English without VPs

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Abstract

In this paper, we propose a flat analysis of English clause structure in which there is no syntactic VP constituent. Wherever in the derivation of any individual sentence, a unit appears, which looks superficially like a VP, we argue that it is either syntactically a subjectless clause, as in "VP-preposing" and "VP-coordination", or a unit which is constructed solely at the level of logical form, as in "VP-ellipsis" and "VP-anaphora". The construction of logical forms is carried out in two stages. Firstly, each syntactic rule is accompanied by a translation rule which compositionally gives a corresponding logical form. This aspect of the proposal has affinities with ideas from Lexical Functional Grammar, in particular GLUE semantics (Dalrymple 2001), and Combinatory Categorial Grammar (Steedman 1996), although neither of these frameworks assumes a flat clause structure. The logical forms which are so constructed may then themselves be the input to a further stage of higher-order unification. This procedure manipulates them in a variety of ways. For example creating the partitions required by information structure (Pulman 1997). This aspect of the proposal has affinities with proposals for a flat structure for English clauses in Role and Reference Grammar (Van Valin 2005).

Keywords: Flat Analysis, Clause Structure without VPs, LFG, CCG, RRG

زبان انگلیسی بدون گروه فعلی

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چکیده

در این مقاله تحلیلی مسطح (غیرمطبق) از ساختار جمله‌واره (بند) در زبان انگلیسی که فاقد سازه VP باشد، ارائه می‌گردد. طی فرایند اشتقاق هر جمله، هر کجا واحدی ظاهر شود که به‌طور خاص با VP مشابهت داشته باشد، ادعا خواهیم نمود که بند مذکور یا در زمره بندهای بدون فاعل قرار دارد (مانند ساخت‌های همپایه VP) و یا واحد مذکور در سطح صورت منطقی ظاهر گردیده است (مانند موارد حذف VP). شکل‌گیری صورت‌های منطقی طی دو مرحله شکل می‌گیرد. نخست هر قاعده نحوی با یک قاعده انتقالی همراه می‌گردد که ترکیب آن دو با یکدیگر یک صورت منطقی را به‌دست می‌دهد. این جنبه از تحلیل مشابهت‌هایی با دستور واژ ـ نقشی و به ویژه با معناشناسی GLUE (دالریمپل 2001) و دستور ترکیبی مقوله‌ای (استیدمان 1996) دارد، هرچند که در این دو چارچوب ساختاری مسطح برای بندها در نظر گرفته نمی‌شود. صورت‌های منطقی که به‌این‌ترتیب شکل می‌گیرند ممکن است خود درونداد مرحله‌ای دیگر در سطحی بالاتر واقع شوند. شکل‌گیری صورت‌های منطقی از راه‌های گوناگونی انجام می‌شود. شکل‌گیری بخش‌هایی که نیازمند ساختار اطلاعی می‌باشند نمونه‌ای از این موارد است. این جنبه از تحلیل مشابهت‌هایی با در نظر گرفتن ساختار مسطح برای جمله واژه‌های زبان انگلیسی در دستور نقش و ارجاع (ون ولین 2005) دارد.

کلیدواژه‌ها: تحلیل مسطح، جمله‌واره بدون گروه فعلی، دستور واژ ـ نقشی، دستور ترکیبی مقوله‌ای، دستور نقش و ارجاع

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1 – Introduction

The existence of a VP constituent in English was prefigured in the immediate constituent analysis of Bloomfield (1933), and became explicit in early generative work (Chomsky 1965), The VP constituent, along with NP, became a model for constituent structure in X-bar theory (Chomsky 1970, Jackendoff 1977) and has been a cornerstone of most analyses of English to this day: Minimalist Program (Chomsky 1995), Lexical Functional Grammar (Bresnan 2001), Head-Driven Phrase Structure Grammar (Pollard & Sag 1994), *The Cambridge Grammar of the English Language* (Huddleston & Pullum et al 2002). Standard arguments for the constituency of VP (ellipsis, pro-forms, displacement, coordination[1]) recur in most syntax textbooks alongside those for the constituency of noun phrases. An exception is Role and Reference Grammar (Van Valin 2005).

Nevertheless, it has long been observed by analysts of other languages that the classic constituency tests often do not identify a VP constituent, e.g. Warlpiri (Simpson 1991), in which the combination of verb and object cannot occur unlike the verb alone, or NPs, in clause-initial position. Postulation of VP also forces in many cases a displacement analysis of basic word order (e.g. VSO languages).

In theories in which grammatical relations and/or semantic roles are defined configurationally, the presence of VP constituency is essentially axiomatic. However, in theories in which constituent structure is decoupled from grammatical relations and logical form, it is not necessary to postulate a VP constituent for these purposes. Within such theories, absence of evidence for VP constituency frequently results in the postulation of a flat clause structure. Within such a theory, we argue that English too should be flat.[2].

2 – Flat English

The first stage of the two-stage proposal in this paper for flat English invokes syntactic rules, each of which is accompanied by a translation rule which compositionally gives a corresponding logical form. The basic rule for clause structure is (1):

(1) $[_{Clause}\ GR{:}X_n,\ .....,\ GR{:}X_1,\ Predicator{:}V]$

$\Rightarrow$ $Sat(X_n',\ .....(Sat(X_1',\ V')))$

The syntactic part of this rule states that a clause can consist of any number of constituents X, each of which is associated with an appropriate grammatical

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1 - We will reserve a discussion of coordination for a subsequent paper, in which it is argued that apparent VP coordinations should be analysed as coordination of clauses.

2 - The flat clause structure we propose for English does not entail that English generally lacks constituent structure. Indeed, in a number of specific rules we explicitly assume that such structure exists. For example, in clauses which contain displaced elements, we assume a prenucleus–nucleus structure in which the displaced element, e.g. the preposed clause in "VP-preposing", combines with the clause from which it is displaced.

relation GR, together with a verb functioning as predicator.[3] The structure thus licensed is taken to be unordered. Ordering constraints will be imposed by a separate linear precedence rule of the type in (2):

(2)   Subj > Predicator > Obj.

For a simple transitive sentence such as *Hargreaves opened the dining-room door*, this results in a flat structure such as that in (3):

(3)
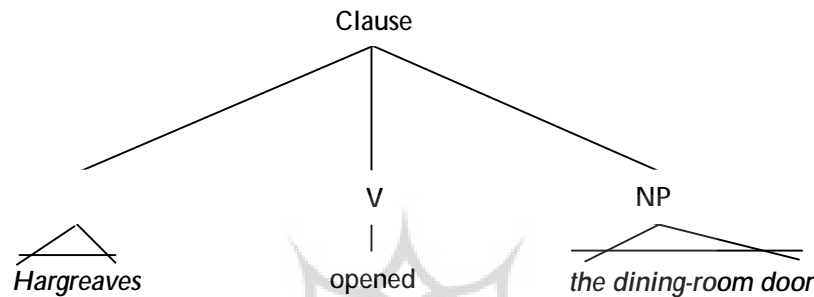
The syntactic structure in (3) is then linked by the rule in (1) to a logical form representation which we take to be a higher-order lambda calculus: Assume first of all simplified logical representations of the individual constituents, with appropriate semantic types:

(4)   *open*:   open' $< e, < e,t>>$
       Hargreaves: $\lambda P \cdot P(hargreaves')$ $<< e,t>, t>$
       the dining room door: $\lambda P \cdot P(drd')$ $<< e,t>, t>$
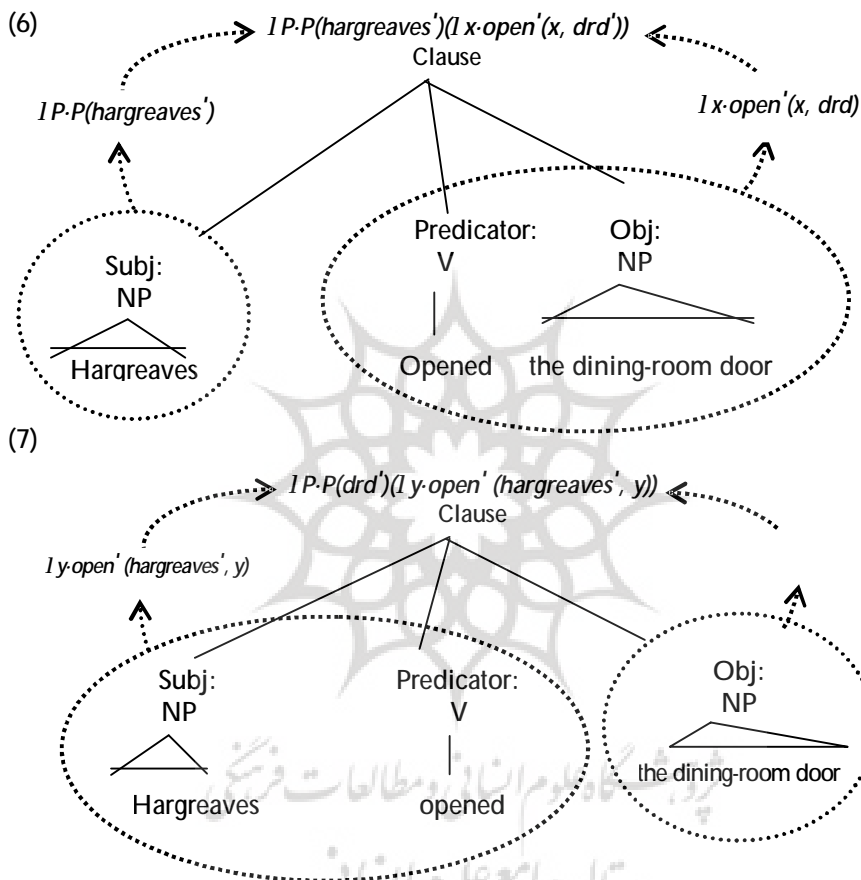
Further assuming a convention which matches grammatical relations with the appropriate argument slots of the predicator, the operation of saturation (Sat) (Nam 1991; Winter 1996) then combines the translation of the verb with the translation of each argument in turn. Saturation of the arguments of the predicate in the order oblique-first will then yield a representation in which one component (here highlighted in bold) indeed corresponds to verb+object:

(5)   a. $\lambda P \cdot P(hargreaves')(l\ x \cdot l\ P \cdot P(drd)(l\ y \cdot open'(x,\ y)))$
       b. $\lambda P \cdot P(hargreaves')(\mathbf{l\ x \cdot open'(x,\ drd')})$
       c.   open' (hargreaves', drd')

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3 - The syntactic structures adopted here, apart from the absence of VPs, are essentially those of *The Cambridge Grammar of the English Language* (Huddleston & Pullum et al 2002)

Here the translation (5a) derived directly from saturation simplifies straightforwardly by lambda conversion to (5b) and then (5c).

However, since the syntactic representation in the rule is taken to be unordered, the arguments can in principle be selected for combination in any order. For a simple transitive sentence such as *Hargreaves opened the dining-room door*, this allows the construction of two (equivalent) logical forms depending on whether the object position (6) or the subject position (7) is saturated first:

(6)

$\lambda P \cdot P(hargreaves')(\lambda x \cdot open'(x, drd'))$

Clause

$\lambda P \cdot P(hargreaves')$

$\lambda x \cdot open'(x, drd)$

Subj:
NP

Predicator:
V

Obj:
NP

Hargreaves

Opened   the dining-room door

(7)

$\lambda P \cdot P(drd')(\lambda y \cdot open'(hargreaves', y))$

Clause

$\lambda y \cdot open'(hargreaves', y)$

Subj:
NP

Predicator:
V

Obj:
NP

Hargreaves   opened

the dining-room door

Here in (6) the logical form which results from the combination of subject and predicator is highlighted in bold. This logical form simplifies by lambda conversion to (4c).

This aspect of the proposal has affinities with ideas from Lexical Functional Grammar, in particular GLUE semantics (Dalrymple 2001), and Combinatory

Categorial Grammar (Steedman 1996). However, GLUE semantics works on unordered f-structures, and CCG assumes an isomorphic relation between syntactic and logical structure.
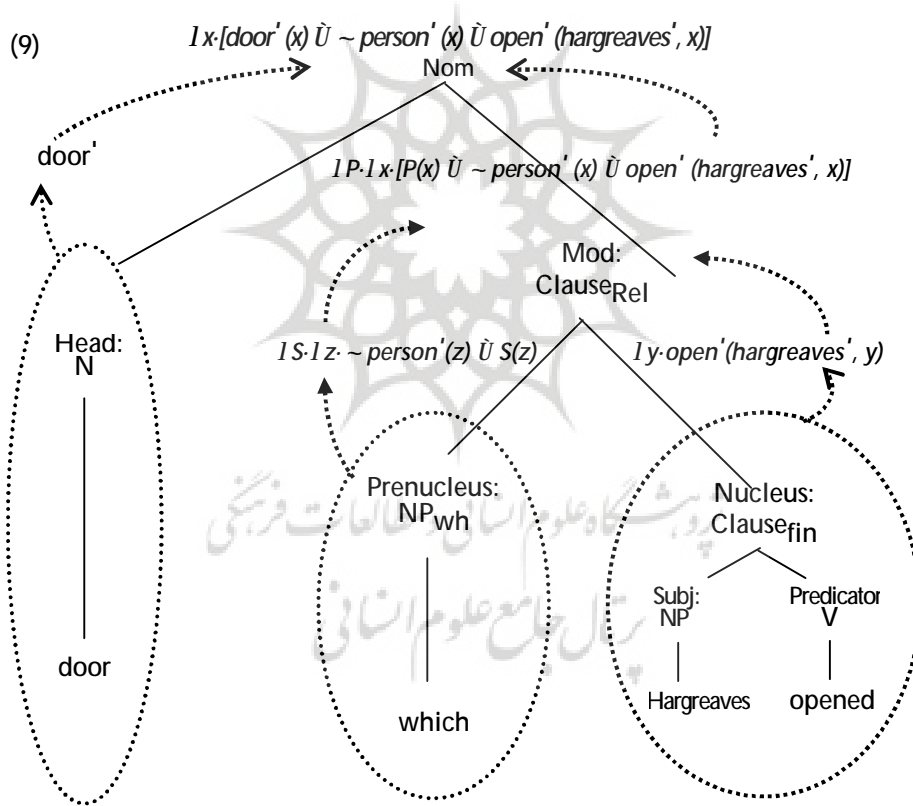
3 - Islands

The logical units formed by saturation from verb + object and verb + subject ave equal status. As pointed out by Steedman (1985), units like the ones in (7) hich compose a subject with a transitive verb may be utilised directly in the ranslation of more complex syntactic constructions in English. For example, the basic relative clause rule in flat English will be (8):

(8)   [$_{Clause_{Rel}}$ Prenucleus: NP$_{wh}$ Nucleus: Clause$_{fin}$]

⇒   λP·λx·[P(x) ∧ NP$_{wh}$'(Clause$_{fin}$')(x)]

This licenses structures such as (9):

(9)

The possibility arises within the present framework that strong island constraints such as the complex NP constraint can emerge directly, as in the GLUE treatment of Dalrymple (2001), at the stage of compositional translation into logical form.

(10)   *the butler [$_{Clause_{Rel}}$ who Clouseau examined the door

          [$_{Clause_{Rel}}$ which opened]]

In (10), the translation will become incoherent at the point where an attempt is made to compose the translation of *which*, which requires as argument a predicate of type $<e,t>$. and the unsaturated predicate *open'*, which is of type $<e,<e,t>>$. The incompatibility between *which* and the unsaturated predicate ultimately derives from the translation of *which*, namely $1S·1z· \sim person(z) \ Ù \ S(z)$. This contains a coordination of two propositions. If *open'* is unsaturated and of type $<e,<e,t>>$, then *S(z)* will illegitimately have to be of type $<e,t>$. An expression of this type cannot be coordinated with the proposition $\sim person'(z)$, which is of type $<t>$.

4 - Higher-order unification

Different orders of saturation of a predicate, while useful, nevertheless do not appear to yield the full flexibility that is required of the level of logical form. The analysis of constructions involving ellipsis, and the representation of information structure, ultimately require more complex semantically equivalent articulations of basic logical forms. These will essentially be lambda equivalents of the basic logical forms, but will involve higher orders of type raising. The approach we will adopt is the higher-order unification approach of Dalrymple, Shieber & Pereira (1991) and Pulman (1997). In this approach,. the algorithm which computes higher order equivalents of more basic forms is higher-order unification. Essentially, the higher-order unification algorithm can be thought of as providing solutions to equations of the form in (11), where *a(b)* is a logical expression whose order is higher than or equal to the order of *g*:

(11) $\alpha(\beta) = \gamma$.

As an illustration of higher-order unification, consider the analysis of focus constructions in Pulman (1997). Building on the structured meaning approach of Krifka (1991), Pulman analyses focus constructions by taking *a* to be background information and *b* to be focal information. Consider then the exchange in (12):

(12)   a. Did Hargreaves open the dining-room door?
           b. No, he opened THE WINDOW.

Narrow focus on *THE WINDOW* in (12b) will, in Pulman's account, require articulation of the logical form into the format *B(F)*, where *B* = background and

F = focus. Since, taking the contextual information into account, $F = \lambda P \cdot P(window')$, this articulation will emerge from solving the equation in (13):

(13) $B(\lambda P \cdot P(window')) = open'(hargreaves', window')$

The solution is (14), where the variable T is of the higher order type $<<e,t>,t>$, the general type of NP translations:

(14) $B = \lambda T \cdot T(\lambda y\ open(hargreaves, y))$

With this value for B, it is easy to check that $B(F)$ indeed simplifies by lambda conversion to the basic expression *open' (hargreaves', window').*

One of the main attractions of higher-order unification is that it liberates logical-form partitions of this kind from too direct a connection to surface constituency. It is then relatively straightforward to account for a variety of more complex cases such as discontinuous multiple foci, or foci within syntactic islands. Consider for example (15a), with focus on *Hargreaves.* The background information here will be representable by the higher-order expression in (15b):

(15) a. Clouseau examined the door which HARGREAVES opened.
     b. $B = \lambda T \cdot T(\lambda x \cdot examine'(clouseau', \iota y \cdot (door'(y) \wedge \sim person'(y) \wedge open'(x,y)))$

However, it does not seem at all plausible that this logical expression should correspond to a surface constituent, given that relative clauses are islands for extraction constructions.

5 - Preposing
Consider the "VP-preposing" example in (16):

(16)   My tutor said I should work harder and go to the lecture today, and <u>go to the lecture today</u> I WILL:

An obvious indication that what is preposed is not actually just a VP, but rather a subjectless clause, is the presence of the adverbial *today.*

The rule which licenses (16) is given in (17):

(17) $[_{Clause}$ Prenucleus: $Clause_{bare}$ Nucleus: $Clause_{fin}\{X_{emph} < last > \}]$
          $\Rightarrow$ $Clause_{bare}'\ (Clause_{fin}')$

The syntactic part of this rule treats the preposed clause as a prenucleus, and requires that it be a bare clause, i.e. a bare infinitival clause, a gerund-participial clause, or a past-participial clause. The nucleus clause which follows

must be finite, and contain an emphatic category as its final constituent, i.e. an emphatic finite auxiliary or emphatic *not*. Since emphatic *not* is only compatible with finite auxiliaries, the last verb in the nucleus is in both cases constrained to be a finite auxiliary, and this in turn will, through the typing requirements of the semantic part of the rule, force the prenucleus to be a subjectless clause.

In (18) we the derivation of the second coordinate in (16):

(18)
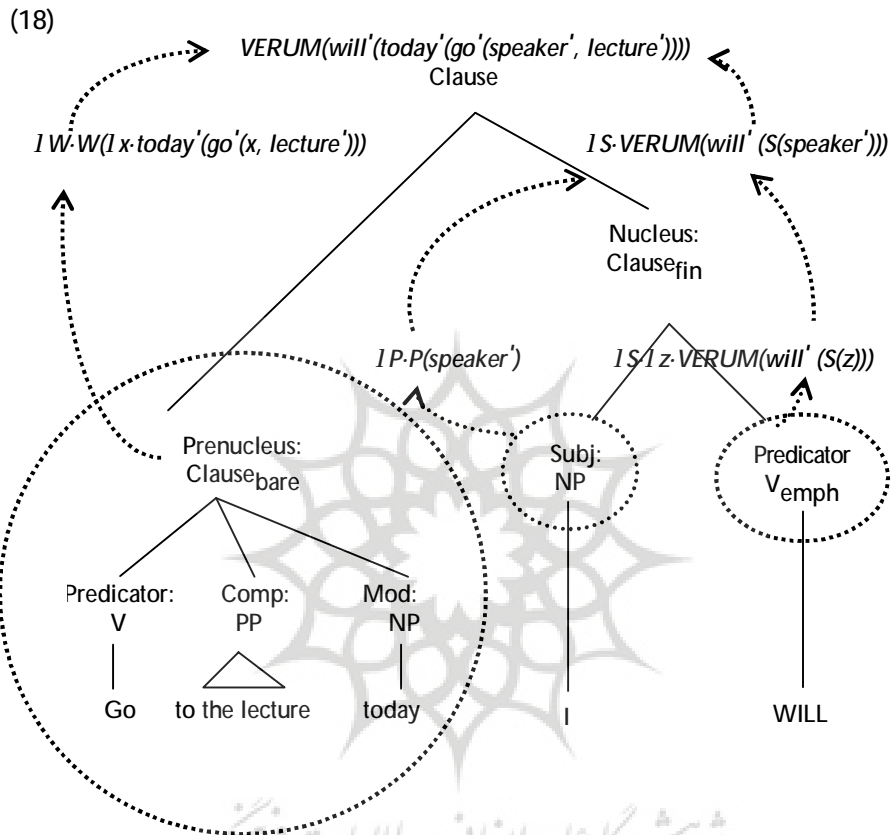
The function of this construction is clearly to articulate the sentence structurally in such a way that "verum" focus (Höhle 1994), i.e. focus on the truth or falsity, of a proposition, is indicated by the final element of the matrix clause. The information-structure purpose of the *VERUM* predicate is to induce a background-focus partition $B(F)$ where $F = VERUM$. The equation (19a) which results can be solved by higher-order unification, and this solution is given in (19b):

(19)   a. $B(VERUM) = VERUM(will'(today'(go'(speaker', lecture'))))$
       b. $\lambda O \cdot O(will'(today'(go'(speaker', lecture'))))(VERUM)$

The logical unit corresponding to the background, here in bold, is obtained fairly trivially by type-raising the expression *will'(today'(go'(speaker', lecture')))* to type $<<t,t>,t>$.

To conclude this analysis of the preposing construction, we note that it has been considered, ever since Ross (1967/1986:241-142), to involve an unbounded dependency and to be subject to standard syntactic island constraints. Consider then the example in (20):

(20)   *My tutor said everyone should work harder and go to the lecture today,
        and <u>go to the lecture today</u> **I think I know a student who WILL**.

The relative clause in (20) is an island and this example is blocked for the same reason as (10).

6 - Ellipsis

There appear to be two distinct rules of 'VP-ellipsis" in English, "auxiliary verb stranding" and:"ellipsis of complements of lexical verbs and adjectives" (Stirling & Huddleston 2002). "Auxiliary verb stranding", is the one usually invoked as an argument for VP constituency,

Auxiliary verb stranding allows ellipsis of material immediately following an auxiliary verb or auxiliary-negating *not*:

(21)   a. I don't want to go to the lecture today, but I will Ø.
        b. I don't want to go to the lecture tomorrow, but I will Ø today.
        c. I'm not on the committee at the moment, but I will be Ø.
        d. I was planning to go to the lecture, but in the end I will probably not Ø.

In flat English, the ellipted material in (21a) has a logical form which does indeed correspond to a constituent, but this constituent is, as in the preposing cases, a subjectless clause rather than a VP. The requisite logical form is simply $1x\cdot today'(go'(x, lecture'))$. However, the ellipted material in (21b) does not correspond to a constituent. Rather, it corresponds to a unit of logical form, namely $1x\cdot go'(x, lecture')$. In the general case, therefore, we claim that the ellipted material in this construction must have a well-formed logical form, but the logical form does not necessarily correspond to a constituent.

Strong independent evidence that the ellipsis site in auxiliary verb stranding does not generally correspond to a constituent comes from "pseudo-gapping" (Levin 1986), where material is retained which is itself a complement (or a complement within a complement) of the ellipted head:

(22)   a. A. Will you [Clause <u>fix</u> the computer <u>this afternoon</u>]?
        B. No, but I will [Clause Ø the TV].
        b. A. Do you [Clause <u>have</u> [NP a good picture <u>of John</u>]]?
        B. No, but I do [Clause Ø of his sister].

In the flat English analysis of (22a), *fix the computer this afternoon* is a subjectless clause with three subconstituents: *fix*, *the computer*, and *this afternoon*. The ellipsis in this case is of the logical unit corresponding to *fix this afternoon*. In (22b), ellipsis is of the logical unit corresponding to *have a good picture*, but *a good picture* is syntactically a subconstituent of the NP *a good picture of his sister*.

Ellipsis also seems to pick out multiple syntactic units in examples like (23):

(23)   Peter thinks I would <u>rather</u> [$_{Clause}$ <u>marry Jill</u>], but I wouldn't Ø.

Flat English therefore requires that it be possible to form a logical unit corresponding to *rather date Jill*, even though *rather marry Jill* is not a constituent. Evidence for this is that in preposing, only the subjectless clause *marry Jill* is preposed. Compare then: *Peter thinks that I should marry Jill,.but* [$_{Clause}$ *marry Jill*] *I would rather NOT*. Here, of course, a final emphatic *NOT* is required to satisfy the stranding requirements.

It has also long been known that VP-ellipsis cannot simply represent the deletion of an antecedent VP constituent:

(24)   A. She walks and she chews gum.   (Nash-Webber & Sag 1978)
         B. Jerry does Ø too, but not at the same time.

The general solution, namely that the ellipted material must be recoverable from the logical form of the antecedent rather than its syntax, has long been clear (see also Sag 1976; Miller 1992). Higher order unification provides a natural framework in which to instantiate this insight (Dalymple et al 1991), and in the division of labour between compositional translation and higher order unification proposed here, also makes the prediction that ellipsis, unlike preposing, will not generally be subject to island constraints. As example (25) shows, this prediction seems to be correct:

(25)   A. Do you [$_{Clause}$ know someone [$_{Clause_{Rel}}$ who can fix the car]]?

         B. No, but I do [$_{Clause}$ Ø the TV.]

The rule for auxiliary verb stranding will take the form in (26), and is syntactically quite complex:

(26) $[\;_{Clause} < _{Comp} XP >]\{Predicator:V_{aux}{}^* \left(\begin{cases} >> Comp \\ > not \end{cases} \right) < last >\}$

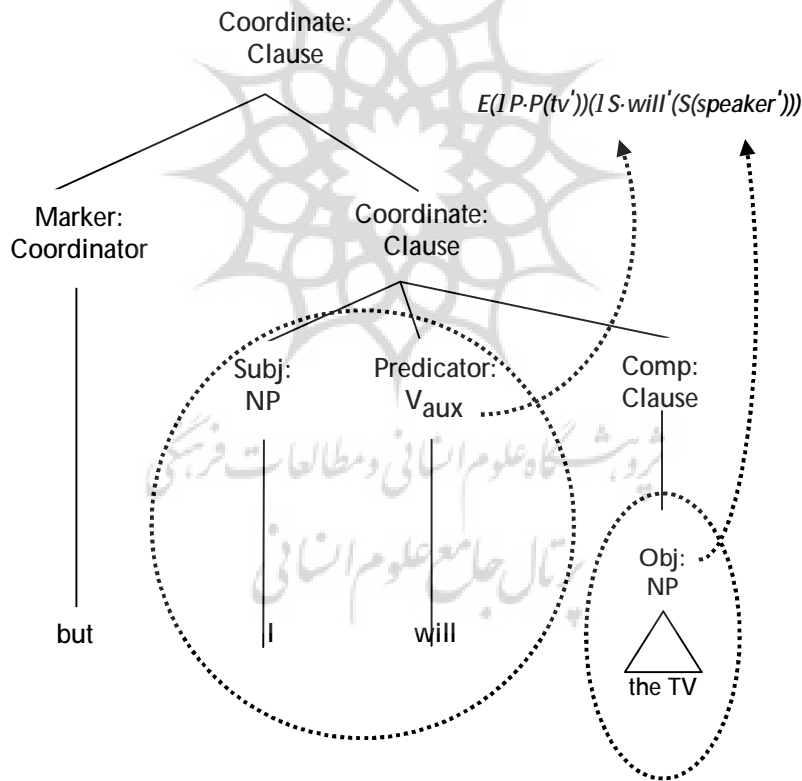 $\Rightarrow$ $E(XP' \bullet Clause')$

A first condition, imposed by the expression in angled brackets in the main part of the rule, is that the clause may contain a complement which itself contains a

unique maximal phrase. This covers the pseudo-gapping cases. A second set of conditions is imposed by the part of the rule in curly brackets. The basic requirement here will be that the rule apply solely to clauses whose predicator is an auxiliary verb, including positive declarative forms of the non-emphatic auxiliary *do*. The category $V_{aux}*$ is thus distinguished from the category V_{aux} by the inclusion of these forms of *do*, which are thereby constrained, unlike the emphatic, interrogative or negative forms, to occur solely in elliptical constructions. There is then an ordering requirement that the auxiliary either itself occur last, or optionally be followed by a single final constituent. This single final constituent may itself either be the pseudo-gapping complement,, in which case the auxiliary must immediately precede the complement, as represented by the symbol "> >"). Or the final constituent may be the negative adverb *not*, in which case the auxiliary may be separated from *not* by intervening material such as other adverbs.

By contrast, the compositional translation is very simple. It introduces *E*, a logical expression corresponding to the ellipted material which must be found from the discourse under higher-order unification.

The structure of B's reply in (22a) will be as follows:

(27)

In (27) we have a incomplete *Comp* containing just a single object NP. The translation of the coordinate is therefore given by $E(NP' \cdot Clause') = E(1 P \cdot P(tv'))(1 S \cdot will'(S(speaker')))$. The antecedent in this case is contained in A's question, and is given in (28):

(28) $E(NP' \cdot Clause')$
$= 1 T \cdot 1 W \cdot W(1 x \cdot T(1 y \cdot thisafternoon'(fix'(x,y))))(\lambda P \cdot P(tv'))(\lambda S \cdot will'(S(speaker')))$
$= will'(this\text{-}afternoon'(fix'(speaker',tv')))$

In other words, higher order unification computes a functor representing "fix this afternoon". which is of an appropriate type to take "I will" and "the TV" as arguments.

7 - *Do so* anaphora

The pro-form *do so* is often taken as a pro-VP, but examples such as (29), analogous to (22), suggest that a similar analysis is required as for ellipsis:

(29)   A. She walks and she chews gum.
             B. Jerry does so too, but not at the same time.

The rule we propose treats the form *so* as having a translation which must be computed in the same way as *E*, by higher order unification:

(30) $[_{Clause} < Comp:so, Affected:PP>]\{Predicator: do_{so}\}$
        $\Rightarrow so'(PP' \cdot Clause')$

The presence of the PP in the rule is to handle cases analogous to pseudo-gapping, first observed by Miller (1992), in which a complement PP with an affected semantic role can occur:

(31)   Mary <u>spoke</u> to Peter <u>about the problems</u>, and I did so to Kim.

Here then higher order unification will compute a functor representing "spoke about the problems" which is of an appropriate type to take "I" and "to Kim" as arguments:

(32) $so'(PP' \cdot Clause')$
$= 1 T \cdot 1 W \cdot W(1 x \cdot T(1 y \cdot (speak'(x,y,problems'))) (\lambda P \cdot P(kim'))(\lambda S \cdot S(speaker'))$
$= speak'(speaker',kim',problems')$

8 - Conclusion

The flat clause structure we propose for English does not entail that English generally lacks constituent structure. Indeed, in a number of specific rules we

explicitly assume that such structure exists.. Nevertheless, the flat structure of basic clauses has potentially interesting consequences for general theories of clause structure. The verb is now the immediate daughter and head of the clause, just as adjectives are the immediate daughter and head of adjective phrases and prepositions are the immediate daughter and head of prepositional phrases. Exactly the same principles might be applied to the argument and modifier structure of noun phrases, with no need, for example, to postulate the syntactic stacking of adjectives. We leave the feasibility of such an analysis for future investigation: the distinctive role of determiners raises a number of important issues. However, the question then arises whether there is any need in syntactic theory for any intervening nodes between lexical and phrasal levels.

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