Projections and Glue for Clause-Union Complex Predicates

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1 Introduction

(1) a. el mestre fa llegir un poema al nen
the teacher makes read.INF a poem to.the boy
'The teacher is making the boy read a poem.' (Alsina 1996:190)

b. el mestre el fa llegir al nen
the teacher it makes read.INF to.the boy
'The teacher is making the boy read it.' (Alsina p.c.)

(2) a. Glue provides easily for two predicates to function in a 'semantic complement' relation in a single f-structural clause (as in the analysis of qunatifiers and sentence adverbs such as *obviously*)

b. Glue sits in the right place to do much of the work of a theory of argument-structure

c. It provides good support for the notions that such theories are generally taken to need to provide

(3) Glue derivations as projections, connected to the rest of the grammatical structure by a correspondence relation (Crouch and van Genabith 1999 and Asudeh and Crouch 2002).

2 Prefab Glue

(4) a. The basic idea is to do the conversion from 'proof format' to 'logical form' format in the lexicon, and then assemble, rather than in the reverse order.

b. Therefore no need for 'proof terms', 'semantic trips', etc.

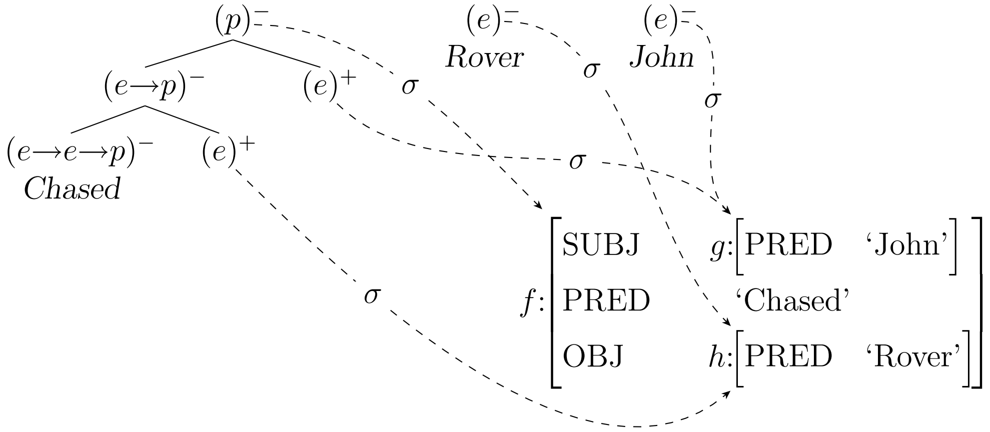
c. It's yet another version of proof-nets, based on the 'dynamic graph' of de Groote (1999), Lamarche (1994).

(5) a. *Chased* : $(\uparrow \mathrm{OBJ})_e \rightarrow (\uparrow \mathrm{SUBJ})_e \rightarrow \uparrow_p$

Rover : $\uparrow_e$

John : $\uparrow_e$

b.



(6) **Basic Assembly Rules:** Run 'axiom-links' from positive to negative atomic nodes

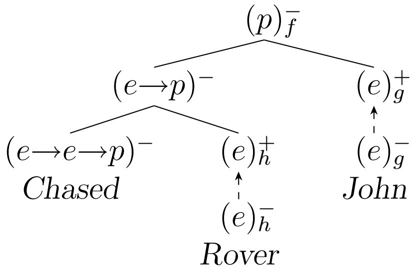
a. with the same type

b. and f-structure correspondent

c. in non-overlapping pairs

d. leaving one node of type p left over, whose f-structure correspondent is the entire f-structure

(7)



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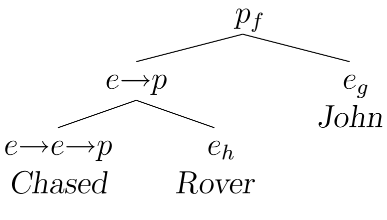
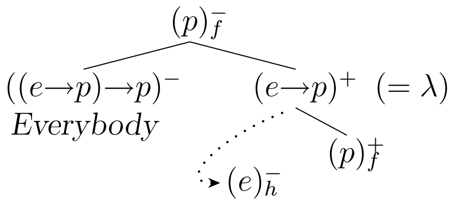


(9) a. *Everybody* : $(\uparrow_e \to (\mathrm{GF}^* \uparrow)_p) \to (\mathrm{GF}^* \uparrow)_p$

b.



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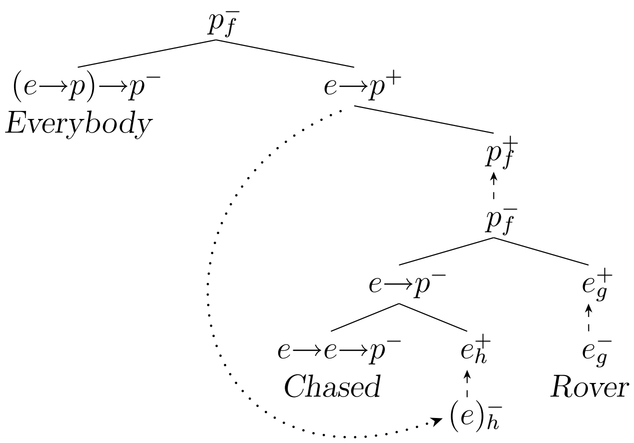
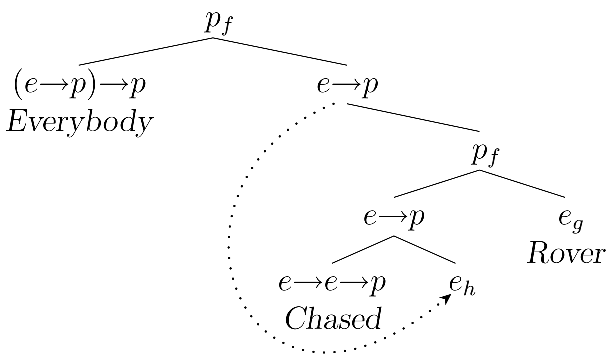
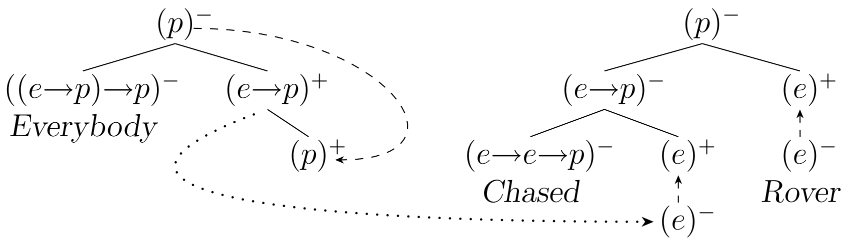


(11) a.



b. $Every(\lambda x.Chased(x)(Rover))$

(12)



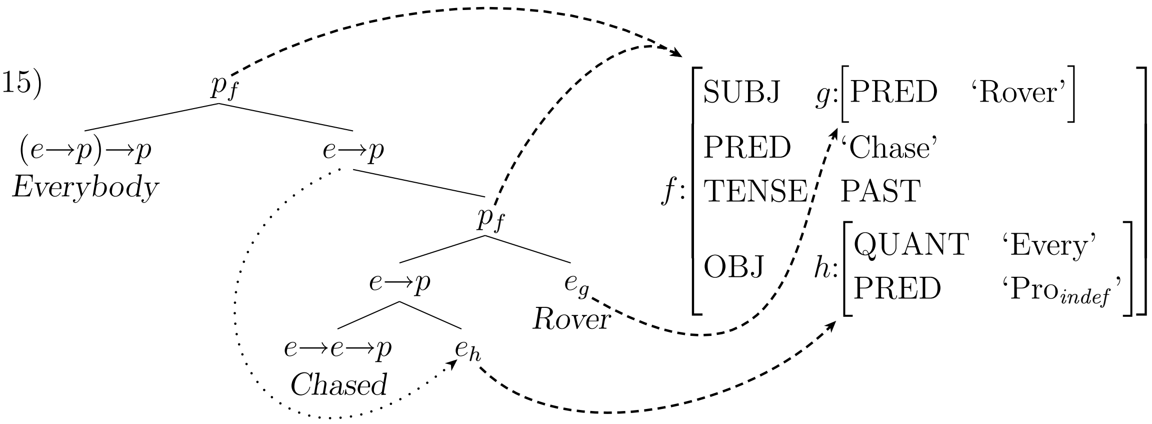
(13) **Dynamic Graph:** The solid links, oriented upwards, and the dashed ones, constitute the 'dynamic graph' of Lamarche (1994) and de Groote (1999), which proves to be rather useful for defining concepts of argument-structure

Lamarche had the opposite orientation to de Groote, and called it the 'essential net' (and I don't understand very much in that paper, but fortunately, de Groote and Moot do).

(14) **Correctness Criterion:** The dynamic graph must be rooted and acyclic, and every path to the root that starts at the target of a dotted link must pass through the source of that link (Lamarche 1994, de Groote 1999, Moot 2002:94-95).

The Correctness Criterion has a very large number of equivalent formulations.

(15)

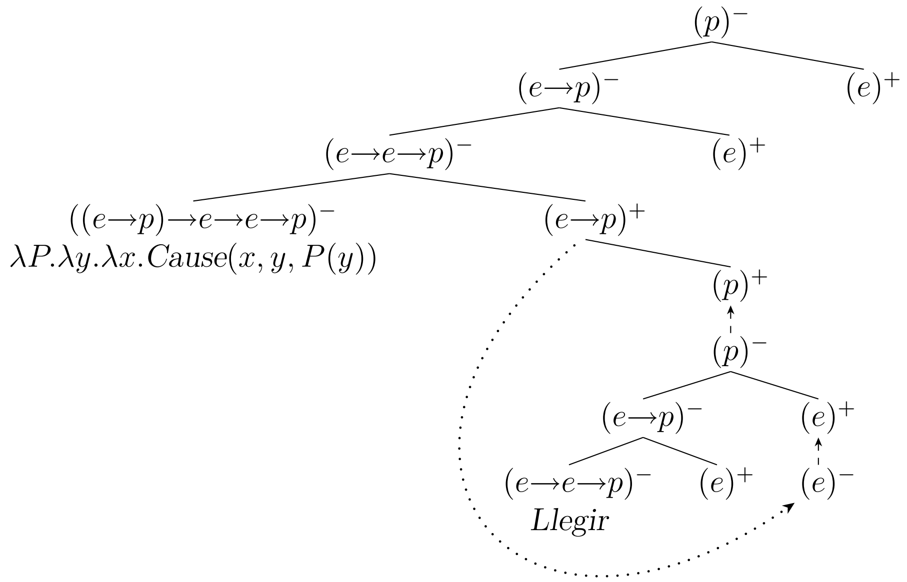


3 Constructors for Causatives

(16) a. $\lambda P.\lambda y.\lambda x.Cause(x, y, P(y))\ :\ (e{\to}p){\to}e{\to}e{\to}p$

b. x does something to y. Because of this, y does P

(17)



(18) 'cause<[P-A] [P-P] read <[P-A] [P-P]>>'
Alsina (1996:191)

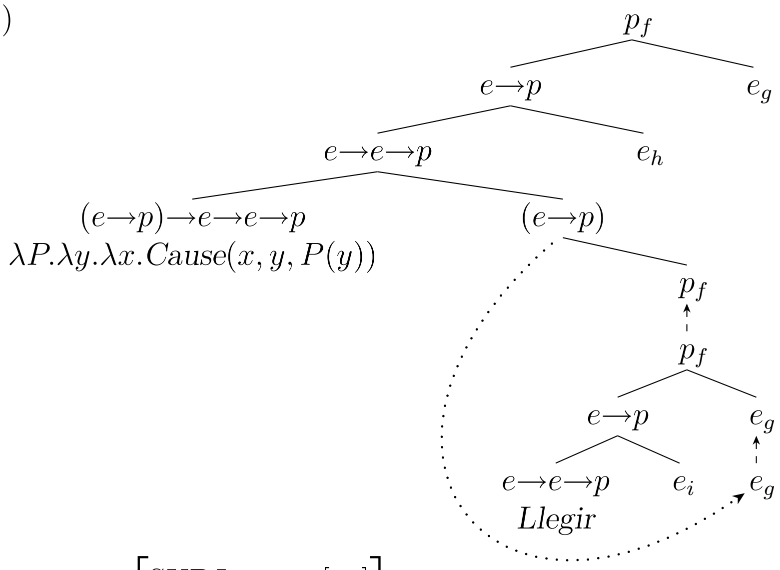
(19) a. $\lambda P.\lambda y.\lambda x.Cause(x, y, P(y))\ :\ ((\uparrow ?\mathrm{OBJ})_e{\to}\uparrow_p){\to}(\uparrow ?\mathrm{OBJ})_e{\to}(\uparrow \mathrm{SUBJ})_e{\to}\uparrow_p$

b. $\lambda P.\lambda y.\lambda x.Cause(x, y, P(y))\ :\ ((\uparrow \mathrm{SUBJ})_e{\to}\uparrow_p){\to}(\uparrow ?\mathrm{OBJ})_e{\to}(\uparrow \mathrm{SUBJ})_e{\to}\uparrow_p$

c. *Llegir* : $(\uparrow \mathrm{OBJ})_e{\to}(\uparrow \mathrm{SUBJ})_e{\to}\uparrow_p$

d. ?OBJ due to OBJ/IOBJ alternation for causee

(20)



$$f:\left[\begin{array}{ll} \text{SUBJ} & g:[\ ] \\ \text{IOBJ} & h:[\ ] \\ \text{OBJ} & i:[\ ] \end{array}\right]$$

(21) $\lambda Px.Seem(P(x))\ :\ ((\uparrow \text{XCOMP SUBJ})_e \rightarrow (\uparrow \text{XCOMP})_p) \rightarrow (\uparrow \text{SUBJ})_e \rightarrow \uparrow_p$

(22)
$$f:\left[\begin{array}{ll} \text{SUBJ} & g:\left[\ldots\right] \\ \text{PRED} & \text{`Seem(XCOMP)'} \\ \text{XCOMP} & h:\left[\begin{array}{ll} \text{SUBJ} & i:\left[\ldots\right] \\ \ldots & \end{array}\right] \end{array}\right]$$
$g \neq i$.

(23) Every goblin seems to have pinched Merry (Asudeh 2002, 2005a)
(21) gives an analysis where narrow scope isn't available

(24) Els metges ens deixen beure una cervesa cadascun
the doctors us let drink a beer each

a. Each of the doctors lets us drink a beer

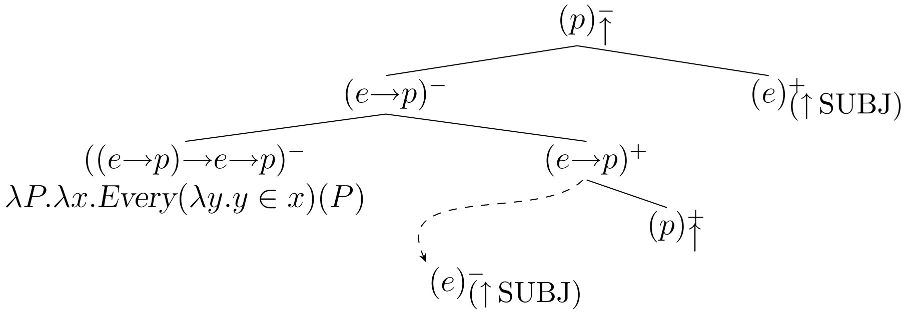
b. *The doctors let each of us drink a beer

(Alsina 1996:217)

(25) Els metges$_i$ ens$_j$ han convençut de beure una cervesa cadascun$_{i/j}$
the doctors us have convinced of drink a beer each
The doctors each convinced us to drink a beer
The doctors convinced us to drink a beer each
(Alsina p.c.)

(26) a. $\lambda Px.\mathit{Every}(\lambda y.y \in x)(P)$: $((\uparrow \mathrm{SUBJ})_e {\rightarrow} \uparrow_p) {\rightarrow} (\uparrow \mathrm{SUBJ})_e {\rightarrow} \uparrow_p$

b.

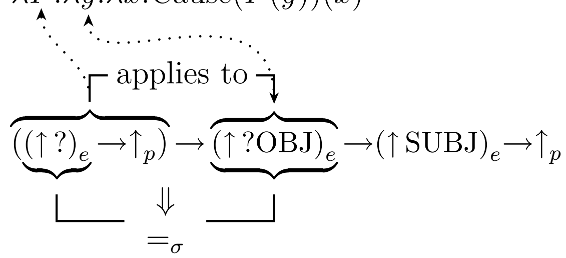


(27) $\lambda x.\mathit{Every}(\lambda y.y \in x)(\lambda z.\mathit{Beure}(\mathbf{b})(z))$

(28) $\lambda x.\mathit{Let}(x, \mathbf{ns}, (\lambda x.\mathit{Every}(\lambda y.y \in x)(\lambda z.\mathit{Beure}(\mathbf{b})(z)))(\mathbf{ns})) \Rightarrow_\beta$
$\lambda x.\mathit{Let}(x, \mathbf{ns}, \mathit{Every}(\lambda y.y \in \mathbf{ns})(\lambda z.\mathit{Beure}(\mathbf{b})(z))) \equiv$
$\lambda x.\mathit{Let}(x, \mathbf{ns}, \mathit{Every}(y, y \in \mathbf{ns}, \mathit{Beure}(\mathbf{b})(y)))$

(29) The analysis of Urdu causatives in Butt et al. (2003), if extended to Catalan, would have the same problem.

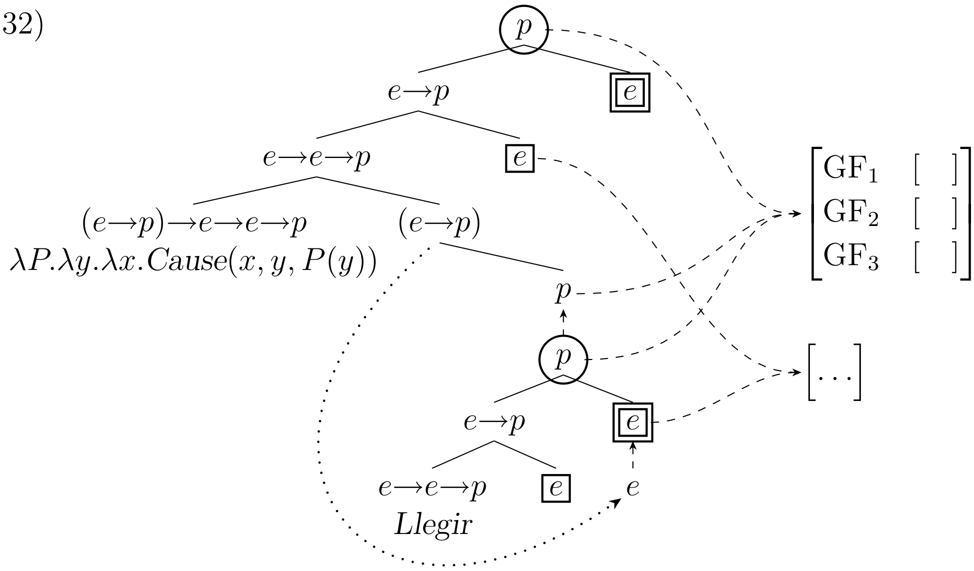
(30) $\lambda P.\lambda y.\lambda x.\mathit{Cause}(P(y))(x)$



(31) **Functional Consistency:** If the meaning-side λ-variable corresponding to the glue-side term $\alpha{\rightarrow}\beta$ is applied as function to the meaning-side λ-variable corresponding to the glue-side term γ, then α and γ must have the same f-structural correspondents for their literals. (Possible weakening: require coreference rather than f-structural identity, using reference indexes as an f-structure attribute. Another: perhaps set-membership rather than identity for *Every man but no woman danced*, etc.)

4 Linking for Glue

(32)



(33) a. 'Final Outputs' circled, 'Arguments' boxed

b. 'Logical Subjects' double-boxed

c. Argument positions α and β (in an assembled glue-structure) are co-arguments if the σ-values of their final outputs are the same.

(34) α is more 'a-prominent' than β if every glue-node properly dominating α w.r.t. the dynamic graph properly dominates β, but not vice-versa.

(35) LMT Adapted

a. Romance languages have at most 2 [−r] co-arguments

b. This restriction applies to assembled structures

c. bound argments are ignored

d. Therefore there are two three-place causatives:

i) *Cause*([−r], [−r], P*([ ]))

ii) *Cause*([−r], [+o], P*([ ]))

It is stipulated that (i) must be used if possible, but if the Caused Event is transitive, then (a-b) require the use of (ii)

e. a [+o] argument is asigned IOBJ grammatical function and dative case

f. the most prominent [−r] argument is SUBJ, the other OBJ

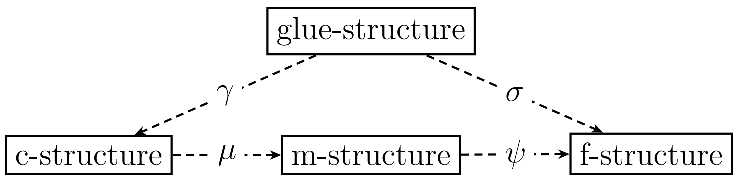
5 Respecting The Tree

(36) a. L' acabo de fer llegir al nen
It I.finish of make read to the boy
'I just made/I finish making the boy read it.'

b. La faig acabar de llegir al nen
It I.make finish of read to the boy
'I make the boy finish reading it.'

(Alsina p.c.; adapted from Alsina (1997))

(37)



$\phi = \psi \circ \mu$ γ connects meaning nodes to their c-structure introducers

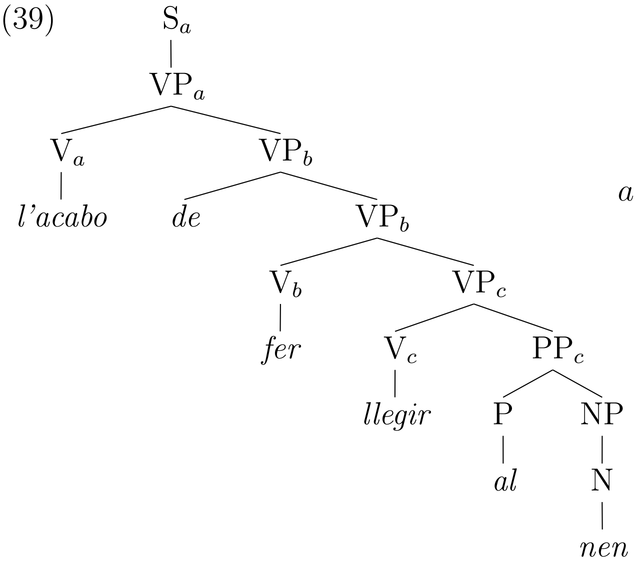
(38) Structure-Function Principles:

a. Members of a basic (i.e. not extended) X-bar projection share μ

b. Members of an extended projection share $\phi = \psi \circ \mu$.

c. 'VP' complements can be treated as either real complements or extended projections.

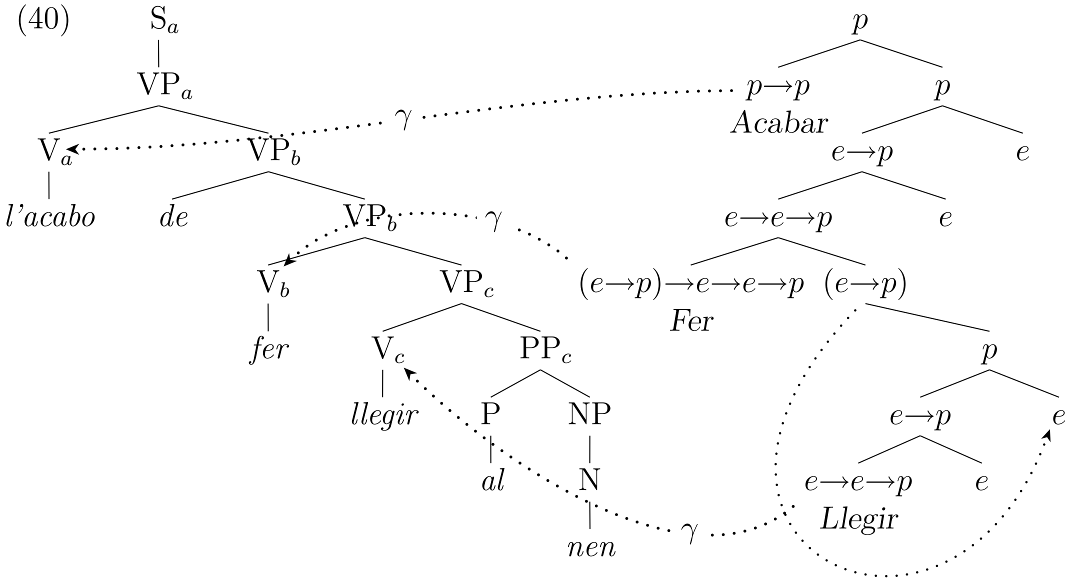
(39)



$$a{:}\left[\begin{array}{ll} \text{PRED} & \text{'Acabar'} \\ \text{VFORM} & \text{FIN} \\ \text{DEP} & b{:}\left[\begin{array}{ll} \text{PRED} & \text{'Fer'} \\ \text{VFORM} & \text{INF} \\ \text{VMARK} & \text{DE} \\ \text{DEP} & c{:}\left[\begin{array}{ll} \text{PRED} & \text{'Lllegir'} \\ \text{VFORM} & \text{INF} \end{array}\right] \end{array}\right] \end{array}\right]$$

$$a, b, c{:}\left[\begin{array}{ll} \text{SUBJ} & [\ ] \\ \text{IOBJ} & [\ ] \\ \text{OBJ} & [\ ] \end{array}\right]$$

(40)



(41) He fet beure el vi a contracor a Maria
I-have made drink the wine against will to Mary
I made Mary drink the wine against her/my will
(Manning (1992), Andrews and Manning (1999:126), from Alex Alsina p.c.)

(42) **Extended Argument of**: Meaning-bearing glue node m is an extended argument of meaning-bearing glue-node n iff the dynamic path of m joins the dynamic path of n before the FinalOutput of n (= 'Feeds Into' from Andrews (to appear)).

(43) **b1-command:** c-structure node c b1-commands node d iff every $\overline{\mathrm{X}}$ projection dominating c dominates d.

(44) **γ-harmony:** If $\gamma(m)$ b1-commands $\gamma(n)$ but not vice-versa, and $\phi(\gamma(m)) = \phi(\gamma(n))$, then n must be an extended argument of m (the condition on $\phi \circ \gamma$ is supposed to keep this from applying to adjuncts, so as to allow the ambiguity of (41).

A From Constructors to Proof Pieces

(45) 'Project' a proof-piece from an instantiated meaning-constructor as follows:

a. Start: Create a node with negative polarity, the meaning-side of the constructor as its meaning, and the semantic type of the constructor as its semantic type.

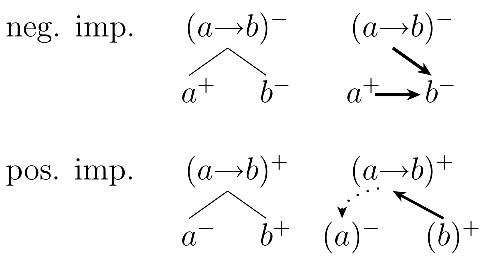
b. Negative Implication: If the semantic type of a negative node n is an implication, create a new node m with negative polarity, the consequent of the implication as its semantic type, and set n as the left-daughter of m. Then create another new node r with positive polarity, and the antecedent of the semantic type of n as its semantic type, and set this as the right-daughter of m (neither mother nor right-daughter get a meaning;.

c. Positive Implication: If the semantic type of a positive node p is an implication, then create a new negative node l as its 'left pseudo daughter' (connected to p in the graphic representation by a curved, dotted line), with antecedent of semantic type of p as its semantic type, and create another new positive node r as its right daughter, with the consequent of semantic type of p as its semantic type (neither left- nor right-daughter get a meaning-label).

d. σ-correspondence: If a node n is of atomic semantic type, it is σ-linked to the f-structure whose label appears in the glue-side literal that it represents

B From Proof-nets to Proof-pieces

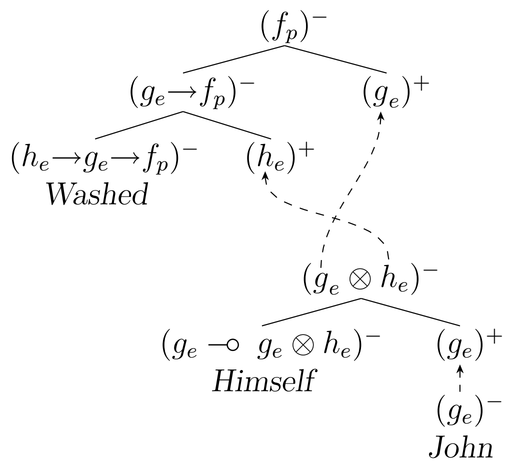
(46) net/type proof-piece



(47) The approach taken here can be regarded as producing proof-terms for proofs or 'semantic readings' for nets (de Groote and Retoré 1996, Perrier 1999, various TLG literature) in the lexicon, and stitching the results together, rather than the opposite order.

C Tensors

(48)



(49) Read each branch from the tensor as a different 'projection':
$\mathit{Washed}(\pi_1(\mathit{Himself}(\mathit{John})))(\pi_2(\mathit{Himself}(\mathit{John})))$
(see. Moot (2002) for projections instead of (Abramsky's?) **let**)

(50) a. **let** has a messier relationship to proof-nets than the projections, but see the 'commuting conversions' of e.g. Mackie et al. (1993)

b. There appears to be a disconnect between the LFG glue and TLG literature on tensors

(51) Relational Nouns (Asudeh 2005b):

$$\begin{aligned} \mathit{Neighbor} &: (\%F)_e \multimap \uparrow_e \multimap \uparrow_p \\ \lambda x.[x, x] &: (\%\mathrm{F}\, \mathit{ANT})_e \multimap (\%\mathrm{F}\, \mathit{ANT})_e \otimes \%F_e \end{aligned}$$

$$(\%F\ \mathrm{ANT}) = ((\mathrm{GF}^*\ \mathrm{GF}\uparrow)\ \mathrm{GF})$$

%F refers to a piece of f-structure not connected to anything else, so not accessible by resource manager for resumptive pronouns. An argument for the standard 'semantic projection' thereby avoided.

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