

Mortal computational efficiency and copy externalization

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An important aspect of Chomsky 2024a,b is the emphasis on computational efficiency rooted in Resource Restriction, a constraint following from the nature of biological systems. This focus dovetails with recent work on types of computations implementable in living organisms, particularly Hinton's (2022) mortal computation, which is substrate-dependent and hence resource-constrained (Ororbias and Friston 2023). With this background in mind, I examine Chomsky's (2024b) copy realization mechanism in *wh*-questions, with subsequent revisions in Kitahara & Seely 2025, and suggest an alternative.

In brief, Chomsky (2024b) proposes that the realization of a *wh*-XP is determined when C accesses the *wh*-copy remaining lower in the structure (Spec,V or Spec,Infl for Kitahara & Seely). Neither he nor Kitahara & Seely develop this approach to *wh*-XP linearization further, so the reflections that follow may be misplaced. That said, it seems that attributing the ultimate realization of *wh*-XP to Access from C is not without cost, if only because it requires enriching the system with a memory component. In particular, since Access for the CI and SM purposes applies simultaneously at Transfer (cf. Form Copy in Chomsky 2021, 2024a), but linearization standardly applies at PF, arguably following a number of other post-syntactic operations (incl. head movement per the Miracle Creed, as well as, e.g., Impoverishment and Chain Reduction; see Embick & Noyer 2007; Arregi & Nevins 2012; Embick 2015; Bobaljik 2017), memory of Access and the ordering instruction provided by it would need to be available at the relevant point of the PF derivation. I thus suggest that while Access may be needed for interpretation at the CI interface/system, it plays no role for externalization, which is instead guided directly by linearization.

Assuming that labeling (Chomsky 2013, 2015) is needed (only) for linearization (Takita 2019, Ruda 2025), I propose that the linear positioning of the *wh*-XP in sentences like *What did you break?/What broke?/What was broken?/What does she think you broke?* is a consequence of the unlabelability, and hence unlinearizability, of the set/set representation generated by Internal Merge of the *wh*-XP:

(1) Basic intuition for clause-initial *wh*-XPs

Structure generated in the narrow syntax: $\{wh\text{-XP}, VP\}$ or $\{wh\text{-XP}, InflP\}$

- a. *wh*-XP and VP or InflP are labeled and precedence relations are generated for them at PF (e.g., per Fox & Pesetsky 2005, Ruda 2025).
 - This means adding $\{wh < NP\}$ (i.e., the precedence relations for the *wh*-XP) to the set of precedence relations.
- b. $\{wh\text{-XP}, VP\}$ and $\{wh\text{-XP}, InflP\}$ cannot be labeled and, consequently, cannot be linearized with respect to v^* and C respectively.
- c. The representation of the *wh*-XP is removed from the representation of the clause.
 - This is an instance of rescue by deletion, complying with mortal computational efficiency (avoidance of wasting resources used to construct the representation so far).
- d. The clause can be labeled and linearized.
- e. The precedence relations for *wh*-XP are concatenated with the rest of the clause based on the $[wh]$ feature shared with $C_{[wh]}$, yielding $\{wh < NP\} < CP$.
 - The presence of $[wh]$ in C & $C < InflP \Rightarrow [wh] < InflP \Rightarrow wh\text{-NP} < InflP$.

Another option, arguably more economical but subject to additional conditions like recoverability of deletion, is to remove the representation of the CP and externalize only the set of precedence relations associated with the *wh*-XP. This option derives sluicing, a type of ellipsis featured in sentences like *I know that you broke something, but I don't know **what***.

References

- Arregi, Karlos & Andrew Nevins. 2012. *Morphotactics: Basque auxiliaries and the structure of Spellout*. Dordrecht: Springer.
- Bobaljik, Jonathan David. 2017. Distributed Morphology. In Mark Aronoff (ed.), *Oxford research encyclopedia of linguistics*. Oxford: Oxford University Press.
- Chomsky, Noam. 2013. Problems of projection. *Lingua* 130:33–49.
- Chomsky, Noam. 2015. Problems of projection: Extensions. In Elisa Di Domenico, Cornelia Hamann, & Simona Matteini (eds.), *Structures, strategies and beyond: Studies in honour of Adriana Belletti*, 1–16. Amsterdam: John Benjamins.
- Chomsky, Noam. 2021. Minimalism: Where are we now, and where can we hope to go. *Gengo Kenkyu* 160:1–41.
- Chomsky, Noam. 2024a. Genuine explanation. In Giuliano Bocci, Daniele Botteri, Claudia Manetti, and Vincenzo Moscati (eds.), *Rich descriptions and simple explanations in morphosyntax and language acquisition*, 15–44. Oxford: Oxford University Press.
- Chomsky, Noam. 2024b. Miracle Creed and SMT. In Matteo Greco & Davide Mocci (eds.), *A Cartesian dream: A geometrical account of syntax*, 17–39. Lingbuzz Press.
- Embick, David. 2015. *The morpheme. A theoretical introduction*. Berlin: Mouton de Gruyter.
- Embick, David & Rolf Noyer. 2007. Distributed Morphology and the syntax-morphology interface. In Gillian Ramchand & Charles Reis (eds.), *The Oxford handbook of linguistic interfaces*, 289–324. Oxford: Oxford University Press.
- Hinton, Geoffrey. 2022. The forward-forward algorithm: Some preliminary investigations. <https://arxiv.org/abs/2212.13345>.
- Kitahara, Hisatsugu & T. Daniel Seely. 2025. Simplifications and extensions of the Miracle Creed. *Linguistic Variation Online First*: 1–23.
- Ororbia, Alexander, & Karl Friston. 2023. Mortal computation: A foundation for biomimetic intelligence. <https://arxiv.org/abs/2311.09589>.
- Ruda, Marta. 2025. Null subjects, labeling, and linearization: Microvariation in subject and agreement drop. *Linguistic Inquiry Early Access*:1–66.
- Takita, Kensuke. 2020. Labeling for linearization. *The Linguistic Review* 37:75–116.