverbal PP functions both as a subject and topic, while the postverbal NP has subject and focus properties at the same time. Departing from configurational approaches (Newmeyer 1987, Coopmans 1989, Hoekstra and Mulder 1990, Rochemont and Culicover 1990, among others), this paper attributes such intriguing and mixed properties of the constructions to the interaction of enriched lexical information of the lexemes occurring in LI and construction-specific constraints. In particular, the paper claims that LI is a result of different mapping relations among grammatical function structure (valence structure), argument structure, and discourse structure. In particular, the information structure in which the locative PP carries topic and the theme represents focus in a sense triggers the PP to be realized as syntactic subject and the NP to be object. Together with such a mapping constraint, the paper shows that constraints on the phrase *locative-inv-ph* and its supertypes, whose existence is independently motivated by English grammar, play crucial roles in accounting for phenomena such as freezing effects.

Key Words: locative inversion, construction, lexicalist, subject property, focus, topic, argument structure, grammatical interface

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1 Introduction

Locative inversion (LI) is a general term applying to cases of inversion with the locative PP in the preverbal and the theme NP in the postverbal position. The examples of LI given in (1) are cases found in the ICE-GB (British Component of the International Corpus of English) that contains about one million words from 500 different spoken and written texts:[1]

(1) a. And then suddenly from the bottom [appears] a motor car. (ICE-GB:S1B-038)
b. Then behind him [came] Eton Lad who fluttered. (ICE-GB:S2A-006) (ICE-GB:W1A-011)
c. Within this quotation are [engraved] astrological zodiacal symbols, clockwise from Pisces uppermost.
(ICE-GB:W2A-040)
d. In a closely-guarded paramilitary base in the wilds of northern Sardinia [stands] a well-worn billiard table...(ICE-GB:W2C-010)
e. In the top drawer of her desk [lay] her letter of resignation from Jupiter Services.(ICE-GB:W2F-008)

As noted by Ward et al. (2002), such examples have syntactically more basic counterparts differing not in truth conditions but only in the way the informational content is presented. Numerous attempts have been made to account for how the syntax makes it possible to say the same thing in different ways. The central concern of these attempts has been the following:

- How can we generate such locative constructions and what triggers the inversion?

- What are the grammatical properties of the preverbal PP and the postverbal NP, and the status of the verb in LI?

- How can we account for various grammatical (syntactic, semantic, and pragmatic) constraints in LI?

This paper is another attempt to answer these questions from a constraint-based perspective. In particular, in order to account for intriguing and mixed properties of the constructions in question, the paper argues for a grammar that allows tight interactions among different grammatical components: valence, argument-structure, discourse-function (information structure), and constructions.

In the paper, we will first briefly review the previous literature and then provide an alternative analysis within a constraint-based grammar.
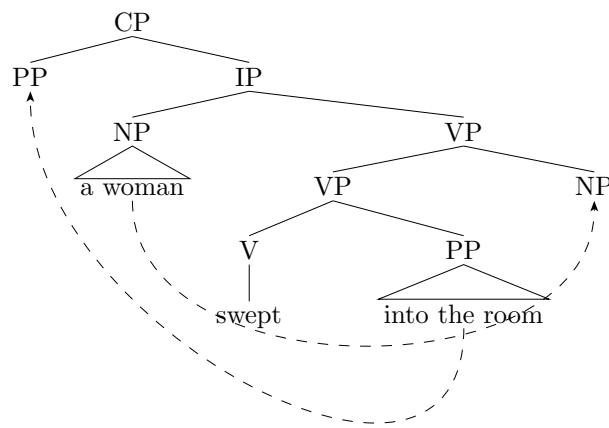
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[1]Our research is restricted to main verb locative inversion. LI with the *be* have several differences from LI with main verbs. For example, the postverbal element can be various in copula LI; the PP need not be locative; the NP need not be heavy:

(i) a. Standing next to me was the president of the company. (Participle preposing)
b. More to the point is the identification of the proposal's supports (ICE-GB: W1B-020).
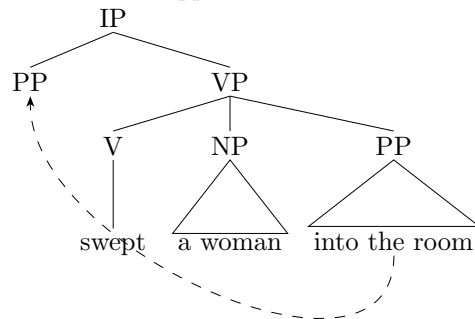c. In second place is Jeremy Doncaster. (ICE-GB S2A-012)

2 Configurational Approaches to Locative Inversion

The traditional syntactic view has treated LI in terms of movement and configurational structures. As represented in (3), the view can be at large divided into two main anlayses: topicalization approach (cf. Bowers 1976, Newmeyer 1987, Rochemont and Culicover 1990), and unaccusative approach (cf. Coopmans 1989, Hoekstra and Mulder 1990).

(2) Topicalization Approach:

```
                    CP
           _____/ _____
         PP                   IP
                    _____/    _____
                  NP                       VP
                 / \              _____/    _____
              a woman          VP                       NP
                        _____/  _____
                      V                  PP
                      |              ___/  \___
                    swept          into the room
```

(3) Unaccusative Approach:

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               IP
          ____/  \____
        PP            VP
               _____/|_____
             V       NP        PP
             |       /\        /  \
           swept  a woman  into the room
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The basic idea of the topicalization approach is to move the PP into a topic position and the subject NP to a VP-adjoined position. Meanwhile, the unaccusative analysis takes the NP to be the object of an unaccusative verb and moves to the locative PP into a subject position.[2]

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[2]It is hard to claim that LI is limited to unaccusative verbs. LI seems to include certain unergatives but exclude certain unaccusatives (see Birner 1994, Birner and Ward 1998):

Both of these two analyses reflect some basic properties of LI. For example, LI cannot occur with a transitive verb as in (4) :[3]

(4) a. *In the room rolled John the ball.
   b. *Down the street walked the old nanny her dog.
   c. *Onto the track ran the jockey the horse. (Rochemont 1986)

But this does not mean that all intransitive verbs can be applicable in LI. LI is possible only when the locative PP is a complement as noted in Bresnan (1994):[4]

(5) a. *On the corner was drinking a woman.
   b. *On his bicycle appeared John.(Coopmans 1989)

Other than such basic properties, the predications of the two analyses are quite different when we look into the two analyses in more detail.

2.1 Review of the Topicalization Approach

2.1.1 Advantages

As represented in (2), the topicalization approach, originated from Bowers (1976), takes the PP to be moved into the topic position and then the subject NP into an adjunction position of VP or S.

Subject Properties of the Postverbal NP: Since the NP is generated as subject, we would expect more subject properties of the NP.

1. Agreement: The examples in (6) show that even though the postverbal NP is not in the canonical subject position, it plays the role of subject with respect to agreement.

(i) a. *On the top floor of the skyscraper broke many windows.
   b. *On the streets of Chicago melted a lot of snow. (Levin and Rappaport Hovav 1995).

(ii) a. Behind the mayor's car marched police officers.
    b. On the third floor worked two young women.

As noted, unaccusative verbs like *broke* and *melted* cannot occur in LI whereas unergative verbs like *march* and *work* do appear. Birner (1994) has claimed that what plays an important role here is a pragmatic constraint on the information status of the verb in context: namely, that the verb must not represent new information in the discourse.

[3]However, as discussed in Birner (1994), Birner and Ward (1998), and Culicover and Levine (2001), LI allows incorporated nouns in complex verbs., e.g. *take place, take root.*, as in *In that year took place a great renewal.*

[4]The following contrast exhibits one main difference between a complement and an adjunct (Bresnan 1994):

(i) a. On the corner, who drank?
   b. *On the corner, who stood?

(6) a. In the garden stand/*stands two fountains.
  b. Down through the hills and into the forest flows/*flow the little brook.
  (Levine 1989)

2. Nominative: Another subject property of the NP centers on its nominative case. As noted by Kathol and Levine (1992), when the postverbal NP is a pronoun, it must have nominative case.[5]

(7) a. Under the garden wall sat I (, waiting for my friends to appear).
  (Levine 1989)
  b. In the garden is HE. (Green 1992)

Topic properties of the PP: Since the PP is moved into a topic position, we would expect some topic properties on the PP.

1. The Definiteness PP: As argued in Schachter (1992), one strong argument for the topichood of the PP concerns the usage of an indefinite PP. As shown in the contrast (8), it is possible to have an indefinite locative proform in a noninverted sentence but this is not the case in LI:

(8) a. A child was found somewhere.
  b. *Somewhere was found a child.

A topic element in general represents established information and it is thus preferred to be definite. The topichood of the PP in LI then could explain why it cannot be a maximally indefinite locative phrase like *somewhere.*

2. Distributional Similarities: The PP also exhibits distributional similarities with a topic phrase. For example, just like a topic phrase, the preverbal PP appears neither in a nonfinite clause nor in an embedded *if* or *whether* clause as illustrated in (9):

(9) a. *Bill asked if such books John only reads at home.
  b. *Bill asked if near John's house lies buried treasure.

The co-occurrence with the complementizer also indicates the topichood of the PP. When LI or topicalization occurs in an embedded clause, the overt complementizer *that* must exist, as shown in the contrast (10) and (11):

(10) a. Mary said [that the dog, the man kicked].
  b. *Mary said [the dog, the man kicked].

(11) a. Mary said [that under the tree sat a woman].
  b. *Mary said [under the tree sat Mary].

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[5]Kathol and Levine (1992) suggest that the NP cannot be accusative when it is focused.

  (i) a. *Under the garden wall sat me (, waiting for my friends to appear).
    b. *"Good", said me.

However, Rochemont (1986) and Green (1992) provide cases where the NP can be accusative. See (14).

2.1.2 Problems

Despite such strong points of the analysis, there are some nontrivial issues in such an analysis.

Adverbs: Given the assumption that the NP is adjoined to a VP or an S, nothing would block a VP adverb from occurring right after the verb or before the adjoined postverbal NP as in (12).

(12) a. *In front of us walked proudly Dana.
    b. *Into the room strode boldly Robin.
    c. *Outside the door sat uncomfortably a young man.

However, there is a strong tendency for an adverb to occur after the adjoined NP (Kathol and Levine 1992):

(13) a. Into the room strode Robin boldly.
    b. In front of us walked Dana proudly.
    c. Outside the door sat a young man uncomfortably.

Accusative NP: Another issue arises from the possibility of the accusative NP. As noted by Rochemont (1986) and Green (1992), when the postverbal pronoun is used as deitic, not as anaphoric, the pronoun can be accusative too:

(14) a. Into the forest ran HIM.
    b. Next to his father stood HER.

Focus Properties of the NP: Such a topicalization approach makes no explicit statement about the focus status of the postverbal NP.[6] As noted by Rochemont (1986) and (Bresnan 1994) among others, LI has a special discourse function. It introduces or reintroduces the referent of the postverbal NP on the scene referred to by the preposed locative. Thus, while the preposed PP serves as the topic of the given sentence, the postverbal NP serves as a presentational focus. The focus property of the postverbal NP can explain why the reply B is odd in the following context:

(15) A: I am looking for my friend Rose.
    B: # Among the guests of honor was sitting Rose.

Since Rose is already mentioned in A, it cannot be (re)introduced on the discourse as a presentational focus. Another related observation concerns the pronominal restriction (Bresnan 1994):

(16) #Rose, among the guests of honor was sitting she/her.

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[6]One can argue that adjoining a phrase to a VP is to assign a focus to the element. We believe this is an implicit statement (cf. Bresnan 1994). In addition, there seems to exist strong evidence that the NP functions just like an object.

The preposed PP is normally thematic in the sense that its referent is known to the hearer. The postverbal position is, however, for a syntactic element carrying higher degree of 'communicative force' (cf. Hartvigson and Jakobsen 1974). The communicative force means the extent to which the sentence element contributes to the development of the communication. Given this, the personal pronouns have lowest degree of communicative force unless they are stressed.[7]

Another phenomenon resulting from the focus property is contrastive focus, as noted in (Bresnan 1994).

(17) a. On the wall hung canvasses, but not paintings.
b. ??On the wall hung canvasses, but not on the easels.

Though the PP is more difficult to serve as a contrastive focus since it functions as a topic, the postverbal NP, serving as a focus, can naturally work as a focus of contrast.

2.2 Review of the Unaccusative Approach

Unlike the topicalization approach, the unaccusative approach accepts the view that the theme NP is the object of an unaccusative verb and the PP moves to the Spec of IP position as given in (3):

2.2.1 Advantages

Subject Properties of the PP: With this approach, the PP, which moves into the specifier position of IP, is predicted to carry some subject properties.

1. Raising: The first piece of evidence supporting the subjecthood of the locative PP concerns raising phenomena (Bresnan 1994). Since English allows only subject to be raised, according to this line of approach, we can expect cases where the locative PP is the subject of a raising verb. This is in fact what happens as in (18):

(18) a. Over my windowsill seems to have crawled an entire army of ants.
b. On the hill appears to be located a cathedral.

2. Tag Question: The formation of a tag question also supports the subjecthood of the preverbal PP. Since in tag questions the pronoun agrees with the subject, we can predict that *in the garden* in (19)a is the subject:

(19) a. In the garden is a beautiful statue, isn't there/*isn't it?
b. In the ocean are whales, aren't there?

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[7]We also assume that a heavier NP has higher degree of communicative force.

3. *That*-trace Effect: The *that*-trace effect can also tell us that the PP behaves like a subject. The absence of the complementizer *that* is the very characteristic of English subject extraction as in (20). When the preverbal PP in LI is extracted from an embedded clause, an overt complementizer cannot occur as shown in (21) (Data from Culicover and Levine 2001):

(20) That bunch of gorillas, Terry claims (*that) __ walked into the room.

(21) a. Into the room Terry claims (*that) __ walked a bunch of gorillas.
b. Into which room does Terry claim (*that) __ walked a bunch of gorillas?

4. Weak cross-over Effect: According to Culicover and Levine (2001), another subjecthood property of the PP centers on weak cross-over effects. As shown in the contrast (22), the wh-question in (22)a is far worse than the raising example in (22)b:

(22) a. ??Who$_i$ does his$_i$ mother think [t$_i$ is genius]? (WCO)
b. Who$_i$ appears to his$_i$ mother [t$_i$ to be a genius]? (Raising)

The parallel contrast is evident between the topicalized PP in a noninverted case and the inverted PP. As in (23), unlike in the canonical topicalization case, the reciprocal PP can be bound by the NP:

(23) a. *Into every dog$_i$'s cage its$_i$ owner peered __ . (Topicalization)
b. Into every dog$_i$'s cage peered its$_i$ owner. (LI)

This observation, as noted by Culicover and Levine (2001), implies that the locative PP in (23)b functions like a subject or in an A-position.

5. No Do-support Phenomenon: Another subject property has to do with the formation of a *wh*-question. When the subject is realized as the *wh*-word, the so-called *do*-support does not occur as in (24). This is what happens in (25):

(24) a. Who *did meet/met Bill?
b. Which portrait of the artist *did hang/hung on the wall?

(25) a. In which garden *did stand/stood a fountain?
b. On which wall *did hang/hung a portrait of the artist?

Object Properties of the Postverbal NP: In the unaccusative approach, the NP is generated as the object of an unaccusative verb. Some of its object properties can be found:

1. In canonical cases, the main clause subject controls the subject of *without* adjunct clause as in (26).

(26) The trouble is in English you can't say it without appearing offensive. (ICE-GB Corpus: SLA-053-289)

As observed by Coopmans (1989), the postverbal NP in LI cannot control the subject of the *without* adjunct-clause:

(27) a. Two shieks lay near the oasis [without PRO talking].
b. *Near the oasis lay two sheiks [without PRO talking].

Given that only subjects can control *without* VP adjunct clause as in (26), this would mean that the postverbal NP does not function as the subject.

2. Adverb position: Unlike the topicalization approach, the distributional restriction of adverbs in LI follows immediately from this unaccusative approach. Since the NP is generated as the complement of the verb, nothing can intervene between them as we have noted in (12) and (13) , whose data are repeated here:

(28) a. In front of us walked Dana proudly.
b. *In front of us walked proudly Dana.

2.2.2 Problems

However, such an approach also suffers from several problems.

Topic Properties of the PP: Within such an approach, there exist no clear mechanism to assign the topic properties to the preverbal PP unless we introduce functional projections such as Topic Phrase.

Subject Properties of the NP: Another remaining issue of such an analysis is how to account for the subject properties of the postverbal NP. For example, even though the postverbal NP can be accusative, there exist cases where it is nominative. In addition, the verb seems to agree with this postverbal NP.

Focus Properties of the NP: Also, the analysis says nothing about the focus properties of the postverbal NP.

Root Phenomenon and Freezing Effects: The unaccusative analysis needs to introduce additional mechanisms in accounting for the so-called root phenomenon. If the PP functions as the subject, there seems to exist no clear reason why it does not form a SAI:

(29) a. *Did up the street trot the dog?
b. *Did into the room sweep a woman?

Related to such a root phenomenon is freezing effects. The extraction of the NP in LI forms an island: the postverbal NP cannot be either questioned or relativized (Levine 1989):[8]

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[8]But the whole locative phrase can be relativized or questioned as in (i):

(i) a. In which garden stands a fountain?
b. She stood on the corner on which was standing another woman.

(30) a. *What does in the garden stand ___ ?
    b. *The fountain that in the garden stands ___ is my favorite.

If the NP resembles a canonical object, we would not expect such an island effect either.

3   Lexicalist Approaches to Locative Inversion

Unlike the configurational approaches we have just seen, there is another sort of direction for LI proposed in various forms in Levine (1989), Bresnan (1994), Green (1992), Kathol and Levine (1992), among others. The central assumption of these analyses is that the lexical properties of the inversion verb play an important role in projecting LI sentences. The representations in (31) and (32) are canonical cases of these lexicalist anlayses:

(31) C-structure of the Factorization Approach: (Bresnan 1994)
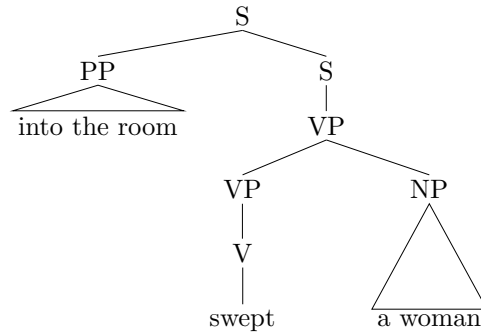
(32) Linearization Approach: (Katol and Levine 1992, Levine 2002)
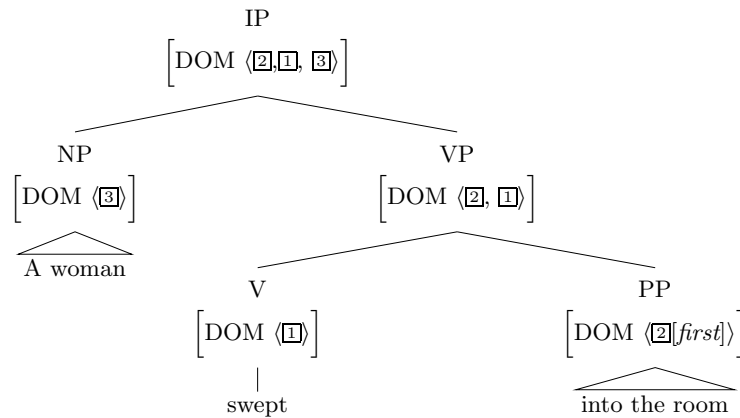
The common denominator of such lexical approaches is to treat LI not in terms of movement operations, but in terms of alternative lexical specifications for inversion verbs.

In particular, the factorization approach in (31) assumes that the difference between LI and its source sentences resides in differences in mapping relations among different structures, that is, from *a*-structure into grammatical functions and from f-structure into c-structure (cf. Bresnan 1994). In such an analysis, the inverted PP is a topic at the level of *c*-structure but a subject at a f-structure: the NP is a VP adjoined element at *c*-structure but a focused object at f-structure. The factorization of various properties in LI into different structures seem to capture the mixed properties of each element in LI. However, it appears to us that there is no systematic mapping relations from f-structure to c-structure. For example, it does not tell us what triggers the object NP to adjoin to the VP. In addition, such an analysis needs to resort to a different mechanism to account for the subject properties of the postverbal NP. Another remaining issue such an analysis faces is the so-called freezing effects that we will discuss in 4.1

With the linearization approach developed by Kathol and Levine 1992, Levine 2002, and sketched in (32), ordering relations among terminal elements are directly stated in the grammatical component of DOM(AIN) specifications. The DOMAIN list define the subcomponents of linguistic expressions subject to linear order restrictions with respect to each other. Unlike ordinary declarative sentences, the PP in LI can declaratively bear the [+ *first*] specification on the verb's mother's DOM list, as represented in (32). The linearization approach thus reflects the linear projection of phrase structure, not phrase structure itself. Some crucial loose ends of such an approach have to do with the feature [+ *first*] that makes the constituent with this feature come first: there seems to be no trigger for assigning this feature into PP. In addition, this approach needs to have a finer-grained theory to capture various discourse functions related to the PP and the NP in LI.

4 A Construction and Constraint-Based Approach

4.1 Constraints on the Mapping Relation

The basic idea of my analysis starts from the assumption that LI is a result of different mapping relations among grammatical function structure (valence structure), argument structure, and discourse structure. I also take discourse functions to be the main trigger for LI. That is, as represented in (33)a, in the canonical cases, the theme NP is mapped onto SUBJ and the locative PP onto COMPS. However, as represented in (33)b, when the locative PP carries topic and the theme is assigned to have focus, this mapping relation is reversed.

(33)   a. Mapping in the Canonical case:

			SUBJ	COMPS
Valence Structure:			SUBJ	COMPS
			│	│
Argument-structure:			NP[theme]	PP[loc]

   b. Mapping in the LI case:

			SUBJ	COMPS
Valence Structure:			SUBJ	COMPS
Argument-structure:			NP[theme]	PP[loc]
Discourse-structure:			Top	Focus
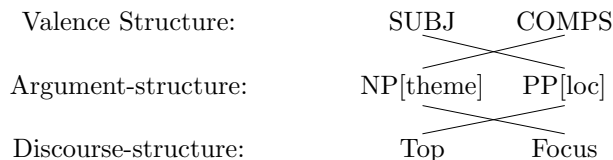
We could take this mapping condition as a lexical process. Represented in the HPSG framework, a *loc-v-lxm* (locative-verb-lexeme) will minimally have the lexical information given in (34):

(34)
$$\begin{bmatrix} \textit{loc-v-lxm} \\ \text{HEAD} \quad \begin{bmatrix} \textit{verb} \end{bmatrix} \\ \text{ARG-ST} \quad \left\langle \text{NP, PP} \right\rangle \end{bmatrix}$$

Like other lexemes, such a lexeme observes the Argument Realization Constraint in (35), when realized in syntax.

(35) Argument Realization Constraint (ARP):

$$\begin{bmatrix} \textit{word} \\ \\ \text{VALENCE} \quad \begin{bmatrix} \text{SUBJ} & \boxed{A} \\ \text{COMPS} & \boxed{B} \end{bmatrix} \\ \text{ARG-ST} \quad \boxed{A} \oplus \boxed{B} \end{bmatrix}$$

The ARP in (35) basically ensures that all the elements in the argument structure are realized on the appropriate valence list (grammatical functions): SUBJ and COMPS. For example, an intransitive verb like *sit* will be realized as follows:

(36)
$$\begin{bmatrix} \textit{loc-v-w} \\ \text{PHON} \quad \langle \text{sit} \rangle \\ \\ \text{VALENCE} \quad \begin{bmatrix} \text{SUBJ} \ \langle \boxed{1} \rangle \\ \text{COMPS} \ \langle \boxed{2} \rangle \end{bmatrix} \\ \text{ARG-ST} \quad \langle \boxed{1}\text{NP}, \boxed{2}\text{PP} \rangle \end{bmatrix}$$

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We assume that a *loc-inv-w* (*locative-inversion-word*) is a noncanonical realization of the *loc-v-lxm*[9] when the PP is mapped onto TOPIC and the NP is on FOCUS at the same time, as represented in (37):[10]

(37) Locative Inversion Argument Realization:

$$loc\text{-}v\text{-}lxm \rightarrow \begin{bmatrix} loc\text{-}inv\text{-}w \\ \text{VALENCE} \begin{bmatrix} \text{SUBJ} \ \langle \ \boxed{2} \ \rangle \\ \text{COMPS} \ \langle \ \boxed{1} \ \rangle \end{bmatrix} \\ \text{ARG-ST} \ \langle \boxed{1}\text{NP}, \boxed{2}\text{PP} \rangle \\ \text{INFO-ST} \begin{bmatrix} \text{TOPIC} \ \boxed{2} \\ \text{FOCUS} \ \boxed{1} \end{bmatrix} \end{bmatrix}$$

Such dissociations between valence structure (grammatical functions) and argument structure motivated by the discourse functions directly reflect some basic properties of locative inversion.[11]

In addition, this analysis clearly indicates that the NP functions as a subject at argument-structure level and an object at a valence level, whereas the PP is a complement at argument-structure but a subject at valence-structure. This can directly capture the mixed properties of the NP as well as the PP.

Verb Types and Passive in LI: The analysis first explains why no transitive verbs can occur in LI as in (38):[12]

(38) a. *In the room rolled John the ball.
     b. *Down the street walked the old nanny her dog.
     c. *Onto the track ran the jockey the horse. (Rochemont 1986)

Transitive verbs like *roll* in (38)a are not *loc-v-lxm* and thus cannot serve as the input to the *loc-inv-v*.

The analysis also predicts that LI is possible with passivized transitive verbs that has a locative PP as its complement (Bresnan 1994).[13]

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[9]Though the mapping from *loc-v-lxm* to *loc-inv-w* is taken as a special type of the canonical ARP in (35), this could be formalized either as a lexical rule.

[10]The feature INFO-ST is adopted from Engdahl and Vallduví (1996).

[11]See Manning and Sag 1999 for a similar dissociation between argument structure and valence features in ergative languages.

[12]However, as discussed in Birner (1994), Birner and Ward (1998), and Culicover and Levine (2001), LI allows incorporated nouns in complex verbs., e.g. *take place, take root.*, as in *In that year took place a great renewal.*

[13]The analysis, in which the optional *by*-phrase is taken to be an adjunct and thus is not in the argument structure, would then predict that the presence of the agentive PP is not welcomed (see Bresnan 1994).

(i) a.??Among the guests of honor was seated my mother by my friend.
    b. ??In this rainforest can be found the reclusive lyrebird by a lucky hiker.

The agentive *by*-phrase is still in the argument structure. This means that the verb *seated* would have three elements in the argument structure, violating the lexical constraint in (51).

(39) a. Among the guests of honor was seated my mother.
    b. On the table has been placed an apple.

Unlike the examples in (38), the passive verbs *seated* and *placed* in (39) have only the patient and locative arguments.[14]

No PP adjunct: LI is possible only when the locative PP is a complement as noted in Bresnan (1994):[15]

(40) a. *On the corner was drinking a woman.
    b. *On his bicycle appeared John.(Coopmans 1989)

(41) a. ??In the lane conferred the co-captains.
    b. ??At the corner of Wright and Green turned the instructor.

In the present analysis, these examples are out simply because an adjunct locative cannot be in the ARG-ST and thus cannot serve as an input to the LI lexicalization.

Binding: The analysis also presents an account of binding facts.

(42) a. Two handsome young boys$_i$ sat beside each other$_i$.
    b. Beside each other$_i$ sat two handsome young boys$_i$.

As noted earlier, the postverbal NP is the subject since in the LI, it binds the anaphor *each other* within the preverbal PP. Within the binding theory of HPSG where the argument-structure is the locus of binding, we then can predict the 'outranking' NP in (43) can function as the binder of the PP.[16]

(43) $\left[\text{ARG-ST } \langle \boxed{1}\text{NP[boys}_i\text{]}, \boxed{2}\text{PP[each other}_i\text{]}\rangle\right]$

Case: By allowing the grammar to refer to both the valence and argument structure, we would expect case variations of the theme NP depending on where the case assignment occurs in LI. As noted earlier, we have cases where the postverbal NP is accusative or nominative (Green 1992).

(44) a. Into the forest ran HIM.
    b. Next to his father stood HER.

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[14]One could question if there is a derivational process from a transitive verb to a passive with the agentive argument and then to a passive with no agentive argument as in (39). Different from this, the present analysis assumes, if interpreted in a procedural point, a transitive verb could be realized as a passive verb with the agentive being either in the ARG-ST or absent.

[15]The following contrast exhibits one main difference between a complement and an adjunct (Bresnan 1994):

(i) a. On the corner, who drank?
    b. *On the corner, who stood?

[16]See Sag and Wasow (1999) for the binding theory of HPSG.

(45) Under the tree sat I (waiting for my friends to appear).

If it is in the valence level where we assign case, the postverbal NP is a complement within our system and thus will get accusative. If the argument structure is the locus of case assignment (Przepiórkowski (1998)), we would then expect nominative NP.

Agreement: The subject-verb agreement fact also follows from the assumption that it is the ARG-ST that is the locus of the agreement. Since the postverbal NP is the subject at the ARG-ST, the verb will agree with this NP element though it is realized in the postverbal position as a complement. For example, let us see the lexical entry of the singular verb *stands*:

$$
(46) \quad
\begin{bmatrix}
\langle \text{stands} \rangle \\
\text{ARG-ST } \langle \text{ NP}_{\boxed{i}}, \text{ PP}_{\boxed{j}} \rangle \\
\text{CONTENT}
\begin{bmatrix}
\text{RELATION} & stand \\
\text{THEME} & \boxed{i}[3rd\ sing] \\
\text{LOC} & \boxed{j}
\end{bmatrix}
\end{bmatrix}
$$

As represented in (47), the verb requires its theme NP to be 3rd singular. This restriction holds whether the NP is realized as a postverbal complement NP or as a subject in a canonical sentence.

Adverb Position: Within the analysis, we also would not expect an adverb to intervene between the verb and the theme NP since the NP is the direct complement of a locative verb. This explains the contrast in (47):[17]

(47) a. Outside the door sat a young man in an attitude of despondency.
b. *Outside the door sat in an attitude of despondency a young man.
(Penhallurick 1984)

Extraction: Still remaining questions are related to how to account for the so-called 'root' phenomenon'. We have seen that only the PP can be extracted, as we have seen in (30), repeated here in (48) and (49):

(48) a. *What does in the garden stand?
b. In which garden stands a fountain?

---

[17]Such examples directly show that the postverbal NP is not adjoined to the VP. As points out by Ivan Sag (p.c.), this would also predict a heavy object could be right-shifted over an adverb as in (i):

(i) a. I read last Tuesday a wonderful book about Korean grammar.
b. On my rug sat on most occasions a magnificent waterpipe that I brought back from Nepal.

(49) a. *The fountain that in the garden stands __ is my favorite.
    b. She stood on the corner on which was standing another woman.

We have also noted that there are even cases where the PP has undergone a long-distance extraction:

(50) a. *What did John say in the garden stood?
    b. In which garden did you say stood a lamp?

Examples like (50) indicate that we cannot simply specify that LI is a root phenomenon. One solution we resort to is to specify the focused theme NP argument as being of type *canon-ss*, that is an element that cannot be gapped. Assuming this, we add this lexical condition to the Locative Inversion Argument Realization as in (51):[18]

(51) Locative Inversion Argument Realization (Revised):

$$
\textit{loc-v-lxm} \Rightarrow
\begin{bmatrix}
\textit{loc-inv-v} \\
\text{VALENCE}
\begin{bmatrix}
\text{SUBJ} \ \langle \ \boxed{2} \ \rangle \\
\text{COMPS} \ \langle \ \boxed{1} \ \rangle
\end{bmatrix} \\
\text{ARG-ST} \ \langle \boxed{1}\text{NP}[\textit{canon-ss}], \boxed{2}\text{PP}\rangle \\
\text{INFO-STR}
\begin{bmatrix}
\text{TOPIC} \ \langle\boxed{2}\rangle \\
\text{FOCUS} \ \langle\boxed{1}\rangle
\end{bmatrix}
\end{bmatrix}
$$

As noted by Bouma et al. (2001), in English there are also peculiar cases where lexemes specify their arguments as being of type of *gap-ss*. One example can be found from the usage of the verb *assure* given in (52):[19]
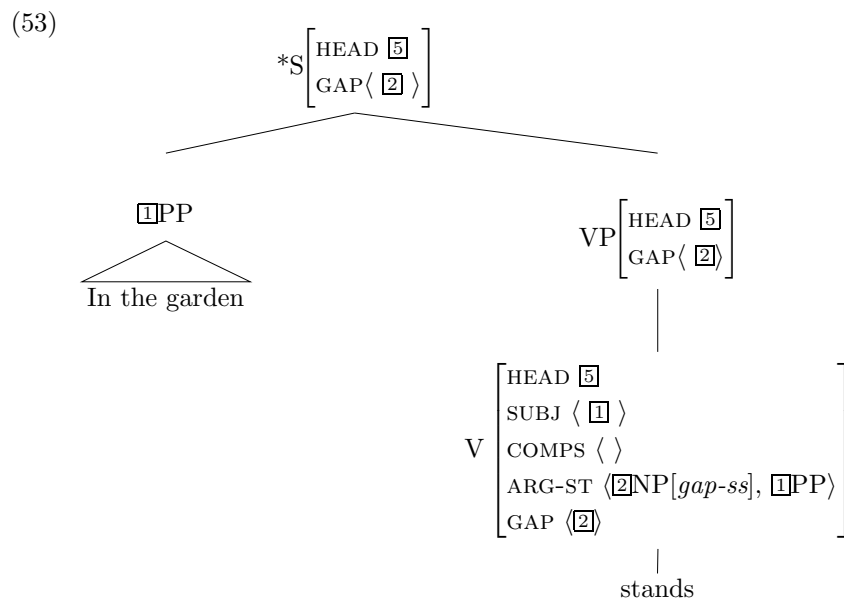
(52) a. This candidate, they assured me __ to be reliable.
    b. *They assured me this candidate to be reliable.

What we can observe in (52) is that the understood subject of the infinitive VP cannot be realized as a canonical NP. Given such a lexical case, it would not unreasonable to assume that the words of *loc-inv-v* impose a specific constraint

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[18]In terms of a discourse point of view, such a lexical constraint could be attributed to the discourse function assigned to the postverbal NP in LI: it should provide a substantial new information. Questioning the whole NP could not satisfy this condition.

[19]One argue that this is not about the lexical properties of *assure*, but the general properties of English VP. That is, English allows two NP sisters within VP only when they are the order of Goal-Theme. However, such a order restriction is hard to support in such a case since thematically *this candidate* is unrelated to *assure* in any way. In addition, there is no problem with *I assure you this candidate is reliable*. As suggested by Robert Levine (p.c.), one can claim that the VP infinitive have a *gap-ss* SUBJ specification (within the assumption that *assure* selects NP and VP). The point we have here is the type of argument can sometimes be lexically determined.

on the type of its focused NP.[20] The lexical specification in (51) means that the NP cannot be realized as a gapped element, blocking examples like (49)a, as we can observe from its partial structure in (53):

(53)

$$
*\text{S}\begin{bmatrix} \text{HEAD } \boxed{5} \\ \text{GAP}\langle\, \boxed{2}\, \rangle \end{bmatrix}
$$

$\boxed{1}\text{PP}$

In the garden

$$
\text{VP}\begin{bmatrix} \text{HEAD } \boxed{5} \\ \text{GAP}\langle\, \boxed{2}\,\rangle \end{bmatrix}
$$

$$
\text{V}\begin{bmatrix} \text{HEAD } \boxed{5} \\ \text{SUBJ } \langle\, \boxed{1}\, \rangle \\ \text{COMPS } \langle\, \rangle \\ \text{ARG-ST } \langle\boxed{2}\text{NP}[\textit{gap-ss}], \boxed{1}\text{PP}\rangle \\ \text{GAP } \langle\boxed{2}\rangle \end{bmatrix}
$$

stands

The present analysis, however, does license cases like (48)b, (49)b, and (50)b. In these examples, what is extracted is not a complement NP but the subject PP. The grammar places no restrictions on the type of this subject PP, implying that it can either be realized as a canonical element or a gapped element. The representation in (54) is the structure of (50)b:

---

[20]Following Bouma et al. (2001), we accept the view that *synsem* has *cannon-ss* and *noncan-ss* as its subtypes, the latter of which in turn has *pro-ss* and *gap-ss*. As default, an argument is *synsem*, meaning that it can be realized either as *cannon-ss* or *noncan-ss*. See Bouma et al. (2001) for details.

(54)

S

 ☐1 PP   S[GAP⟨☐1⟩]

 In which garden

 V   NP   VP
            [GAP⟨☐1⟩]

 did   you   V   VP
             say   [GAP⟨☐1⟩]

                    V   ☐2 NP

$$\begin{bmatrix} \text{SUBJ} & \langle\,\boxed{1}\,\text{PP}\rangle \\ \text{COMPS} & \langle\,\boxed{2}\,\text{NP}\rangle \\ \text{ARG-ST} & \langle\,\boxed{2}\,\text{NP},\ \boxed{1}\,\text{PP}[\textit{gap-ss}]\rangle \\ \text{GAP} & \langle\,\boxed{1}\,\rangle \end{bmatrix}$$

 stood   a lamp
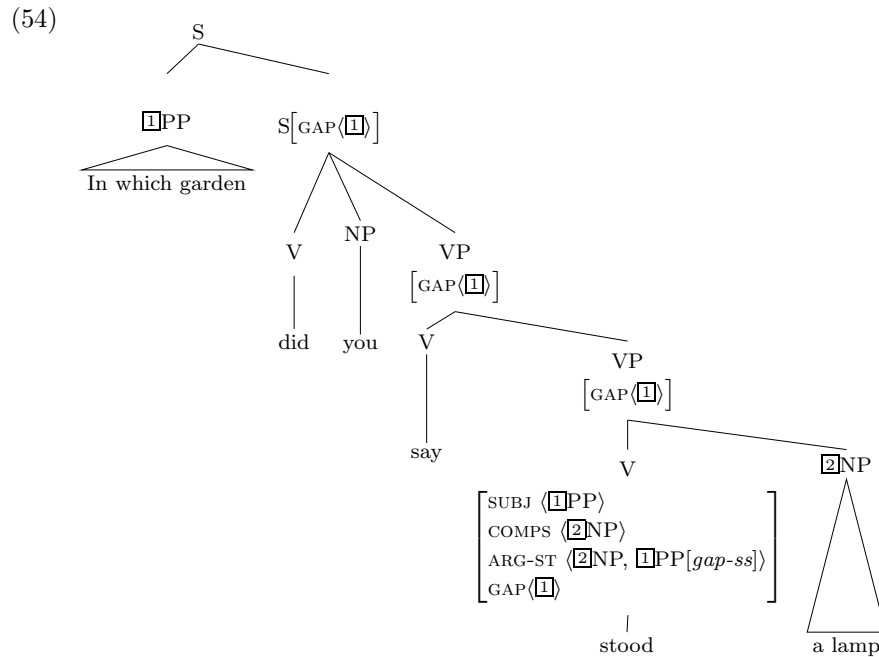
As represented in (55), the subject PP of the *loc-inv-v* is realized as a *gap-synsem* element. This gapped element has been passed up until it is discharged by the filler *in which garden*.[21]

4.2   Constructional Constraints

As pointed out earlier, at stake in LI is the fact that the preposed PP has both topic and subject properties, whereas the postposed NP acts like an object and a focus. We attribute these mixed properties to the fact that LI phrases are

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[21]One could argue that the VP adjoined position is a focus position that blocks any extraction. However, it is possible to question the canonical focus as in (i).

 (i) a. It was John that kicked the ball.
      b. Who was it that kicked the ball?

If this is the case, one then need to account for why we could not question the postverbal focus NP in LI.

 (i) *What does in the garden stand __ ?

One could attribute this to the fact that the PP is a topic and nothing could cross over a topic clause. However, in embedded clauses, English allows the order of *wh*-phrase and topic:

 (ii) a. ...the man to whom, liberty, we could never grant...
       b. ?I wonder to whom this book, Bill should give.

In addition, if the postverbal NP is adjoined to the VP, we could not account for the lack of the order V-Adv-NP in LI and the accusative case assignment to the NP as we have seen in (12).

subtypes of both *head-subj-ph* and *top-cl*, as represented in a simplified multiple inheritance hierarchy in (55):

(55)
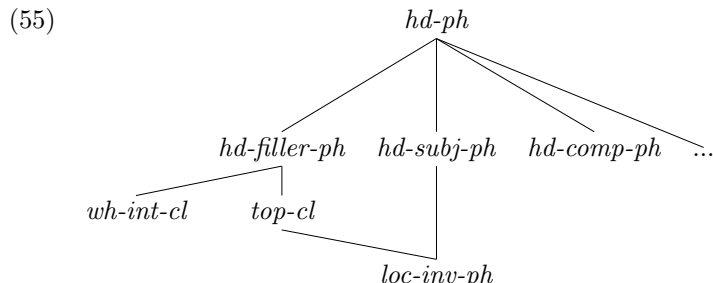
Within a multiple inheritance system, a phrase assigned to a type obtains all the constraints associated with its supertypes, in addition to its own constraints.[22] This then allows us to factor out clausal functions of each phrase while capturing generalizations about particular constructions. The hierarchy in (55) thus makes sure that an instance of *loc-inv-ph* inherits both the constraints of the *top-cl* (a subtype of *head-filler-ph*) and those of the *head-subj-ph* in addition to its own constraint.

A *head-subj-ph* (e.g., a sentence) and *head-filler-ph* (like a phrase consisting of [[*Fido*, [*John likes* __]]) independently have the following constraints:

(56)   *hd-subj-ph*:

$$\begin{bmatrix} \text{SUBJ} & \langle \ \rangle \end{bmatrix} \ \rightarrow \ \boxed{1} \ , \ \mathbf{H} \begin{bmatrix} phrase \\ \text{SUBJ} & \langle \boxed{1} \rangle \end{bmatrix}$$

(57)   *head-filler-ph*:

$$\begin{bmatrix} \ \end{bmatrix} \ \rightarrow \ \begin{bmatrix} \text{LOC} \ \boxed{2} \end{bmatrix}, \quad \mathbf{H} \begin{bmatrix} \text{HEAD verb} \\ \text{GAP} \ \langle \boxed{2} \rangle \end{bmatrix}$$

The constructional constraint (56) says that the *head-subj-ph* consists of a subject and a VP looking for its subject. Meanwhile, the constraint on *head-filler-ph* in (57) ensures that the head daughter must be a verb project and its SLASH value is identified with the LOCAL value of the filler daughter. As expected, the *topic-cl* is a subtype of the *head-filler-ph*, and has its own constraint in (58):

---

[22]The concept of hierarchical classification is essentially assigning phrases (like words) to specific types, and an assignment of those types to superordinate types (supersorts). Each type is declared to obey certain constraints corresponding to properties shared by all members of that type. This system then allows us to express cross-classifying generalizations about phrases (like words), while accommodating the idiosyncracies of individual types on particular subtypes of words. See Ginzburg and Sag (2001) for a comprehensive study of English interrogative constructions developed within such a multiple inheritance system.

(58)   *topic-cl*:

$$[\ ] \quad \rightarrow \quad \boxed{1}\big[\text{TOPIC} +\big], \quad \mathbf{H}\begin{bmatrix} \text{VFORM} \ \textit{fin} \\ \text{IC} + \end{bmatrix}$$

According to the constraint in (58), the non-head daughter will carry the topic value, similar to the traditional notion of topic. The constraint also ensures that topicalized clauses are built from independent finite clauses, e.g., the declarative head-subject clauses. The feature IC (independent clause) is independently motivated for clauses (like relative clauses) with no status of an independent clause (see Ginzburg and Sag 2001). These basic constraints on topic clauses thus block us from generating sentences like (59):

(59) a. *Bill asked if such books John only reads at home.
      b. *[Mary tried [the man]$_i$ to kill __ $_i$].

Since clauses headed with *if* or *whether* cannot be independent clauses (thus [IC −]), and thus cannot be topicalized. Also the condition on the finiteness blocks examples like (59)b.

In a similar manner, the constraints in (58) predict the contrast we observed in (11), repeated here:

(60) a. Mary said [that under the tree sat a woman].
      b. *Mary said [under the tree sat Mary].

As shown in Bouma et al. (2001) and Ginzburg and Sag (2001), an embedded clause can be an independent main clause only if the complementizer *that* appears. A *that*-less embedded clause cannot be an independent clause.

One thing to note here is that since *loc-inv-ph* is a subtype of *hd-sub-ph* and *topic-cl* (which is in turn a subtype of *hd-filler-ph*), it inherits the constraints of these supertypes. This in turn means that the phrase will have at least the following:[23]

(61)   Constraints on the *loc-inv-ph* which are inherited from its supertypes:

$$[\ ] \quad \rightarrow \quad \boxed{1}\big[\text{TOPIC} \quad \boxed{1}\big] \quad \mathbf{H}\begin{bmatrix} \text{VFORM} & \textit{fin} \\ \text{IC} & + \\ \text{SUBJ} & \langle\, \boxed{1}\, \rangle \end{bmatrix}$$

Any instance of *loc-inv-ph* needs to satisfy these constraints inherited from its supertypes. The only thing we then need to specify on the *loc-inv-ph* is its own constraint as in (62).[24]

---

[23]The phrase *loc-inv-ph* as its own constructional constraint does not inherit from *hd-filler-ph* the constraint that the topic phrase is the filler of the gap value of the head.
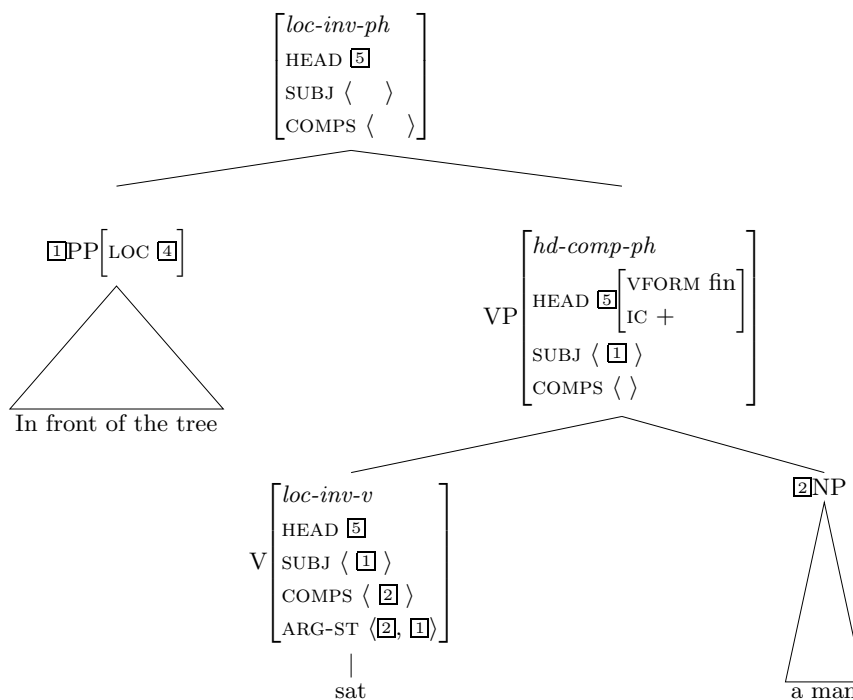
[24]As an anonymous reviewer pointed out, the feature LOCATION here is informal. This is rather a semantic feature assigned to the PP argument by the main verb. We leave a full formalization open here.

(62) *loc-inv-ph*:

$$[\ ] \quad \rightarrow \quad \begin{bmatrix} \text{HEAD } prep \\ \text{LOCATION } i \end{bmatrix}, \mathbf{H}\begin{bmatrix} \text{INFO-ST} \,|\, \text{FOC } nelist \end{bmatrix}$$

What the constraint in (62) says is that a *loc-inv-ph* consists of a locative phrase as non-head daughter and a head element which has a focus value.[25] All the other constraints, such as the assignment of topic value to the PP, will be inherited from its supertypes.

(63)

$$\begin{bmatrix} loc\text{-}inv\text{-}ph \\ \text{HEAD } \boxed{5} \\ \text{SUBJ } \langle \quad \rangle \\ \text{COMPS } \langle \quad \rangle \end{bmatrix}$$

$\boxed{1}\text{PP}\begin{bmatrix}\text{LOC } \boxed{4}\end{bmatrix}$

In front of the tree

$$\text{VP}\begin{bmatrix} hd\text{-}comp\text{-}ph \\ \text{HEAD } \boxed{5}\begin{bmatrix}\text{VFORM fin}\\ \text{IC } +\end{bmatrix} \\ \text{SUBJ } \langle \boxed{1} \rangle \\ \text{COMPS } \langle \, \rangle \end{bmatrix}$$

$$\text{V}\begin{bmatrix} loc\text{-}inv\text{-}v \\ \text{HEAD } \boxed{5} \\ \text{SUBJ } \langle \boxed{1} \rangle \\ \text{COMPS } \langle \boxed{2} \rangle \\ \text{ARG-ST } \langle \boxed{2}, \boxed{1} \rangle \end{bmatrix}$$

sat

$\boxed{2}\text{NP}$

a man

In the tree structure, the head of the *loc-inv-ph*, VP, is finite and independent clause. The verb also satisfies the lexical constraint in (51): the first element in the argument-structure is realized as the subject and the second one as the complement.

By cross-classifying *loc-inv-ph* as a subtype of *topic-cl* and *head-subj-ph*, we could account for why *loc-inv-ph* has various filler properties. For example, as pointed out by Bresnan (1994), raising asymmetries in (64) could be another indicator for the filler properties of the preverbal PP.[26]

---

[25] Following Engdahl and Vallduví (1996), I assume that the FOCUS value of a daughter is inherited up to its mother.

[26] Like an anonymous reviewer, one could question why the verb *expect* cannot take the PP and the VP as its argument, forming a *head-comp-ph*. Following Ginzburg and Sag (2001), as in (58), we assume that in English the TOPIC value can appear only in a as a non-head daughter: no complement can bear [TOPIC +].

(64) a. *I [[$_{VP}$ expect] [$_{PP}$ on this wall] [$_{VP}$ to be hung a portrait of our founder]].

   b. [On this wall] [is likely to be [hung a portrait of our founder]].

Within our system, (64)a violates two constraints at least. First of all, the PP and the VP does not form a constituent as given by the bracket, thus not forming a *loc-inv-ph*. Another violation relates to the topichood of the locative PP. Since it carries a topic value, a locative phrase should serve as the nonhead daughter or a filler of a finite clause. This is not the case in (64)a.[27]

   Such a construction view of grammar also provides an answer to the lack of Yes-no question, as repeated in (65):

(65) *Did [into the room] [walk a woman]?

Adopting the idea of Fillmore (1999) and Ginzburg and Sag (2001), we accept the view that English has the construction of *sai-ph* whose constraints are given in (66):

(66)   *sai-ph*:

$$\left[\text{SUBJ} \; \langle \quad \rangle\right] \;\rightarrow\; \mathbf{H}\begin{bmatrix} \text{INV } + \\ \text{AUX } + \\ \text{SUBJ } \langle \; \boxed{1} \rangle \\ \text{COMPS } \boxed{A} \end{bmatrix}, \quad \boxed{1}, \quad \boxed{A}$$

Given this, we can easily see why (65) is ill-formed as represented in its structure (67):

(67)
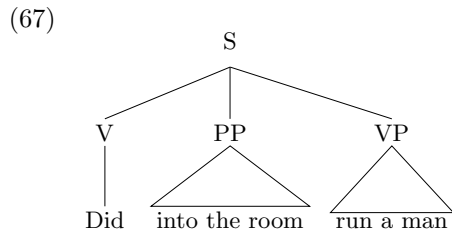
This structure at first does not form a *loc-inv-ph* since the topic phrase *into the room* does not form a phrase with the head VP *run a man*. As given in (58), the topic element can occur only as the non-head daughter with a finite head phase. In (67), the VP headed by the locative verb *run* is neither finite nor the head.

5 Conclusion

In the English LI construction, the preverbal PP and postverbal NP have mixed functional properties. This paper presents a simple way of dealing with mixed

___
[27]If this forms a small clause, it would violate the finiteness condition of a topic clause.

functional properties in HPSG. This paper is very similar to the analysis of Schachter (1992) and Bresnan (1994) in that PP in LI is a topicalized subject whereas the NP functions like a focus.

However, this analysis differs from such previous analyses in several respects. In syntax the preverbal PP is not in the topic position, but it is in the subject position. In addition, the postverbal NP is a direct complement of a locative verb, not adjoined to the VP. The analysis also accept the existence of *loc-inv-ph* in English that is a subtype of both *topic-cl* and *head-subj-ph*. We have shown that the mixed, intricate properties are due to the interaction between the lexical information of the verbs in LI and its constructional constraints.

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