

Scope, Monotonicity, and Maximal Informativity cannot be underestimated!

A Compositional Analysis of an Apparent Linguistic Illusion

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Summary

Building on research on the semantics of comparison (Meier 2003, Beck & Rullmann 1999, Beck 2013) and the analysis of the **depth-charge illusion** (= *No head injury is too insignificant to be ignored*) in Hohaus & Bade (2022), we propose a compositional analysis of the **under-over illusion**. The alleged illusion arises when the maximal informative degree for the comparee in the comparison equals the minimal degree, rather than the maximal degree, a well-attested interpretative effect across degree constructions.

Prima facie, a type of inversion illusion:

Under = Over

"Logically, the literal meaning was the opposite of what I intended."

(Barbara Wallraff, "Word Court", The Atlantic, June 2004)

"This perplexing turn of phrase is extremely common, even among careful writers and speakers."

(Ben Zimmer, "On Language", The New York Times, 21st January 2011)

The Phenomenon

(1) Chomsky's importance cannot be underestimated.
 \Leftrightarrow **Chomsky's importance cannot be overestimated.**

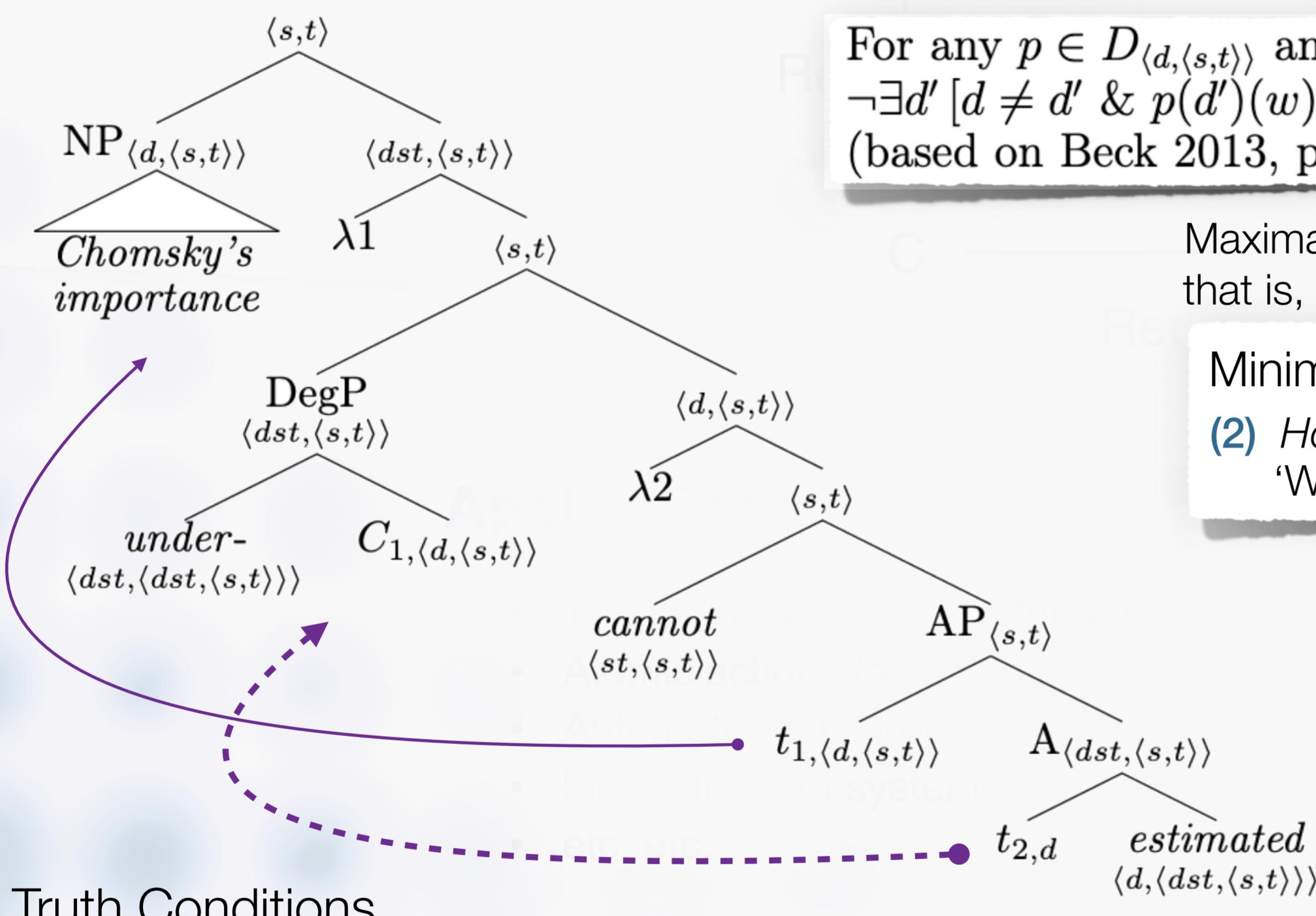
Intended interpretation: 'Chomsky is very important!'

Pedantic interpretation: 'Chomsky is not important at all!'

The Analysis

A scope ambiguity, interacting with maximal informativity.

Surface scope CANNOT >> DegP: pedantic
Wide scope DegP >> CANNOT: intended



Truth Conditions

Pedantic (with DegP >> CANNOT): "Always overestimated!"

$\neg \exists w^* [w^* \text{ is accessible from } w @ \& \text{the-MAX}_{\text{inf}}(\lambda d. \lambda w. d \in \text{ESTIMATE}_w(\lambda d'. \lambda w'. \text{IMPORTANCE}_{w'}(C) \geq d'))(w^*) < \text{the-MAX}_{\text{inf}}(\lambda d''. \lambda w''. \text{IMPORTANCE}_{w''}(C) \geq d'')(w^*)]$

Intended (with CANNOT >> DegP): "Very important!"

$\text{the-MAX}_{\text{inf}}(\lambda d. \lambda w. \neg \exists w^* [w^* \text{ is accessible from } w @ \& d \in \text{ESTIMATE}_{w^*}(\lambda d'. \lambda w'. \text{IMPORTANCE}_{w'}(C) \geq d')](w @) < \text{the-MAX}_{\text{inf}}(\lambda d''. \lambda w''. \text{IMPORTANCE}_{w''}(C) \geq d'')(w @)]$

Nota bene: The first degree property in the comparison is upward-entailing!

— Less-than comparison of the maximally informative degrees of two intensional degree sets

$$\llbracket \text{under-} \rrbracket = \lambda D'_{\langle d, \langle s, t \rangle \rangle}. \lambda D_{\langle d, \langle s, t \rangle \rangle}. \lambda w. \text{the-MAX}_{\text{inf}}(D)(w) < \text{the-MAX}_{\text{inf}}(D')(w)$$

For any $p \in D_{\langle d, \langle s, t \rangle \rangle}$ and world w , $\text{the-MAX}_{\text{inf}}(p)(w) = \text{id}[p(d)(w) = 1 \& \neg \exists d' [d \neq d' \& p(d')(w) = 1 \& [\text{if } p(d')(w) = 1, \text{ then } p(d)(w) = 1]]]$
(based on Beck 2013, p. 13, no. (36))

Maximal informativity is sensitive to entailment patterns, that is, the scalar properties of the degree set involved.

Minimal degree, maximally informative

(2) How much arsenic is lethal in humans?
'What is the minimal amount that is lethal?'

— A modal semantics for the verbal root that maps a degree set to its contextually salient estimate:

$$\llbracket \text{estimate} \rrbracket =_{\text{simplified}} \lambda d. \lambda D_{\langle d, \langle s, t \rangle \rangle}. \lambda w. \forall w' \in \text{ESTIMATE}(w) : D(d)(w') = 1$$

— A degree-based semantics for the noun phrase: $\lambda d. \lambda w. \text{IMPORTANCE}_w(C) \geq d$

'There is no world where C's estimated importance is less than his importance in the actual world.'

'The maximally informative (= minimal) degree of estimated importance that C lacks in any world is less than his actual degree of importance.'

The minimum of the set of importance degrees that C lacks in any world is the highest degree that he has been assigned across worlds.

Discussion

- The claimed illusory but often intended reading arises compositionally from an interaction between the **scope** of negation, monotonicity and **maximal informativity**.
- These cases are highly reminiscent of the depth-charge illusion (= *No head injury is too trivial to ignore*).
- These illusions turn out to be closely related, and formal analysis can provide systematic explanations for both.