

Hypothetical Reasoning and Association with Focus

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A gesture towards the gist

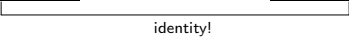
- Adopting a particular perspective on ellipsis pushes us toward
- Transformational analyses of linguistic phenomena, but in addition to ‘movement’, we need
- Hypothetical reasoning, which is, derivationally speaking, the ‘mirror image’ of movement.
- Can hypothetical reasoning be linked up with some linguistic phenomenon, or is it just a technical tool?
- Here we explore the possibility that

Hypothetical reasoning. . .

. . . is association with focus

- The **discharge** operation gives us a *one pass* way to form *Topic-Comment* structures.
- These we can use to provide an account of focus-sensitive operators, basically reconstructing the LF-movement account (of the structured meaning approach to focus), but
- By imposing island constraints, we are able to achieve a homogeneous theory of focus (i.e. of both association with focus and alternative-set computation), that allows us to account for some 'Island-like' effects[Drubig, 1994]

- 1 Motivation : Ellipsis
- 2 Hypothetical Reasoning
- 3 Association with Focus

- Deletion is a natural way of describing ellipsis.
 - John can eat spicy food, but Mary can't ~~eat spicy food~~.

identity!
- It is often straightforward to add an operation of deletion to linguistic grammar formalisms.

$$\text{SPELLOUT}(\text{delete}(t)) = \epsilon$$

- We see that we must constrain the application of deletion, so as to rule out 2.
 - 1 John loves Mary and Bill does ~~love Mary~~ too.
 - 2 *John loves Mary and Bill does ~~enjoy drinking Kölsch~~ too.
- This has its traditional formulation as “deletion up to recoverability.” More precise explications of this intuition recast ‘recoverability’ in terms of the existence of an appropriate antecedent:

Deletion up to recoverability

A structure t in a derivation D may be deleted only if there is a t' in D such that

- 1 t' is not deleted
 - 2 t and t' are identical
- There are at least three natural notions of identity
 - A] Derivational identity: $t = t'$
 - B] Derived tree identity: $eval(t) = eval(t')$
 - C] Semantic identity: $\llbracket eval(t) \rrbracket = \llbracket eval(t') \rrbracket$ or $\llbracket t \rrbracket = \llbracket t' \rrbracket$

Interpretation at LF

Direct Interpretation

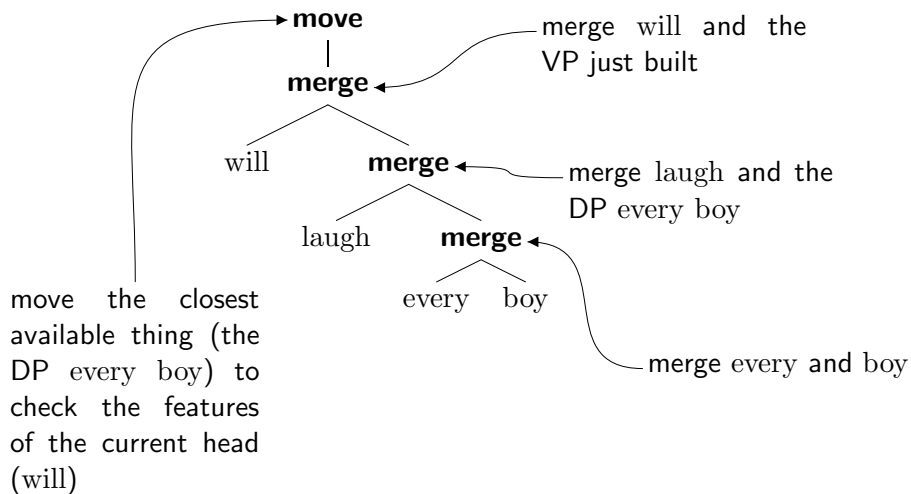
- This is arguably the most natural...
 - ① the derivation is the structure computed by the parser, and by the generator
 - ② items in a chart are derivational constituents...
 - ③ to compute the meaning/surface structure of an expression, we need first its derivation

Representing derivations

- A derivation can be thought of as licensing a sound-meaning pair by showing how it is built up from the primitives of the grammar. Given the obvious lexical items (as ‘axioms’), we ‘prove’ the existence of the sentence *every boy will laugh* as follows:
 - ① [_{DP} every [_{NP} boy]] (merge of *every* and *boy*)
 - ② [_{VP} laugh [_{DP} every boy]] (merge of *laugh* and *every boy*)
 - ③ [_{IP} will [_{VP} laugh [_{DP} every boy]]] (merge of *will* and the VP in 2)
 - ④ [_{IP}[_{DP} every boy][_{I'} will [_{VP} laugh *t*]]] (move of *every boy*)
- It can be difficult to reason about ‘processes’. However, once we realize that derivations like the above can be viewed as *trees*, we can switch between the static ‘tree’ perspective and the dynamic ‘process’ perspective as it becomes convenient:

move(merge(will, merge(laugh, merge(every, boy))))

Representing derivations



Representing derivations

- The set of *possible derivations* will be called T_Σ , which we define as follows:

- 1 each lexical item is a possible derivation (of itself)
- 2 given derivations t and t' , their merger is a possible derivation:
merge(t, t'), or, as a tree

merge



- 3 given a derivation t , applying the operation **move** to t is a possible derivation: **move**(t), or, as a tree

move



Theorem:

The set of convergent derivations $Conv \subseteq T_\Sigma$ in a minimalist grammar is definable in $FOL(DTC^1)$.

Implementing Deletion Under Identity

- We can ask what happens once we enrich our stock of operations to include deletion, by adding the following case to our definition of possible derivations:
 - given a derivation t , applying the operation `delete` to t is a possible derivation: **delete**(t), or, as a tree

delete
|
 t

- If, in a derivation $d \in T_{\Sigma}$, there is a subpart **delete**(t), then
 - 1 there must be another occurrence of t in d ,
 - 2 which is not deleted (there is no node labelled 'delete' on the path from the root of t to the root of d)

Theorem:

The set of convergent derivations $Conv \subseteq T_{\Sigma}$ in a minimalist grammar *with deletion under identity* is definable in $FOL(DTC^2)$.

Derivational Identity versus Ellipsis

Some well-known ‘identity mis-matches’ in ellipsis [Hardt, 1993]:

Agentive nominals and Vs

“Harry used to be a great **speaker**, but he can’t ~~spea~~k anymore, because he’s lost his voice.”

Gerunds and VPs

“The candidate was dogged by charges of **avoiding the draft**, or at least trying to ~~avoid the draft~~”

Passives and actives

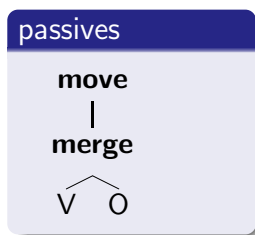
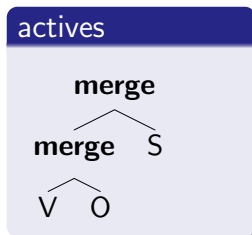
“**This information** could have been **released** by Gorbachev, but he chose not to ~~release this information~~.”

Derivational Identity versus Ellipsis

- Assuming that identity is derivational (the *Derivational Identity Hypothesis*, or DIH for short), we interpret 'mis-matches' as *constraints* on possible theories of grammar.
- For example,
 - ① Given that agentive nominals can antecede verbs, the DIH rules out any theory of syntax which doesn't allow us to derive agentive nominals from verbs
 - ② Given that gerunds can antecede VPs, the DIH rules out any theory of syntax in which gerunds are not built from Verb-Object complexes
 - ③ Given that passives can antecede active VPs, the DIH rules out any theory of syntax in which passive is lexical
- What we have to do is find a theory of grammar that satisfies all of the constraints imposed by the DIH interpretation of the ellipsis facts!

The structure of VP – Conflicting requirements

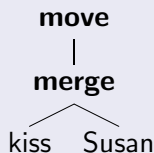
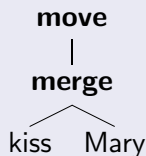
- Because passives may antecede actives, these structures must be derived along something like the following lines:



The structure of VP – Conflicting requirements

- But what about passive – passive ellipsis?


Mary was kissed, and Susan was too



- This *is* VP ellipsis:
 - 1 Mary was kissed passionately, and Susan was too
 - 2 Mary seems to have been kissed, and Susan does too

- 1 Motivation : Ellipsis
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Hypothetical Reasoning

- We saw that the object *can* count for identity, but doesn't have to.
- Under the DIH, this means that in a passive sentence, the object can be merged either in its 'base' position, or in its 'surface' position.
- This means that we need to have another way of satisfying syntactic dependencies, one which allows dependencies to be temporarily satisfied, even if there is nothing there to satisfy them.
- The basic idea will be to incorporate both transformations, as well as hypothetical reasoning into a single formalism.
- Then we can establish dependencies either by using transformations:
 - 1 [VP seems Mary to smile]
 - 2 [S Mary [VP seems Mary to smile]]
- Or by means of hypothesis introduction and discharge:
 - 1 [VP/NP seems τ_{NP} to smile]
 - 2 [S Mary [VP seems to smile]]

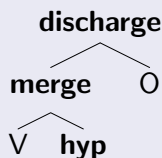
Syntax as Economics (a mercantile metaphor)

- **merge** is putting money in the bank
 - **move** is withdrawing money to pay for something
 - **hyp** is getting a loan: you get something for free, but you have to pay it back later
 - **discharge** is how to pay back loans
- Now, as desired, we have two possible derivations for passives

one where the object
counts for identity



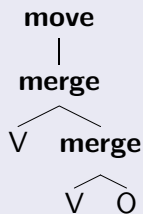
and one where it
doesn't



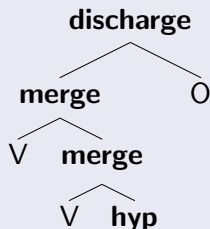
Hypothetical reasoning

- In raising contexts, it looks like this:

one where the object
counts for identity



and one where it
doesn't



- I introduced the Derivational Identity Hypothesis (DIH) as a principled way of thinking about identity in ellipsis.
- We saw that identity mismatches are actually a powerful tool, acting as constraints on syntactic theories.
- We saw that the ellipsis data put seemingly contradictory requirements on a syntactic theory (sometimes the object counts, sometimes it doesn't), and I outlined a (non-contradictory) theory that satisfied these requirements by allowing two ways of satisfying dependencies,
- Which led us to introduce the 'dual' of movement, [hypothetical reasoning](#)

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- The idea common to theories of focus-sensitive operators is that

In a sentence $\Phi[Foc]$...

we are making some sort of statement about the set of meanings of sentences of the form $\Phi[\psi]$, where ψ ranges over *alternatives* to *Foc*.

- *only*($\Phi[Foc]$) will be true just in case for any alternative ψ to *Foc*, $\Phi[\psi]$ is true only if $\psi = Foc$.
- *also*($\Phi[Foc]$) will be true just in case for some distinct alternative ψ to *Foc*, both $\Phi[\psi]$ and $\Phi[Foc]$ are true.

- One standard way of assigning lexical meanings to focus-sensitive operators like *only* is to assume that they are given as arguments both the focused element *Foc*, as well as its context, $\Phi[_]$ [von Stechow, 1990]

$$\llbracket \textit{only} \rrbracket := \lambda x, y. \forall z. (z \in \text{ALT}(x) \wedge y(z) \rightarrow z = x)$$

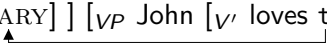
- Alternatives are presumably influenced by contextual factors, but for simplicity, we can take them to be anything of the same type as the focus: $\text{ALT}(x) := D_{\text{type}(x)}$
- So in a sentence “*John only loves MARY*”, the semantic form is:

$$\llbracket \textit{only} \rrbracket(\mathbf{m})(\lambda x. \mathbf{love}(x)(\mathbf{j}))$$

- The tried and true strategy for arriving at such a bipartite representation for a sentence with a focus-sensitive operator is to (covertly) *move* the focused expression to be adjacent to the operator it associates with.

① [S only [VP John [V' loves [MARY]]]]

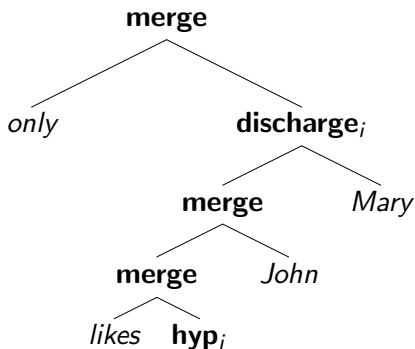
② [S [only [MARY]] [VP John [V' loves t]]]

A diagram illustrating the movement of the focused expression 'MARY' to be adjacent to the focus-sensitive operator 'only'. A horizontal line is drawn under the phrase '[VP John [V' loves t]]' in the second structure. An arrow points from the end of this line up to the 'M' in 'MARY' of the first structure, indicating the movement of the focused expression.

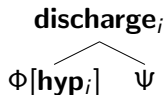
- Here, the first argument to *only* is MARY,
- And the second is [VP John [V' loves t]]

Structured Meanings

- Note that the operations of **hyp** and **discharge** already
 - 1 mark the location of the missing element (**hyp**)
 - 2 pair the missing element up with its context (**discharge**)
- So, for “*John only likes MARY*”, we might have a derivation like



- When **discharge** occurs in a well-formed derivation, its first argument can be viewed as the context of its second.



- A natural interpretation of such a structure is as a pair:

$$\llbracket \text{discharge}_i(\Phi[\text{hyp}_i], \Psi) \rrbracket := \langle \lambda x_i. \llbracket \Phi[t_i] \rrbracket, \llbracket \Psi \rrbracket \rangle$$

- The argument that ‘movement’ of some sort is involved in creating these structures comes from contrasts like the following:
 - 1 Mary didn’t invite JOHN to the party, but ROBERT
 - 2 *Mary didn’t invite [the girls [that JOHN likes]] to the party, but ROBERT
 - 3 Mary didn’t invite [the girls [that JOHN likes]] to the party, but [the girls [that ROBERT likes]]
- The idea is that when the focus occurs embedded in an island, the entire island behaves syntactically as though it were the focused expression.

- Krifka [2004] suggests that we move the island containing the focused item as per what we've been doing,
- but then we still need some way to compute the alternatives!

Note the difference:

- 1 Mary only invited [the girls [that JOHN introduced to Robert]]
 - 2 Mary only invited [the girls [that John introduced to ROBERT]]
- He uses alternative semantics for this [Rooth, 1996].

- Currently, **discharge** has no restrictions on which **hyps** it can, well, discharge.
- If we make it sensitive to syntactic islands, then we can compute alternatives as follows:

$$\begin{aligned} \text{ALT}(p) &= D_{\text{type}(\llbracket p \rrbracket)} \\ \text{ALT}(\mathbf{discharge}_i(q, p)) &= \{\lambda x_i. \llbracket q \rrbracket(\phi) : \phi \in \text{ALT}(p)\} \end{aligned}$$

- In other words, in a structure like:

discharge(q_1 , **discharge**(q_2 , ... **discharge**(q_n , p) ...))

- The alternatives will be gotten by replacing only the most deeply embedded discharged argument, p (the one that was originally focused, but which was trapped in the island)

- To compute the alternatives of *the girls with RED hats*:
- ① $\text{ALT}(\text{discharge}_k(\mathbf{r}(\text{the}, \mathbf{r}(\text{girls}, \mathbf{r}(\text{with}, \mathbf{r}(\text{hats}, \text{hyp}_k))))), \text{red}))$
(using case: $\text{ALT}(\text{discharge}_i(q, p)) = \{\lambda x_i. \llbracket q \rrbracket(\phi) : \phi \in \text{ALT}(p)\}$)
- ② $\{\lambda x_k. \llbracket \mathbf{r}(\text{the}, \mathbf{r}(\text{girls}, \mathbf{r}(\text{with}, \mathbf{r}(\text{hats}, \tau_k)))) \rrbracket(\phi) : \phi \in \text{ALT}(\text{red})\}$
(using case: $\text{ALT}(p) = D_{\text{type}(\llbracket p \rrbracket)}$)
- ③ $\{\lambda x_k. \llbracket \mathbf{r}(\text{the}, \mathbf{r}(\text{girls}, \mathbf{r}(\text{with}, \mathbf{r}(\text{hats}, \tau_k)))) \rrbracket(\phi) : \phi \in D_{\text{type}(\llbracket \text{red} \rrbracket)}\}$

Hypothetical Reasoning and Association with Focus

- Using hypothetical reasoning, we are able to derive phrases in a way that allows us to 'separate' various constituents from their derivational context
- This in turn allows us to have a straightforward treatment of focus-sensitive operators
- And a simple characterization of 'alternatives'
- Adding island sensitivity to hypothesis discharge makes for simple treatment of 'pied-piping' of islands during focus-movement

Conclusions: Association with Focus, and Ellipsis

- Our treatment of ellipsis forces us to use hypothetical reasoning in certain cases. How well do these line up with focalization?
- ① **Passive–Passive ellipsis:** *Mary was kissed, and Susan was too.*
To a first approximation, both surface subjects are contrasted (focused).
- ② **Antecedent contained deletion:** *Mary read every book that I did.*
Less immediately promising; it seems that the object ‘every book’ is *not* focused, although ellipsis forces upon us the idea that the objects is introduced hypothetically.
However: the subjects must be hypothesized as well, and they seem naturally contrasted.
- **Prognosis:** the simplest association between hypothetical reasoning and focus (hypothesis iff focused) won’t be easy to maintain.
- Still, the relation between hypotheses and focalization doesn’t seem to be completely random. Perhaps elegance will emerge!

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