

A Constraint-Based Analysis of English Subordinate Clause Constructions

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Lim, Kyung-Sup. 1997. A Constraint-Based Analysis of English Subordinate Clause Constructions. *Linguistics*, 5-1, 129-151. This paper aims at treating the syntactic and semantic properties of English subordinate clause constructions within the framework of Head-Driven Phrase Structure Grammar. A lexicalist and constraint-based approach to these constructions must include an account of subordinate clause types and constraints. I propose two subtypes of the type *clause*: *finite-subordinate-clause* and *non-finite-subordinate-clause*. I also suggest that adjunct complementizers are needed to analyze the subordinate clauses. The constraint [HEAD adj-comp] on the subordinate clauses is to guarantee that the head of subordinate clauses is an adjunct complementizer such as *when*, *while*, *because*, *if*, etc. The adjunct complementizer for the finite subordinate clauses takes a finite sentence as its complement, while the adjunct complementizer for non-finite subordinate clauses takes any predicative phrases as its complement. The non-finite subordinate clauses have PRO subjects ([SUBJ<PRO>]) and the SUBJ value of the head daughter must be identical with that of the main clause. (Dongshin University)

1. Introduction

This paper aims at treating the syntactic and semantic properties of English subordinate clause constructions within the framework of Head-Driven Phrase Structure Grammar. A lexicalist and constraint-based approach to English subordinate clause constructions must include an account of what types of words and phrases and clauses exist in English and what properties the instances of those types exhibit. Generalizations about dependency relations and clausal functions are factored into distinct dimensions contributing constraints to specific construction types in a multiple inheritance type hierarchy.

There are at least three kinds of English adjunct constructions:

subordinate clause constructions in (1), participial constructions in (2) and predicative adjunct (or absolute) constructions in (3).

- (1) a. [When an atom is split], it released neutrons.
 b. Kevin left [before the reporters could find him].
 c. [If it rains tomorrow], the ceremony will be held next Thursday.
- (2) a. [When waiting for a bus], one should always try to find the correct change.
 b. [If opened carelessly], this package will disintegrate.
 c. [While scratching himself/*herself], John kicked Mary brutally.
- (3) a. [With Kim gone], the project fell apart.
 b. [His hands trembling violently], Sandy loomed in the doorway.
 c. [Trembling violently], Sandy loomed in the doorway.

The bracketed strings in (1a,b,c) are not main clauses but non-main (or subordinate) clauses. A clause may exist alone or it may join up with other clauses. One way of joining clauses together is to subordinate one to another; another way is to coordinate them. In (1b) the sentence *Kevin left [before the reporters could find him]* consists of a main clause (*Kevin left*) and a subordinate clause (*before the reporters could find him*).

The subordinate clauses in (1), which are bracketed, consist of an adjunct complementizer and a finite sentence. The subordinate clauses in (1) are different from the non-finite subordinate clauses in (2) in that subordinate clauses have finite verbs, while the non-finite subordinate clauses have not.

There are two kinds of English predicative adjunct clauses by Pollard and Sag-1987: *with*-predicative adjunct clause in (3a) and *with*-less-predicative adjunct clauses in (3b,c)

In this paper, I analyze the English subordinate clauses on the basis of the properties of English subordinate clauses. And then I provide the subordinate clause type and constraints relevant to the English

subordinate clauses.

In section 2, I will explain the theoretical background of HPSG for this study. In section 3, I will briefly survey the properties of English subordinate clause constructions. And then I will provide a simple and elegant, constraint-based account of English subordinate clause constructions.

2. HPSG: Theoretical Background

2.1 A constraint-based and lexicalist theory

HPSG has the following characteristics:

- (4) a. HPSG is a constraint-based theory of grammatical competence.
- b. HPSG is a lexicalist theory.

(4a) means that all of HPSG's representations--lexical entries, rules, and even universal principles--are partial descriptions of (i.e. constraints on) signs, feature structures of a particular kind used to model types of linguistic utterances. Hence HPSG linguistic descriptions are declarative, order-independent, and reversible, making them ideally suited for the description of linguistic performance. (4b) means that HPSG is a strict lexicalism. That is, the principles of word formation are independent from those governing syntax and internal word structure. Morphological elements and morphological structures are invisible to syntactic constraints and operations. Any lexically based theory necessarily employs rich lexical representations and HPSG's UG is a small set of principles that allows the grammar of phrases to be projected from the lexical representations of words that serve as heads.

In HPSG, the fundamental constructs of a natural language are signs--linguistic objects of a particular type that intuitively specify a conventional association between sound, syntactic category, and meaning. Signs are divided into two subvarieties: *word* and *phrase*. The grammar of any given language must include an account of what types of words and phrases exist in that language and what properties the

instances of those types exhibit.

Feature structures can be useful for modelling linguistic objects of all kinds. They are particularly useful for modelling words. In HPSG, as in other lexicalist frameworks, words have complex properties that can be usefully modelled via hierarchically classified, complex feature structures.

2.2 Clausal Types and Constraints

Within HPSG, words are rich in information. Lexical information is not simply listed, however; rather it is organized in terms of multiple-inheritance hierarchies and lexical rules. Current research is developing extensions of hierarchical lexicons that allow lexical rules to be eliminated and linking patterns to be derived in a general fashion from semantic properties.

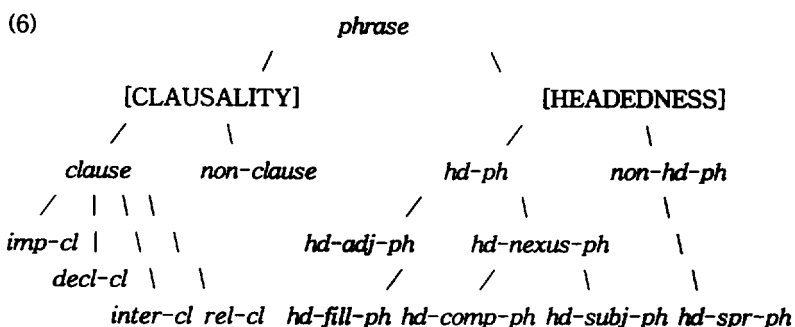
Phrasal Types also can be treated in terms of multiple-inheritance hierarchies that allow generalizations about diverse construction types to be factored into various cross-cutting dimensions.

General constraints to diverse construction types are inherited from the supertypes of the constructions in terms of multiple-inheritance hierarchy. Individual peculiarities of signs are accepted in the subtypes of the constructions.

There are four different clausal types in English as shown in (5).

- | | |
|-------------------------------------|-----------------|
| (5) a. Felix chased the dog. | (declarative) |
| b. {Who, Whose cat} chased the dog? | (interrogative) |
| c. Open the door. | (imperative) |
| d. {who, whose cat} chased the dog | (relative) |

To express the differences among the four types of phrases, Sag (1996) proposes a further dimension of phrasal classification: *decl(arative)-cl(ause)*, *inter(rognative)-cl(ause)*, *imp(erative)-cl(ause)* and *rel(ative)-cl(ause)*. This multidimensional organization of phrases is sketched as follows:



Each type of phrase is thus cross-classified. That is, individual phrase types inherit both from a CLAUSALITY type and a type of HEADEDNESS. This mode of analysis lets us express generalizations about phrases using the same well-developed methods for expressing generalizations about words. It also lets us eliminate invisible C^0 's, whose work will be done by constraints associated with the various subtypes of clause.

(7) Clausal Types and Constraints

TYPE	CONSTRAINTS	ISA								
<i>non-clause</i>		<i>phrase</i>								
<i>clause</i>	<table border="0"> <tr><td>—SUBJ</td><td>list(PRO)</td></tr> <tr><td>—HEAD</td><td>[MOD / none]</td></tr> <tr><td>—REL</td><td>{ }</td></tr> <tr><td>—QUE</td><td>{ }</td></tr> </table>	—SUBJ	list(PRO)	—HEAD	[MOD / none]	—REL	{ }	—QUE	{ }	<i>phrase</i>
—SUBJ	list(PRO)									
—HEAD	[MOD / none]									
—REL	{ }									
—QUE	{ }									
<i>decl-cl</i>	[CONTENT proposition]	<i>clause</i>								
<i>inter-cl</i>	[CONTENT question]	<i>clause</i>								
<i>imp-cl</i>	[CONTENT directive]	<i>clause</i>								
<i>rel-cl</i>	<table border="0"> <tr><td>—HEAD</td><td>MC -</td></tr> <tr><td></td><td>INV -</td></tr> <tr><td></td><td>MOD [HEAD noun]</td></tr> <tr><td>—CONTENT</td><td>proposition</td></tr> </table>	—HEAD	MC -		INV -		MOD [HEAD noun]	—CONTENT	proposition	<i>clause</i>
—HEAD	MC -									
	INV -									
	MOD [HEAD noun]									
—CONTENT	proposition									

One of the constraints on *clause* requires that the SUBJ value be a (possibly empty) list of PROs. Following Pollard (1989), PRO is assumed to be a distinguished, noncanonical subtype of synsem that

corresponds to the unexpressed subject in all instances of control in English. This constraint, taken together with the independently motivated restriction making the SUBJ list maximally singleton, entails that all clauses in English are either [SUBJ elist] or else [SUBJ <PRO>]. The further constraint on type *clause* requires that clauses have empty values for the NONLOCAL features, REL and QUE. The semantic part in HPSG, CONTENT will distinguish among kinds of messages. These types may be universal. The [MC -] constraint ensures that relative clauses are not main clauses, and hence have no status as independent utterances. [MOD [noun]] in *rel-cl* ensures that any relative clause introduced into a head-adjunct phrase will cooccur with a nominal head daughter. Finally, [INV -] imposes the language-particular constraint that relative clauses never exhibit inverted word order.

3. A Constraint-Based Analysis of English Subordinate Clause Constructions

3.1 Properties of subordinate clause constructions

Linda Thomas (1993) shows that it is possible to have more than one S node in a sentence. The following examples in (8) consist of a main clause and a subordinate clause. There are three kinds of subordinate clauses in English. First, the examples in (8) belong to the relative clause constructions.

- (8) a. The cat [which is lying on the mat] loves dogs.
 b. The cat [that loves dogs] is mad.
 c. The film [I saw last night] was really good.

In (8a), *The cat loves dogs* becomes the main clause; *which is lying on the mat* is the subordinate clause, specifically, the relative clause. In (8b), the subordinate clause *that loves dogs* belongs to *that*-relatives and is embedded in the main clause *the cat is mad*. The subordinate clause in (8c) belongs to *that*-less or bare-relatives.

These observations can be accommodated by treating head-relative phrases in (8) as a distinct type of construction. This phrase type and its immediate supertype *head-adjunct-phrase* are sketched in (9).

(9) Phrasal Types and Constraints

TYPE	CONSTRAINTS	ISA
<i>hd-adj-ph</i>	<pre> ┌ HD-DTR [SYNSEM [1]] └ ADJUNCT-DTR [HEAD;MOD [1]] </pre>	<i>hd-ph</i> & <i>non-clause</i>
<i>hd-rel-ph</i>	<pre> ┌ HEAD noun ├ CONT │ ┌ INDEX [2] │ └ RESTR [3] U {[4]} ├ HD-DTR │ ┌ INDEX [2] │ └ RESTR [3] └ ADJUNCT-DTR [CONTENT [4]proposition] </pre>	<i>hd-adj-ph</i>

These constraints guarantee that the adjunct daughter's MOD specification is identified with the head daughter's SYNSEM value in all head-adjunct phrases, but they no longer require that such phrases take their semantic content from the non-head daughter. The constraints on *hd-rel-ph* require that the CONTENT value be a restricted index whose restriction set is constructed by adding the relative clause's propositional content into the restriction set of the head daughter.

Secondly, the bracketed strings in (10) belong to the complement clauses, which are different from so-called subordinate clauses.

- (10) a. I know [(that) they like me].
 b. We told her [(that) she could come].
 c. The most important thing is [that you're happy].
 d. I am sure [that she must have known him].

In (10a) the subordinate clause is the object of a transitive verb *know*, and in (10b) the subordinate clause is the direct object of a ditransitive verb. A subordinate clause can function as the complement of the verb *be* in (10c) and the complement of adjective in (10d).

There are three kinds of complementizers in English, which are proposed by Sag(1996).

- (11) a. I know [that I am right].
 b. Kim said [Sandy left].
 c. I'm aiming [for my team to win].
 d. Jean tried [to play Paganini].

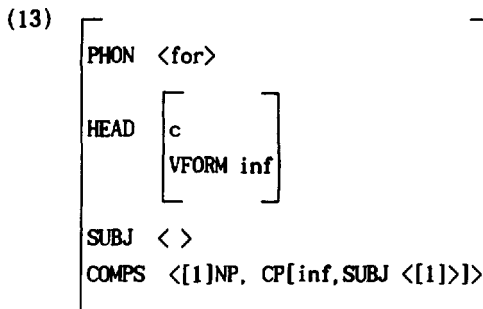
HPSG treats S and CP as two subtypes of a common supertype. This can easily be done by treating HEAD values in terms of part-of-speech (pos) hierarchy that includes *verbal* as an immediate supertype of *verb* and *comp*. VFORM, AUX and other features become features defined as the supertype *verbal*. This provides a basis for assigning common specifications (e.g. [VFORM *fin*] or [AUX +]) to both verbs and complementizers.

A single constraint can be imposed requiring VFORM sharing between complementizers and their verbal complements. In virtue of this constraint, the lexical entry for the complement *that* will be as follows:

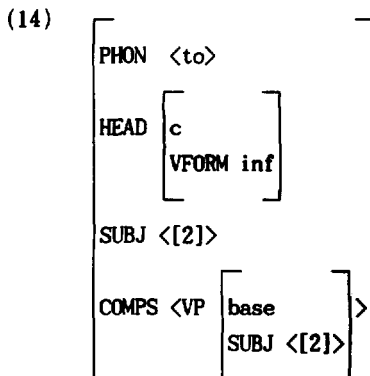
- (12)
- | | | | |
|-----------|---|---|-----------|
| PHON | <that> | | |
| HEAD | <table border="1" style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="padding: 5px;">c</td> </tr> <tr> <td style="padding: 5px;">VFORM fin</td> </tr> </table> | c | VFORM fin |
| c | | | |
| VFORM fin | | | |
| SUBJ | < > | | |
| COMPS | <S[fin]> | | |

This specification will be consistent with S[fin] or CP[fin] complements. In (11a), the verb *know* takes a CP[fin] complement, but in (11b), the verb *said* takes a S[fin] complement.

As for the infinitival clauses, HPSG posits two infinitival C⁰s in English: *for* and *to*, whose lexical entries are represented as in (13) and (14):



The complementizer *for* is the head of CP. The head *c* takes *inf* as the value of VFORM and selects two complements, that is, one NP and one CP[*inf*]. The complementizer *for* is essentially an object-raising element. The unexpressed subject of the CP[*inf*] is coindexed with the complement NP.



The complementizer *to* is a subject-raising element, i.e. it identifies its SUBJ value with that of its unsaturated complement. The head *c* takes *inf* as the value of VFORM and selects one VP[base].

These complement clauses differ from the subordinate clauses in that complement clauses function as the complement of a verb, noun, adjective, etc. in English. Also these complement clauses are different from main clauses in that complement clauses either can or must

contain an overt complementizer, while main clauses by contrast can never contain an overt complementizer in English¹.

Thirdly, the examples in (15) belong to subordinate adverbial clauses.

- (15) a. [When an atom is split], it released neutrons.
 b. Kevin left [before the reporters could find him].
 c. [If it rains tomorrow], the ceremony will be held next Thursday.

Like adverbs and adverbial phrases, subordinate adverbial clauses add the information on manner, time, place, and so on. They tend to answer the questions 'How?', 'When?', 'Where?', 'Why?' Most adverbial clauses begin with a subordinator. In (15a) the subordinator is *when*; The subordinators of (15b) and (15c) are *before* and *if* respectively. There is no option to omit the subordinator in adverbial clauses.

Consider the following example, which is different from the above head-relative phrases.

- (16) Leslie always drinks milk.

The adverb *always* in (16) may lexically select the kind of element they can modify via the HEAD feature MOD. The semantic content (CONT) of a phrase is identified with that of its adjunct daughter, if there is one, and with the content of the head daughter, otherwise.

This kind of sentence belongs to the type *simple-head-adjunct-phrase*, which is a subtype of *head-adjunct-phrase*. The constraints on *simp-hd-adj-ph* is the same as those on its supertype *hd-adj-ph*.

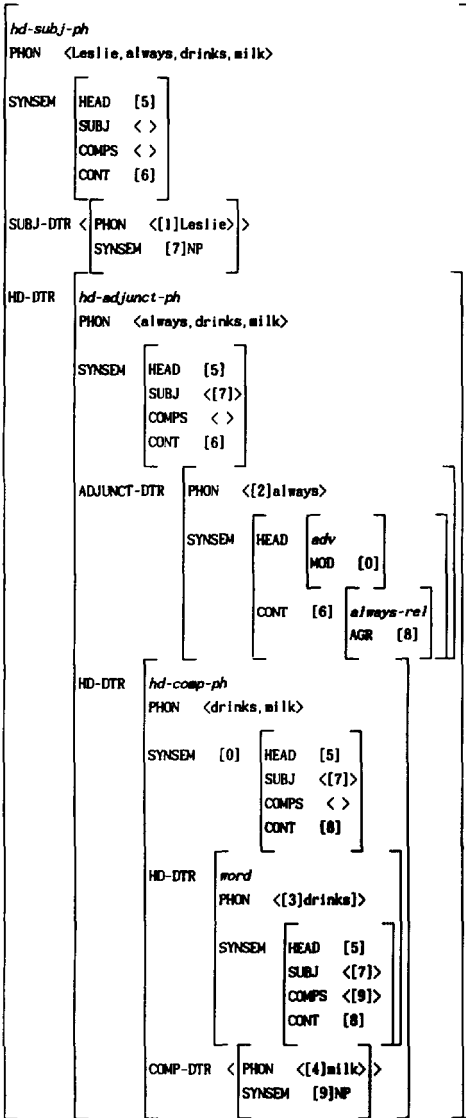
The AVM of (16) is something like (17).

1. Radford (1988) observed the following:

- (i) a. *That the government may change its decision.
 b. *Whether the Prime Minister will resign?

The above sentences are ungrammatical because main clauses have overt complementizers *that* or *whether*.

(17)



There are at least three analyses of subordinate clauses. Firstly, Baker (1989) shows that **modifying-phrases** can be divided into verbal

modifiers and clausal modifiers in terms of modification. The most clausal modifiers consist of a clause-taking preposition and a finite sentence. In (15a,b,c), the subordinate clauses consist of a clause-taking preposition *when*, *before*, and *if* and a finite sentence².

Secondly, there is a subordinate conjunction analysis in the school grammar. When we put two clauses into one sentence, we use a conjunction to link them and to indicate the relationship between them. There are two kinds of conjunction. They indicate the different kinds of relationship between clauses in a sentence. When we are adding a clause in order to develop some aspect of what we are saying, we use a subordinate conjunction. A clause which begins with a subordinating conjunction is called a subordinate clause. Under this analysis, (15a,b,c) consist of a subordinating conjunctions *when*, *before*, and *if* and a finite sentence³.

Thirdly, there is an adjunct complementizer approach. This approach was proposed by Cho (1996) to analyze the Untensed Phrases in Korean Verbal coordination. He argued that *-ko* used for the sequential reading in the coordination of the UPs could be a temporal adjunct complementizer (like *-kose* ('after')) and the other *-ko* (*-ka2*), which is a conjunctive (like *and*), could be used for the non-sequential reading in the coordination of the UPs. In (15a,b,c), the subordinate clauses consist of an adjunct complementizer *when*, *before*, *if* and a finite sentence, respectively.

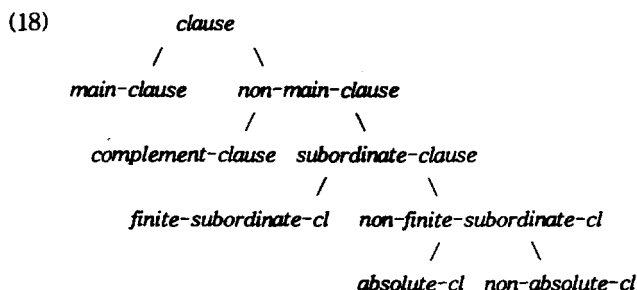
In this paper, I adopt the last analysis, that is, adjunct complementizer analysis for the subordinate clause constructions.

3.2 Subordinate Clause Types and Constraints

I will assume that clauses are classified as follows:

2. This analysis was adopted by Lim (1996).

3. This analysis was proposed by Lim (1993). The subordinating conjunction takes a finite sentence as its complement to make a subordinate clause, and has a MOD feature whose value is VP or S.



Clauses are classified as either *main-clause* or *non-main-clause*, each type having a variety of subtypes. Among the non-main clauses, a distinction is drawn between *complement-clause* and *subordinate-clause*, the latter being broken down into the two subtypes *finite-subordinate-clause* and *non-finite-subordinate-clause*, as indicated. While the type *complement-clause* is needed for the analysis of complement clauses (or noun phrases), the type *subordinate-clause* may be needed for the analysis of subordinate (or adverbial) clauses.

I also propose that we need for the adjunct complementizers for the subordinate clauses. These adjunct complementizers are different from the complementizers used in complement clauses in that adjunct complementizers take a *finite sentence* or any predicative phrases as complements to make a *subordinate clause*. But the complementizers for complement clauses take a *finite sentence*, an NP and an infinitive VP, or an infinitive VP as their complements.

We sketch the part of the grammar of English clauses as the following type hierarchy and associated type constraints:

(19) Subordinate Clause Types and Constraints

TYPE	CONSTRAINTS	ISA
<i>main-cl</i>	[HEAD MC +]	<i>clause</i>
<i>non-main-cl</i>	[HEAD MC -]	<i>clause</i>
<i>complement-cl</i>	[HEAD comp]	<i>non-main-cl & hd-comp-ph</i>
<i>subordinate-cl</i>	[HEAD adj-comp]	<i>non-main-cl & hd-comp-ph</i>

Just as in the case of the lexicon, clausal types obey type-specific constraints. The effect of the constraint [HEAD| MC -] on the

non-main clauses is to guarantee that the complement clauses and subordinate clauses are not main clauses, and hence have no status as independent utterances. The constraint [HEAD *comp*] on the complement clauses is to guarantee that the head of complement clauses is a complementizer. There are at least three complementizers, i.e. *that*, *for*, and *to*, for the complement clauses in English. The effect of the constraint [HEAD *adj-comp*] on the subordinate clauses is to guarantee that the head of subordinate clauses is an adjunct complementizer. There are several adjunct complementizers in English: *when*, *if*, *because*, *although*, etc.

3.3 Finite Subordinate Clause Constructions

There are three main subordinate clauses⁴: relative clauses, reported clauses and adverbial clauses. Relative clauses can be analyzed by the type *head-relative-phrase*, and the reported clauses can be treated as *complement-clause*. The adverbial clauses belong to the type *subordinate-clause*.

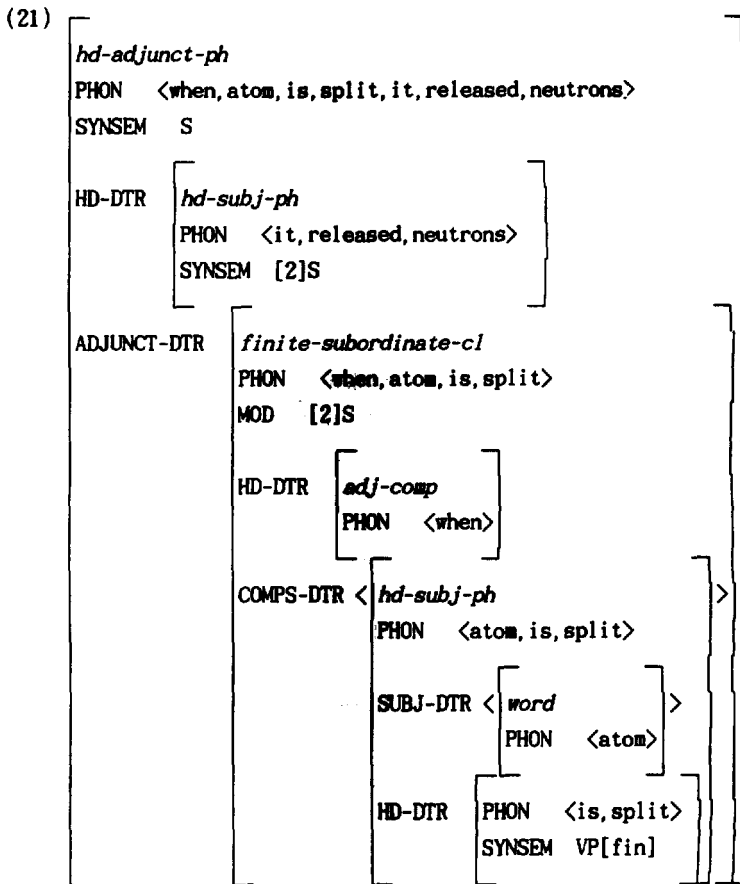
There are eight types of subordinate or adverbial clauses.

- (20) a. Her father dies [when she was young]. (time clause)
 b. [If England had a hot climate], the attitude would be different. (conditional clause)
 c. I bought six cows so that we should have some milk to sell. (purpose clause)
 d. I couldn't feel anger against him [because I liked him too much]. (reason clause)
 e. My suitcase had become damaged on the journey home, [so that the lid would not stay closed]. (result clause)
 f. I used to read a lot [although I don't get much time for books now]. (concessive clause)
 g. He said he was happy [where he was]. (place clause)
 h. I don't understand why he behaves [as he does]. (clauses of manner)

4. See William Collins Sons & Co Ltd (1990)

The subordinate clauses in (20) take different adjunct complementizers as their heads: *when* for time clauses, *if* for conditional clauses, *because* for reason clauses, *although* for concessive clauses, etc. The lexical entry for the adjunct complementizer *when* used in the finite subordinate clauses takes a finite sentence as its complement.

The feature structure of the typical subordinate clause shown in (15a) is represented as (21).



The sentence consists of a subordinate clause which is headed by the

adjunct complementizer *when* and a main clause. This sentence is licensed by the head-adjunct schema. The MOD specification in ADJUNCT-DTR ([2]S) is identified with the head daughter's SYNSEM value in this head-adjunct phrase. The adjunct daughter, which belongs to the type *subordinate-clause*, is licensed by head-complement schema. The head of this adjunct daughter is the adjunct complementizer *when*, and the complement is a finite sentence. Again the finite sentence is licensed by the head-subject schema. The subject of this sentence is a noun phrase *atom* and the head is a finite verb phrase *is split*.

3.4 Non-finite Subordinate Clause Constructions

We have analyzed finite-subordinate clauses with finite verbs via *finite-subordinate-clause*, which is a subtype of type *subordinate-clause*. The *finite-subordinate clauses* consist of an adjunct complementizer and a finite sentence. Let's consider the following sentences which have non-finite verbs. These sentences belong to the type *non-finite-subordinate-clause* or *reduced-subordinate-clause*, which consists of an adjunct complementizer and any predicative phrases. There are two types of non-finite subordinate clause constructions. One begins with the adjunct complementizer whereas the other does not.

- (22) a. [Although always helpful], he was not much liked.
 b. [When questioned], she denied being a member of the group.
 c. [With Noriega in power], we'll have to cancel our vacation.
 d. [His hands trembling violently], Sandy loomed in the doorway.
 e. [Trembling violently], Sandy loomed in the doorway.

(22a,b), which begin with the adjunct complementizers *although* and *when*, can be treated as participial constructions or reduced clausal modifiers. (22c,d,e), which have not any typical adjunct complementizer, can be treated as predicative adjunct clauses or absolute clauses. (22c) is an example of *with*-predicative adjunct clauses and (22d,e) are *with*-less-predicative clauses.

To express the differences among the two types of non-finite subordinate-clauses, I propose a further dimension of clausal classification that will distinguish finite subordinate clauses from non-finite subordinate clauses, and in addition at least the following subtypes of the type *non-finite subordinate clause*: *absolute-clause* and *non-absolute-clause*, the former being broken down into the two subtypes *with-absolute-clause* and *with-less-absolute-clause*.

There are three properties in non-finite subordinate clauses. First, many words that introduce finite subordinate clauses can also be followed by various subjectless phrases. The adjunct complementizer *when* in non-finite subordinate clauses, for instance, takes several types of phrases as its complement:

- (23) a. [When waiting for a bus], one should always try to find the correct change.
 b. [When questioned by the prosecutor], you should try to keep a straight face.
 c. [When angry], a polar bear is a dangerous creature.
 d. [When in Rome], do as the Romans do.

We have a present-participial verb phrase in (23a), a passive phrase in (23b), an adjective phrase in (23c), and a locative phrase in (23d) as the complements of the head adjunct complementizer *when*.

Second, all of these complements have the constraint [PRD +, FIN -]. That is to say, the complements should be a non-finite, predicative phrases. The following examples⁵ show that non-finite subordinate clauses must have the complements which the adjunct complementizer takes can be any predicative phrases.

- (24) a. She learned everything [while in the army].
 b. *She learned everything [while the army].

In (24a), the non-finite subordinate clause will be the same as *while she was in the army*, but in (24b), the non-finite subordinate clause will be

5. See Napoli (1993).

**while she was the army*. The subordinate clause *while she was the army* is not grammatical because the complement NP *the army* that the adjunct complementizer *while* takes is not predicative. In addition, the PRO subject is not identical with the subject of the main clause.

Third, the non-finite subordinate clauses have PRO subjects ([SUBJ<PRO>]) and the SUBJ value of the head daughter must be identical with that of the main clause. All the predicate phrases in these constructions are of kinds that can come after BE. Furthermore, their interpretation is very much the same as it would be in corresponding finite constructions in which BE actually appeared:

- (25) a. [When one is waiting for a bus], one should always try to find the correct change.
 b. [When you are questioned by the prosecutor], you should try to keep a straight face.
 c. [When it is angry], a polar bear is a dangerous creature.
 d. [When you are in Rome], do as the Romans do.

That is to say, the understood subject of non-finite subordinate clauses or 'reduced clausal modifiers' in (25) can be the grammatical subject of the main clauses.

The following examples show that the non-finite subordinate clauses with overt NPs as subjects are ungrammatical.

- (26) a. [While singing bawdy songs], Mary closes her eyes.
 b. *[While John singing bawdy songs], Mary closes her eyes.
 c. [When provoked by passersby], Mary insults them.
 d. *[When John provoked by passersby], Mary insults them.

(26a,c) are grammatical, while (26b,d) are ungrammatical. The reason is that (26b,d) have overt subjects, not PRO subjects. This property makes non-finite subordinate clauses differ from absolute clauses.

I propose that the non-finite subordinate clauses have PRO subjects ([SUBJ<PRO>]) and the SUBJ value of the head daughter must be identical with that of the main clause.

These two constraints are also postulated for the Binding Theory of

HPSG. The Principle A of Binding Theory in HPSG predicts that the coindexing in (27a) and (27b) is obligatory. This is because the anaphor *himself* in (27a) is locally o-commanded by *John* and therefore has to be locally o-bound; but *John* is the sole local o-commander, and therefore the only potential local o-binder. The corresponding ARG-ST for the two occurrences of *scratching* is shown in (27c). The anaphor *herself* in (27b) is locally o-commanded by *Mary* because the subject PRO is the same as the subject of the main clause. The subject PRO is the potential binder in the ARG-ST for the verb *scratching*. The reflexive *herself* can be coindexed with the SUBJ value of the main clause in terms of the Binding Theory.

- (27) a. While scratching himself_i, John_i kicked Mary brutally.
 b. While scratching herself_i, Mary_i was kicked by John brutally.
 c. [ARG-ST <NP:PRO_i, NP:ana_i>]

I provide the lexical entry for the typical adjunct complementizer *when* in the non-finite subordinate clauses, as in (28).

- (28)

[PHON	<when>]
[HEAD	adj-comp]
[SUBJ	list(PRO _i)]
[COMPS	<XP[+PRD]]

The adjunct complementizer *when* has a PRO subject which is identical with the subject of the main clause, and takes any predicative phrases as its complement.

I express the generalizations mentioned above in terms of the type *finite-subordinate-clause* and *non-finite-subordinate-clause*, which are subtypes of the type *subordinate-clause*. Associated with these types are the following constraints:

(29) Subordinate Clause Types and Constraints

TYPE	CONSTRAINTS	ISA						
<i>subordinate-cl</i>	[HEAD adjunct-comp]	<i>non-main-cl</i> & <i>hd-comp-ph</i>						
<i>fin-subordinate-cl</i>	[COMPS <S[fin]>]	<i>subordinate-cl</i>						
<i>non-fin-subordinate-cl</i>	<table border="0" style="border: none;"> <tr> <td style="border: none;">[</td> <td style="border: none;">SUBJ list(PRO)</td> <td style="border: none;">]</td> </tr> <tr> <td style="border: none;">[</td> <td style="border: none;">COMPS <XP[+PRD]></td> <td style="border: none;">]</td> </tr> </table>	[SUBJ list(PRO)]	[COMPS <XP[+PRD]>]	<i>subordinate-cl</i>
[SUBJ list(PRO)]						
[COMPS <XP[+PRD]>]						
<i>absolute-cl</i>		<i>non-fin-subordinate-cl</i>						
<i>non-absolute-cl</i>		<i>non-fin-subordinate-cl</i>						

The constraint to the type *non-finite-subordinate-clause* correctly guarantees that the unexpressed subject of this type of clause is of type PRO and the complement of this type of clause is any predicative phrase.

I propose two subtypes of the type *non-finite-subordinate-clause*, that is, the type *absolute-clause* and the type *non-absolute-clause*. The *absolute-clause* can be further classified into two subtypes-*with-absolute-clause* and *with-less-absolute-clause* to deal with the *with-predicative adjunct clauses* and *with-less-predicative adjunct clauses*. These kinds of clauses will be discussed later.

The feature structure of the typical non-finite subordinate clause like (23a) is represented as (30).

complementizer *when* of non-finite subordinate clauses has the MOD feature ([2]S), and the value of the MOD feature is identified with the SYNSEM value of the head of the main clause.

4. Conclusion

A lexicalist and constraint-based approach to English subordinate clause constructions must include an account of subordinate clause types and constraints. I propose two subtypes of the type *clause*: *main-clause* and *non-main-clause*. Main clauses can be classified into four subtypes: *declarative-clause*, *interrogative-clause*, *imperative-clause*, and *relative-clause*. Among the non-main-clauses, a distinction between *complement-clause* and *subordinate-clause*, the latter being broken into two subtypes *finite-subordinate-clause* and *non-finite-subordinate-clause*. I also propose that we need for adjunct complementizers for the subordinate clauses. The constraint [HEAD adj-comp] on the subordinate clauses is to guarantee that the head of subordinate clauses is an adjunct complementizer such as *when*, *while*, *because*, *if*, etc. The adjunct complementizer for the finite subordinate clauses takes a finite sentence as its complement, while the adjunct complementizer for non-finite subordinate clauses takes any predicative phrases as its complement. I propose that the non-finite subordinate clauses have PRO subjects ([SUBJ<PRO>]) and the SUBJ value of the head daughter must be identical with that of the main clause.

Relatively adjunct phrases have not been focussed on in previous linguistic research. However, the need for the study of modifiers are increasing in current linguistic theory. Under this circumstances, I hope this lexicalist and constraint-based approach to syntax and semantics of subordinate clause constructions in English can be a contribution to modern linguistic theory on adjunct constructions.

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