LFG notes

1. Overview
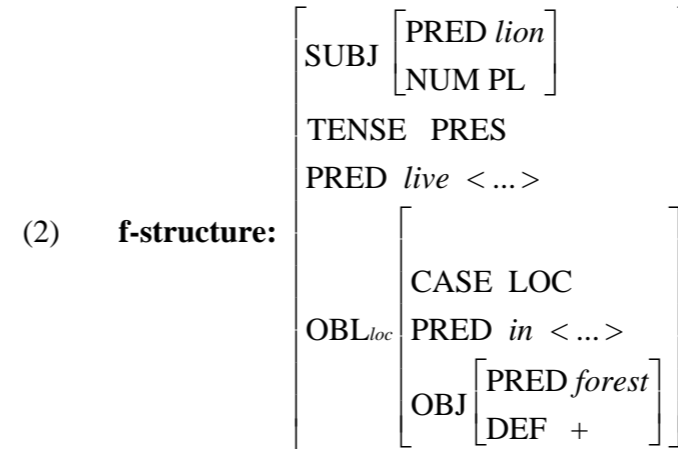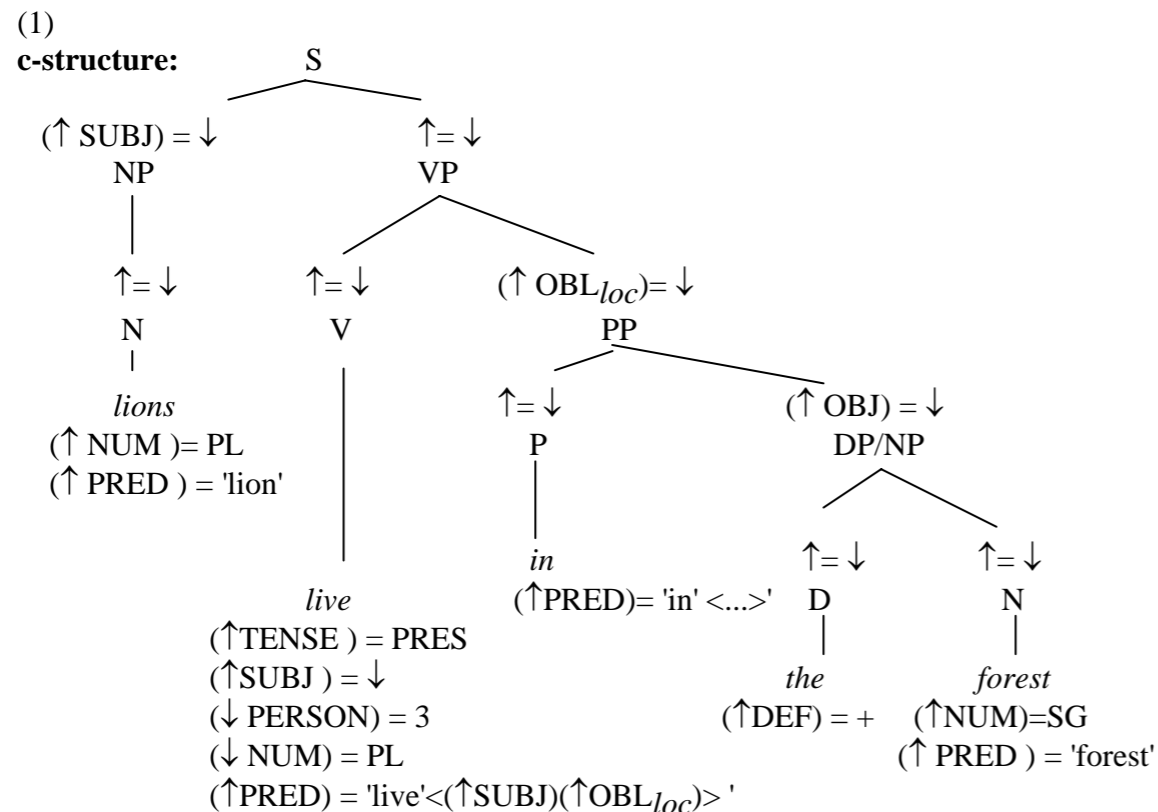
Relational Grammar:
Laws govern the mapping from lexical semantics to grammatical relations (including laws that govern the relations among GR-patterns) that are independent of phrase-structure.

LFG:
"[LFG] choose[s] a more abstract representation of the grammatical functions subject and object, one which is neutral between the differing modes of expression of languages. On this alternative, grammatical functions are *not* reducible to phrase structure configurations..."
[p. 9]

(1)
c-structure:

(2) **f-structure:**

$$\begin{bmatrix} \text{SUBJ} \begin{bmatrix} \text{PRED } lion \\ \text{NUM PL} \end{bmatrix} \\ \text{TENSE PRES} \\ \text{PRED } live <...> \\ \text{OBL}_{loc} \begin{bmatrix} \text{CASE LOC} \\ \text{PRED } in <...> \\ \text{OBJ} \begin{bmatrix} \text{PRED } forest \\ \text{DEF +} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

2. A-structure and F-structure [chapter 14]

- Argument structure/θ-structure of the predicate maps to GRs (f-structure), which in turn is in a correspondence relation (whose character is language-particular) with c-structure.

- How do we know which thematic roles of the predicate are associated with which grammtical functions? *Answer*: a distinct system maps **A-structure** to f-structure.

(3)   **Thematic hierarchy [determines A-structure prominence]**
agent > beneficiary > experience/goal > instrument > patient/theme > locative

Notation: most prominent semantic role of a predicator is θ   ("theta hat").

(4)   **Feature Decomposition of Argument Functions**

	-restricted	*+restricted*
−objective	SUBJ	OBL$_\theta$
+objective	OBJ	OBJ

- Yields a markedness hierarchy (assuming negative value is unmarked)
  SUBJ > OBJ, OBL$_\theta$ > OBJ$_\theta$

(5)   **Semantic classification of A-structure roles for Function**

       patient-like roles: θ
                                               |
                                       [-r]

       secondary patientlike roles: θ
       (e.g. benefactive) |
                                       [+o]

       other semantic roles: θ
       (e.g. locative) |
                                       [-o]

[A-structures may also have empty argument roles with no semantic content: these are [-r]. (See discussion of *Raising* below.)]

(6)   **Mapping Principles**
     a. Subject roles:

        (i) θ [-o] is mapped onto SUBJ when initial in the a-structure; otherwise

        (ii) θ[-r] is mapped onto SUBJ
           [NB no reference to *initial*: see (17) below.]

     b. Other roles are mapped onto the the [most marked] compatible function in [(4)].

(7)   **Passive:**   θ
                        |
                        ø

(8)   **Active agentive verb**:
pound   < x   y >
a-structure   [-o]   [-r]
                    | |
f-structure   S   O   (by (6a)i/ii)

(9)   **Passive agentive verb:**
pounded   < x   y >
a-structure   [-o]   [-r]
                    ø |
f-structure   S   (by (6a)ii)

(10)   **Unaccusative:**
freeze   < x >
a-structure   [-r]
                    |
f-structure   S   (by (6a)ii)

NB: Object-like properties of unaccusative subjects (e.g. subject of resultative) are due to the [-r] feature that they have in common with the subjects of active transitive verbs. Subject-like properties are due to the mapping of this argument to the subject function.

(11)   **Unergative:**
bark   < x >
a-structure   [-o]
                    |
f-structure   S

(12)   **Asymmetrical object parameter:**
*θ[-r] θ[-r]   (true in English)

In a language like English, the lower argument is assigned [+o] instead of [-r]. Thus:

(13)   **Ditransitive   'cook Mary dinner' (English)**
cook-for   < x   y   z >
a-structure   [-o] [-r] [+o]
                    | | |
f-structure   S   O O_θ

(14)   **Passive of ditransitive**
[exercise for the reader]

(15)   **Unspecified object deletion:**
                               θ (patient or theme)
                                       |
                                       ø

(16)   We cooked Mary *(dinner).

(17)   **Locative inversion**
        a. Locative is [-o] (i.e. never a direct object).

        It can be [+r] or [-r] by default.

        b. If Locative is [+r], then in the absence of an Agent, the *Theme* is subject.
        c. If Locative is [-r], the *Locative* must be subject since it cannot be object
           ([-o]!) and is unrestricted (i.e. subject or object).

(18)   a. The lion sat in the clearing.
        b. In the clearing sat the lion.

The process overall:
▪ Semantic roles
▪ Use hierarchy to yield ordered list of arguments.
▪ Apply alterations like passive or object deletion. Result: **A-structure**.
▪ Classify arguments by r/o features.
▪ Add default features.
▪ Map a-structure to f-structure using mapping principles.

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3. F-structure and c-structure

▪ **F-structures are *attribute-value matrices*.**

(19)   a. An **attribute** can be:
            a symbol, e.g. SUBJ, TENSE, NUM, PRED
        b. A **value** can be:
            a symbol (e.g. PL), or
            a semantic form (e.g. 'lion'), or
            an f-structure   [p.47]

(20)   **Uniqueness Condition**
        Every attribute has a unique value.

Notation: not: *f1* (ATTRIB) = VALUE
             but: (*f1* ATTRIB) = VALUE
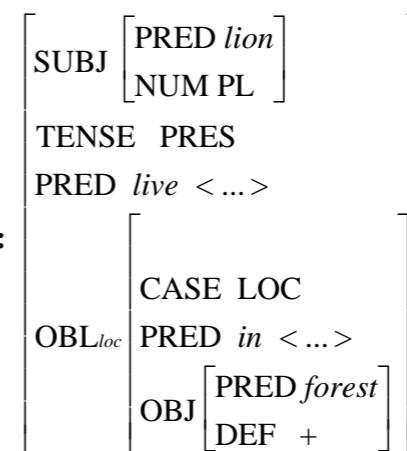
(21)   **Completeness:**
        Every function designated by a PRED (thanks to a-structure/f-structure
        mapping principles) must be present in the f-structure of that PRED.

(22)   **Coherence:**
        Every argument function in an f-structure must be designated by a PRED.

(23)   **f-structure:**

$$
\begin{bmatrix}
\text{SUBJ} & \begin{bmatrix} \text{PRED } lion \\ \text{NUM PL} \end{bmatrix} \\
\text{TENSE} & \text{PRES} \\
\text{PRED} & live <...> \\
\text{OBL}_{loc} & \begin{bmatrix} \text{CASE LOC} \\ \text{PRED } in <...> \\ \text{OBJ} \begin{bmatrix} \text{PRED } forest \\ \text{DEF } + \end{bmatrix} \end{bmatrix}
\end{bmatrix}
$$

▪ **C-structure rules** include constraints on the corresponding f-structure as
  "annotations" (**functional schemata**).

(24)   ↑ = "features of the mother of this node"
        ↓ = "features of this node"

(25)   The counterpart to HPSG's sharing of Head Features between mother and
        daughter is the annotation: ↑=↓ — i.e. "the functions designated by the
        mother are the same as the functions designated by the daughter".

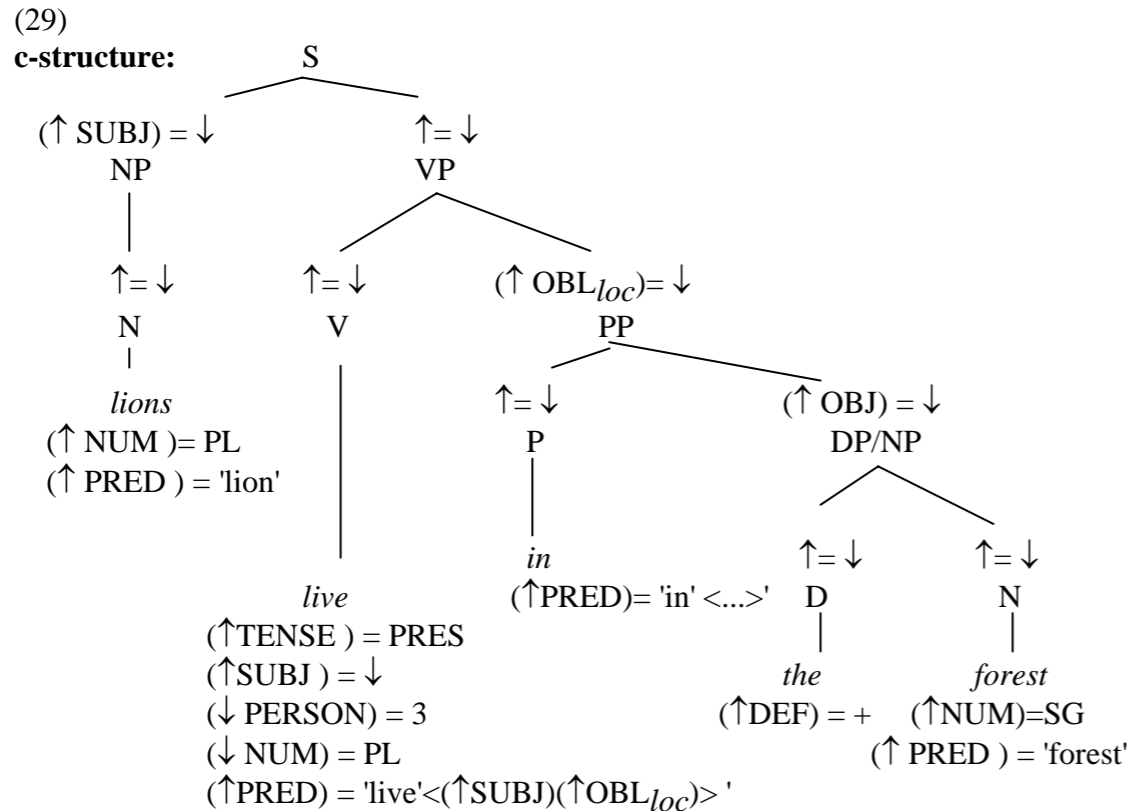**Phrase structures for English, with f-structure an**

(26)   S →   NP   VP
               (↑SUBJ) =↓   ↑ =↓

(27)   NP → $\begin{pmatrix} \text{Det} \\ \uparrow=\downarrow \end{pmatrix}$ N
                                            ↑=↓

(28)   VP →   V $\begin{pmatrix} \text{PP} \\ (\uparrow \text{OBL}_{loc})=\downarrow \end{pmatrix}$
               ↑=↓

■ LFG f-structures look like HPSG feature-structures, but are not so much an unbundling of the properties of an individual node as an independent representation of a clause K.

(29)
c-structure:

```
                    S
          _____|_____
     (↑ SUBJ) = ↓          ↑= ↓
        NP                 VP
         |           _____|_____
        ↑= ↓        ↑= ↓           (↑ OBL_loc)= ↓
         N           V              PP
         |                    _____|_____
       lions                 ↑= ↓        (↑ OBJ) = ↓
    (↑ NUM )= PL              P            DP/NP
    (↑ PRED ) = 'lion'        |         ____|____
                             in         ↑= ↓   ↑= ↓
                    (↑PRED)= 'in' <...>'  D      N
                                         |       |
                          live          the    forest
                     (↑TENSE ) = PRES  (↑DEF) = +  (↑NUM)=SG
                     (↑SUBJ ) = ↓              (↑ PRED ) = 'forest'
                     (↓ PERSON) = 3
                     (↓ NUM) = PL
                     (↑PRED) = 'live'<(↑SUBJ)(↑OBL_loc)> '
```

Notations and concepts:

1. The parentheses in the argument structure for *live*: an **existential constraint** ([p. 61]). There must be some value for the SUBJ attribute, for instance, given "(↑SUBJ)" in the argument structure of 'live'. The fact that

2. D and N are **coheads** of DP/NP, due to the ↑= ↓ specification on both D and N. This incorporates Grimshaw's notion of "extended projection" (itself partly due to Abney's thesis). It is thanks to this fact that the object of 'in' in f-structure is specified both for PRED and for DEF.

3. The f-structure is a **solution** to the constraints that annotate the phrase structure rules and lexical entries from which the tree in (29) was constructed. That is, for the S as a whole, we can ask "what are the properties of its subject?", "what are the properties of its object?", 'how are subject and object linked to the argument structure of 'live'? -- and, where the object or subject itself contains an object or subject, similar questions can be asked. There must be a **consistent** solution, or else we violate uniqueness.

■ We can demonstrate the correspondence between a given c-structure and a corresponding f-structure by assigning unique indices to the nodes of the c-structure that correspond to f-structure indices and working out equivalences given by (↑ SUBJ) = ↓ etc.

■ This is mapped out on pp. 56-60 of the textbook.

Non-configurationality

Suppose the grammar has statements like (30)

(30)   a. (↓ CASE) = NOM ==> (↑ SUBJ) = ↓
        b. (↓ CASE) = ACC ==> (↑ OBJ) = ↓

■ A nominative NP can map to SUBJ in f-structure even if it is not occupying an Engish-style c-structure subject position.

■ Consequence: non-configurational c-structures (e.g. S-->C*) can map onto f-structures that look entirely English-like. Predicates relevant to f-structure (**f-command**, etc.) will apply to such a language just as they do to English.

Note: UG does specify that the bearer of SUBJ is not contained within VP.

More generally:
(31)   a. **Dependent marking languages:**
             (↓ CASE) = k ==> (↑ GF) = ↓

        b. **Head marking languages:**
             (↓ AGR) = (↑ AF AGR) ==> (↑ AF) = ↓   [p.111]

("AF" = 'argument function', i.e. subj, obj, obl etc.but not top, foc or adjunct)

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4. Head Mobility and coheads (cf. head movement)

(32) **Economy of Expression [p.91]**
All syntactic (excl. terminal and pre-terminal) phrase structure nodes are optional and are not used unless required by independent principles (completeness, coherence, semantic expressivity).

Some properties of heads and specifiers [p. 102]
(33) a. C-structure heads are f-structure heads.
b. Specifiers of functional categories are the grammaticalized discourse functions DF (e.g. TOP, FOC, SUBJ).
c. Complements of functional categories are f-structure coheads [extended projection!].
d. Complements of lexical categories are the nondiscourse argument functions CF.

(34) **The node S [p. 112]**
Available via UG: an exo-centric category S whose daughters NP and XP may be subject and predicate (NP is annotated "($\uparrow$SUBJ) = $\downarrow$") — compare the notion 'small clause'

- By Economy of Expression, there should be no I in *Mary swims* even though there is one in *Mary is swimming*, by Economy of Expression, given the existence of S [and the absence of a VP-internal subject in these proposals].

F-structure/c-structure Mapping principles in an endocentric language (e.g. English):

(35) a. **Heads:** Annotate a projecting node in a projection of the same kind with $\uparrow = \downarrow$..
b. **Specifiers:** Annotate a nonprojecting node in F'' with ($\uparrow$DF)= $\downarrow$.
c. **Coheads:** Annotate a non-projecting complement node dominated by any category X^n with $\uparrow = \downarrow$.
d. **Complements:** Annotate a nonprojecting complement node dominated by any lexical category L'' with ($\uparrow$CF)= $\downarrow$.

Consequence for VSO Welsh:

(36) **IVSO structures (note I and exocentric S are coheads)**


[p. 128]

(37) **VSO structures**

[p. 128]
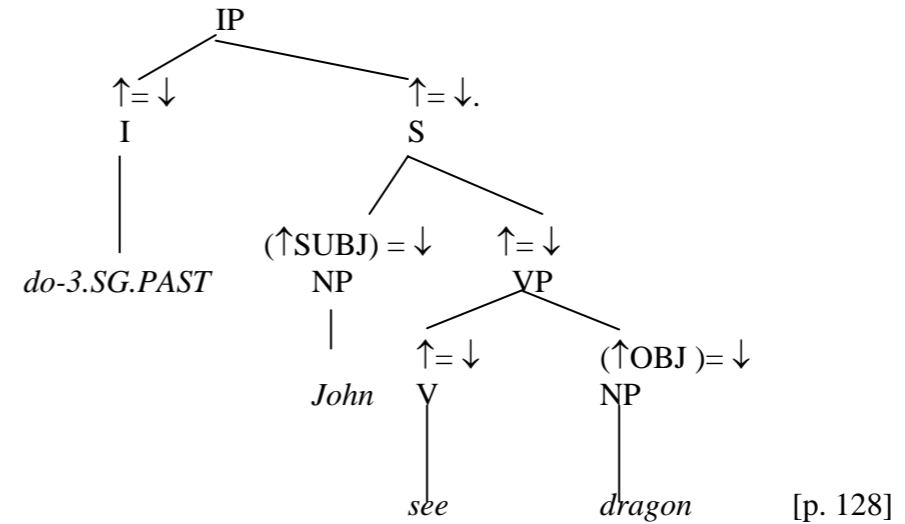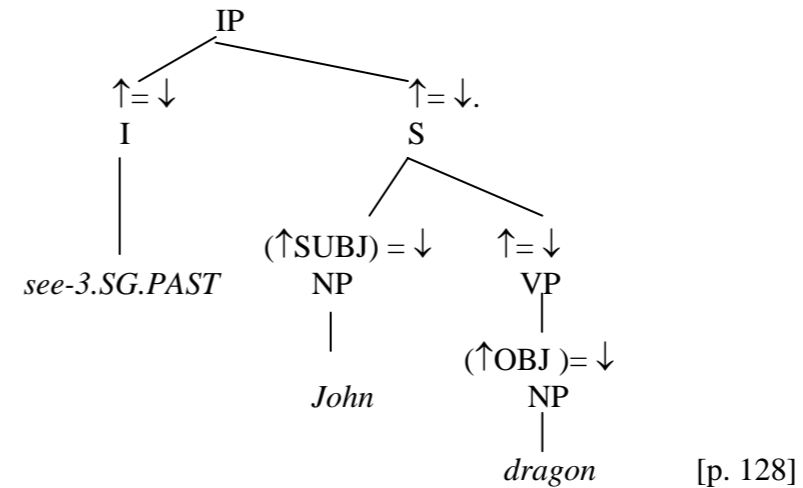
- **Requirement:** all projective categories must have an "extended head", so even if VP lacks a V-head (as in (37)). it is crucial that it is a cohead with I.
- Why? With I and S as coheads, it doesn't matter whether PRED information comes from I or a verb in S. The information will look the same in f-structure. But the PRED information had better be in I, and I had better be a cohead with S.
- This is LFG's counterpart ti head-movement from lexical to functional cohead.

Question: How is verb position in c-structure enforced? Perhaps V of VP is specified as non-finite.

"The functional equivalence of [(36)] and [(37)] has suggested to many that the head 'moves' from one position to the other. But we can now see that the apparent mobility of the head arises nonderivationally from general principles governing the imperfect correspondence between c-structure and f-structure. [p. 131]."
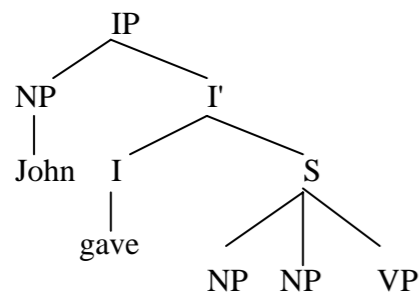

Sells

(38) **Transitive expletives in Icelandic: S as "small clause"**
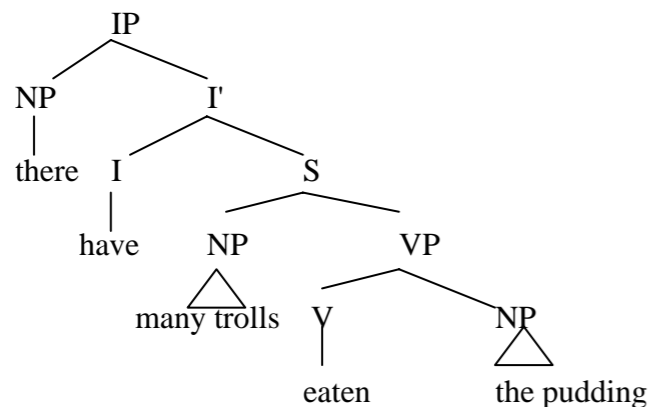
(39) "**Object shift" in Icelandic: S as flat domain**

S --> XP$^+$ [and for each daughter of S, for some GF, ($\uparrow$ GF) = $\downarrow$]

(40) **Icelandic ordering principles**
a. TOPIC is initial. >>
b. X^o head is initial >>
c. SUBJ is initial >>
d. IOBJ is initial

- "Object shift" is the choice of the structure in (39), obeying (40).
- Adverbs including negation are freely interspersed among the arguments not ordered by (40).

Carnie article

(41) **CVSO and CNSO in Irish**
a. Ní **rith**+eann Seán
   Neg run+3s John
   'John doesn't run.'

b. Ní **dhochtúir** é Seán
   neg doctor 3sm John
   'John is not a doctor'

(42) **C-NP-SO vs, *C-VP-SO in Irish**
a. *Níor [phóg Grace] sé
   Neg kissed Grace he-nom
   'He didn't kiss Grace.'

b. *[Phóg go mall] sé é
   Kissed slowly he him
   He slowly kissed him.

c. Níor [dhochtúir ainmhithe] Proinseas
   Neg doctor animals.gen Francis
   Francis is not a doctor of animals

- The problem: if this is head movement, why the full NP in (42c)? If this is head/max movement, why not VP?
- VP remnant approaches? If VP is evacuated for case reasons, why do CPs, which do not need case, also remain unmoved? Likewise adverbs (see (42b) above).

Solution: Irish has a c-structure NP rule but no VP rule. The initial position in the Irish clause is occupied by a *maximal* predicative phrase. That means NP for nominals, but V for VPs.

5. XCOMPs (cf. Raising)

XCOMP = "open complement"

Notation in f-structures: f_n:[ ] shared by more than one functional structure (cf. unification in HPSG).

Lexical entry for *keep* as in *Susan kept eating marshamllows* (p. 270):

(43)   *keep* (subject raising):
           ($\uparrow$PRED) = 'keep <($\uparrow$SUBJ)($\uparrow$XCOMP)>'
           ($\uparrow$SUBJ) = ($\uparrow$XCOMP SUBJ)

(44) f_1 : $\begin{bmatrix} \text{SUBJ } f_3 : [\ ] \\ \text{PRED 'keep } < (f_1 \text{ SUBJ})(f_1 \text{ XCOMP}) >' \\ \text{XCOMP } f_2 \begin{bmatrix} \text{SUBJ } f_3 : [\ ] \\ . \\ : \end{bmatrix} \end{bmatrix}$

Lexical entry for *keep* as in *Susan kept John doubting himself*.

(45)   *keep* (object raising)
           ($\uparrow$PRED) = 'keep <($\uparrow$SUBJ) ($\uparrow$OBJ) ($\uparrow$XCOMP)>'
           ($\uparrow$OBJ) = ($\uparrow$XCOMP SUBJ)

▪ Look familiar from HPSG? Actually, the HPSG community borrowed this way of looking at things from early work of Bresnan on LFG.

Interactions with Binding Theory

(46)   **Syntactic Rank [p. 213]**
   ▪ A locally outranks B if A and B belong to the same f-structure and A is more prominent than B on the relational hierarchy (SUBJ > OBJ > OBJ_θ > COMPL > ADJUNCT).
   ▪ A outranks B if A locally outranks some C which contains B.

(47)   **Nucleus:** PRED — plus the elements whose attributes are functions designated by the PRED.

(48)   **toy BT [p. 219]**
   A. A nuclear (reflexive) pronoun must be bound in the minimal nucleus that contains it and a subject outranking it.
   B. A nonnuclear pronoun must be free in its minimal nucleus.
   C. Other nominals must be free.

6. ANAPHORIC CONTROL

(49)   **Null Subjects lexical rule**
           (V (nonfinite) $\Rightarrow$ ($\uparrow$ SUBJ PRED) = 'PRO')
                     [the parens around the rule indicate that it is optional]

▪ By "functional uniqueness" (coherence?), there will be no extra c-structure constituent bearing the subject function.
▪ By Economy of Expression, there will be no c-structure subject.

See page 297 for c-structures and f-structures demonstrating PRO (functional control) vs. Raising (anaphoric control).

7. WHAT DOES THE WORK DONE BY MOVEMENT IN GB/MINIMALIST APPROACHES?

1.   **Clause-internal A-movement:**
     a. Certain subjects share a-structure features with certain objects.
     b. C-structure argument phrases that do not occupy English-like subject/object positions may nonetheless supply the SUBJ or OBJ functions of the clause.

2.   **Cross-clausal A-movement**
     The SUBJ of an XCOMP may be identified with a higher SUBJ or OBJ.

3.   **Head movement:**
     Certain instances of I (e.g. a finite verb) contribute information (e.g. PRED) that would otherwise be contributed by V. In addition, I and V are coheads, so the information is also shared with VP.

4.   **A-bar movement:**
     Gap is a phonologically null element, identified with a higher Discourse Function by "inside-out functional uncertainty":

     "Associate XP-->e with $((x \uparrow)\text{DF}) = \uparrow$."