Dealing with relevance and redundancy via a compositional model of QuDs[1]

Adèle Hénot-Mortier (MIT)

June 28, 2024

BerlinBrnoVienna Workshop 2024

[1]Many thanks to Amir Anvari, Athulya Aravind, Danny Fox, Nina Haslinger, and Viola Schmitt for their precious input on that project. Thanks also to the BBV Workshop organizing team for giving me the opportunity to present this work. All mistakes are mine.

Data at stake

- Hurford Disjunctions (**HD**, cf. Hurford, 1974) like (1)/(2), which feature entailing disjuncts, feel redundant.

(1) # Mary lives in **Brno** or she lives in **Czechia**. $\mathbf{p}^+ \vee \mathbf{p}$

(2) # Mary lives in **Czechia** or she lives in **Brno**. $\mathbf{p} \vee \mathbf{p}^+$

- Hurford *Conditionals* (**HC**, cf. Mandelkern and Romoli, 2018), like (3)/(4) are isomorphic variants of (1) assuming material implication and (for (4)) a variable change of the form $\neg p := q^+ / p^+ := \neg q$.

(3) # If Mary does **not** live in **Brno**, she lives in **Czechia**.
$\neg \mathbf{p}^+ \rightarrow \mathbf{p}$

(4) If Mary lives in **Czechia**, she does **not** live in **Brno**.
$\neg(\neg \mathbf{p}) \rightarrow \neg \mathbf{p}^+ \equiv \neg \mathbf{q}^+ \rightarrow \mathbf{q}$

- Yet, (3) is odd while (4) is felicitous. This is challenging for existing accounts of Hurford sentences, which rely on a classical interpretation of $\vee$, $\rightarrow$, and $\neg$.

Previous work on Hurford sentences

- Kalomoiros (2024) proposes an interesting solution to the puzzle of HCs and HDs based on the concept of *Super-Redundancy*, which gives a specific role to overt negation. However nothing is said about how Hurford sentences can be repaired.
- As we saw yesterday, Haslinger (2023) accounts for HDs (but not HCs), as well as other related cases, e.g. coordination, *via* some intuitions about the Question under Discussion (**QuD**, Van Kuppevelt, 1995; Roberts, 1996).
- Zhang (n.d.), building on (Simons, 2001; Büring, 2003) proposes another view on HDs (but not HCs) and how to fix them, based on intuitions about QuD *trees*; however, no compositional machinery is proposed to derive those trees.
- **I will be trying to build on Haslinger's and Zhang's insights to propose a way to retro-engineer and constrain questions raised by sentences**, allowing to derive the target asymmetries, and their repairs.

At a glance

- We account for the asymmetry in Hurford sentences using three ingredients:
  - the idea that questions have different levels of **granularity**;
  - the idea that sentences raise questions (Katzir & Singh, 2015) in the form of **trees**, and that conditionals, unlike disjunctions, *restrict* the question raised by the consequent to some "local domain" verifying the antecedent;
  - some generalization of what RELEVANCE and REDUNDANCY mean when combining questions.
- The problem with the infelicitous HC (3) then boils down to the fact that the question raised by its consequent is "coarser-grained" than that of its antecedent, and therefore appears IRRELEVANT, granted the antecedent.

Background on question semantics

- The Context Set (**CS**, Stalnaker (1974)) is the set of worlds that are seen as possible given the premises of the conversation.
- Questions are usually seen as **partitions** of the CS, i.e. sets of non empty, disjoint subsets of the CS (=*cells*) that together fully cover the CS.
- For any set of worlds S, a partition of S can be generated from a set of propositions by simply grouping together the worlds of S that "agree" on all those propositions (Hamblin, 1973). Let's call that operation $\textsc{Partition}(S,\ p_1, ...p_k)$. Special cases:
  - You only consider one proposition p that's not settled in the CS; the partition obtained intuitively corresponds to the **polar question** of *whether p* ($\{p, \neg p\}$).
  - You consider a set of propositions corresponding to formal focus alternatives; the partition obtained intuitively corresponds to a **wh-question** inquiring about the focused material.
    - Special subcase: if the propositions are all possible and mutually exclusive in S, the corresponding question partition is just the set of those propositions: $\textsc{Partition}(S,\ p_1, ...p_k) = \{p_1, ...p_k\}$.

One step forward: questions as trees

- The idea is not new (Büring, 2003; Riester, 2019; Zhang, n.d.) but I want to give it more constrained flavor, defining question **trees as possible parse trees of the CS**.
- A **Q-tree** is a trees whose nodes all denote sets of worlds and s.t.:
  - the **root** node denotes the CS;
  - **leaves** are understood as maximal answers to the global question;
  - **intermediate nodes** are understood as non-maximal answers to the question, and are partitioned by the set of their children.

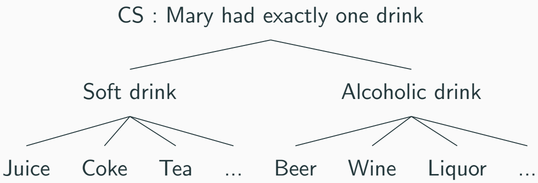


Figure 1: An intuitive Q-tree for the question *Which drink did Mary have?*

Interaction between assertive sentences and questions

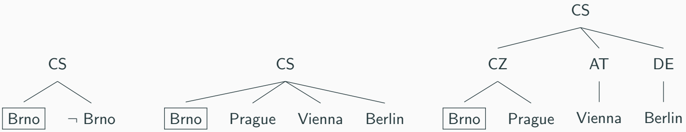
- A recent line of research (Katzir and Singh, 2015 a.o.) develops the idea that **felicitous sentences should be possible answers to a "good" QuD**. What's the connection between assertive sentences and Q-trees then?
- Let's call $\widehat{Qs}(X)$ the set of Q-trees a Logical Form X can be can be seen as the answer to. We'd like some inductive algorithm allowing to **"retro-engineer"** $\widehat{Qs}(X)$ **starting from X's simplex parts and following its structure from the bottom up**.
- Once this is done, there are two cases:
    - Either an overt QuD was given by the context: we then have to check if one element in $\widehat{Qs}(X)$ matches that overt QuD.
    - Or, no QuD was contextually given (our focus here): then we are happy if $\widehat{Qs}(X) \neq \emptyset$.[1]

[1] At this point you might ask: how can $\widehat{Qs}$ be empty in the first place, if the retro-engineering algorithm is constructive? This can happen if certain constraints on Q-tree derivation (tbd) are violated.

$\widehat{Qs}$ of simplex LFs (no operator, connective or quantifier)

- Let's first consider a simplex LF X denoting a proposition p. Intuitively, we'd like that any $T \in \widehat{Qs}(X)$, has as its leaves the kind of traditional question-partition derived from p...
  - either the **polar partition**: $\textsc{Partition}(\text{CS}, \{p\}) = \{p, \neg p\}$;
  - or, the **same granularity wh-partition**: $\textsc{Partition}(\text{CS}, \mathscr{A}_p^g) = \mathscr{A}_p^g$, assuming $\mathscr{A}_p^g$ is the set of exclusive same-granularity focus alternatives to p.
- But, more generally, we want to allow Q-trees with multiple layers of increasing granularity (top-down), and s.t. each layer is defined by same-granularity alternatives to an element entailed by p.
- Finally, let's secure a way to keep track of what is being said by X: we associate $T \in \widehat{Qs}(X)$ with a **multiset of verifying nodes** $\mathbb{N}_T^+$. In the simplex case, $\mathbb{N}_T^+ = \{p\}$ (=the p-leaf).

Q-trees for p and p^+



(a) "Polar" **(b)** "Wh" **(c)** 2-level "wh"

Figure 2: Some schematic Q-trees compatible with the simplex proposition p^+=*Mary lives in Brno*. Boxed cells denote de verifying nodes $\mathbb{N}^+_T$.

(a) "Polar" **(b)** "Wh"

Figure 3: Some schematic Q-trees compatible with p=*Mary lives in Czechia*.

$\widehat{Qs}$ of negated LFs

- Q-trees for a negated LF $\neg X$ are structurally similar to those of X, modulo the sets of verifying nodes, that are flipped into their non-verifying sisters.

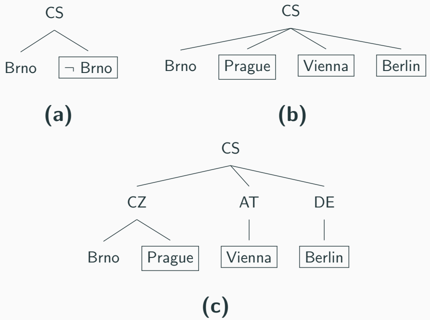


Figure 4: Some schematic Q-trees compatible with $\neg \mathbf{p}^{+}$=*Mary does not live in Brno*.

The conditional case

$\widehat{Qs}$ of conditional LFs (if X then Y)

- Intuitively, a Q-tree for $X \to Y$ **focuses on the question raised by Y in the sub-domain(s) of the CS where X holds**.
- To get a Q-tree T for $X \to Y$:
  - take a Q-tree $T_X \in \widehat{Qs}(X)$ and a Q-tree $T_Y \in \widehat{Qs}(Y)$;
  - for each verifying node of T_X, replace it by its "intersection" with T_Y (="plug in" T_Y).
- What does it mean to intersect a node N with a tree T ($T \cap N$)? Just intersect each node of T with N, and prune any resulting empty node. Verifying nodes are "preserved": if M was a verifying node in T, then $M \cap N$ will be verifying in $T \cap N$.

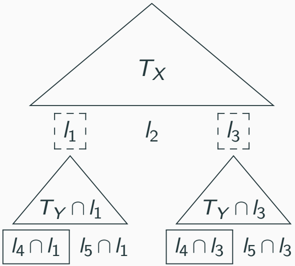
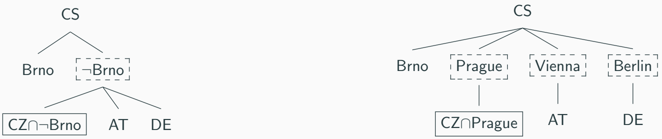


Figure 5: General form of a Q-tree $X \to Y$. Nodes in dashed boxes are assumed to be verifying for X, and are thus further partitioned according to a Q-tree for Y. Boxed leaves are assumed to support Y, and thus also support $X \to Y$.

Q-trees for $\#\neg\mathbf{p}^{+} \rightarrow \mathbf{p}$ and $\mathbf{p} \rightarrow \neg\mathbf{p}^{+}$



(a) T_X=2a, T_Y=3b **(b)** T_X=2b, T_Y=3b

Figure 6: Potential Q-trees obtained for $\#\neg\mathbf{p}^{+} \rightarrow \mathbf{p}$ = *If Mary does not live in Brno, she lives in Czechia*. More combinations possible but will lead to the same end result.

(a) T_X=3a, T_Y=2a **(b)** T_X=3a, T_Y=2b

Figure 7: Potential Q-trees obtained for $\mathbf{p} \rightarrow \neg\mathbf{p}^{+}$= *If Mary lives in Czechia she does not live in Brno*. More combinations possible but will lead to the same end result.

Rephrasing Relevance

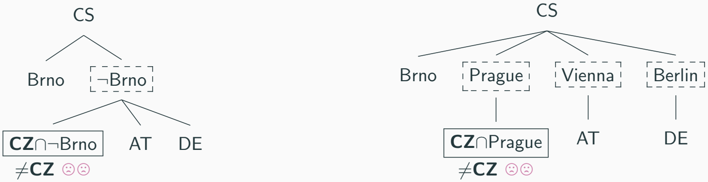
- Under the traditional (partition-based) view of questions, a proposition p (=set of worlds) is relevant given a question (=partition), if it **does not cuts across cells**. We want some generalization of this to apply as a filter during Q-tree derivation.
- Recall tree-node intersection, used to "plug" consequent into antecedent Q-trees? We want to say that this operation should not **cut across any verifying node of its input Q-tree**:

(5) Relevance: $\forall N' \in \mathbb{N}^+_{T \cap N}.\ \exists N'' \in \mathbb{N}^+_{T}.N' = N''$

- In our case this means we don't want a by-city partition cutting across *Czechia*-worlds.

Ruling out the "bad" Q-trees via Relevance: $\neg\mathbf{p}^{+}\to\mathbf{p}$

- RELEVANCE is violated in trees 6a & 6b, due to the impossibility for a verifying *Czechia* node to be fully contained within city-level nodes (introduced by the antecedent).
- This entails $\widehat{Qs}(\neg\mathbf{p}^{+} \to \mathbf{p}) = \emptyset$ and captures the infelicity of the HC (3).



(a) T_X=2a, T_Y=3b

(b) T_X=2b, T_Y=3b

Figure 6 (repeated): Potential Q-trees obtained for $\#\neg\mathbf{p}^{+}\to\mathbf{p}$

Ruling out the "bad" Q-trees via Relevance: $\mathbf{p}\rightarrow\neg\mathbf{p}^{+}$

- Tree 7b satisfies RELEVANCE, because it allows to fully map each verifying *not Brno*-node (city-level) to a particular country-level node.[2]
- This entails $\widehat{Qs}(\mathbf{p} \rightarrow \neg\mathbf{p}^{+}) \neq \emptyset$ and captures the felicity of the HC (4).

Figure 7 (repeated): Potential Q-trees obtained for $\mathbf{p}\rightarrow\neg\mathbf{p}^{+}$

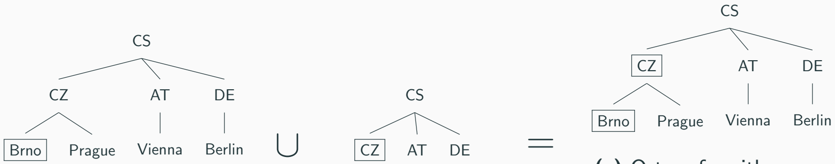
[2] Tree 7a runs into the same issue as trees 6a & 6b

The disjunctive case

$\widehat{Qs}$ of disjunctive LFs (X or Y)

- Intuitively, a Q-tree for $X \vee Y$ raises a question pertaining to X and Y, simultaneously (Simons, 2001; Zhang, n.d.).So, instead of plugging one tree into another as we did with conditionals, we want to **properly fuse them**.
- To get a Q-tree for $X \vee Y$:
  - take a Q-tree $T_X \in \widehat{Qs}(X)$ and a Q-tree $T_Y \in \widehat{Qs}(Y)$;
  - "Union" T_X and T_Y by unioning:
    - the 2 sets of their nodes;
    - the 2 multisets of their verifying nodes;
    - the 2 sets of their edges (=all parent-child pairs).
  - Check that the resulting tree is a Q-tree; if it is, return it; if it's not, then it means we had a clash between the partitionings introduced by resp. T_X and T_Y somewhere, so, return nothing.
- Note that the above **Q-tree-union operation is symmetric**, so whatever we predict for LF $X \vee Y$, we predict for $Y \vee X$.

Q-tree for $\mathbf{p}^{+} \vee \mathbf{p}$ and $\mathbf{p} \vee \mathbf{p}^{+}$



(a) Q-tree for $\mathbf{p}^{+}$

(b) Q-tree for $\mathbf{p}$

(c) Q-tree for either $\mathbf{p} \vee \mathbf{p}^{+}$ or $\mathbf{p}^{+} \vee \mathbf{p}$

Figure 8: Deriving the only possible Q-tree for $\mathbf{p} \vee \mathbf{p}^{+}$/ $\mathbf{p}^{+} \vee \mathbf{p}$

- What's wrong with the resulting disjunctive tree? If you see a path in a Q-tree as a **strategy of inquiry to converge to a maximal answer**, then there's something suboptimal in Tree 8c.

  (6) Redundancy: $\forall N, N' \in \mathbb{N}^{+}_{T}$. N and N' cannot be on the same path in T

- This principle rules out the 2 HDs (1) and (2), more trivial cases such as $\mathbf{p} \vee \mathbf{p}$, and more complex cases such as long-distance HDs (Marty & Romoli, 2022).

Conclusion

- I don't want to sell this as better than the other accounts, because obviously it's full of stipulations and ad-hoc principles, but I have the hope this gives a framework to think about how sentences relate to questions in the more general case.
- A couple topics to explore further:
  - **Coordination** (thanks to Nina); how to Q-tree derivation interact with updates of the CS?
  - **Accommodation**: in particular this idea that answers to a QuD cannot result from an accommodated proposition (Heim, 2015). How to integrate this in the current framework?
  - **Scalar implicatures**: the presence of scalar items in HDs creates a new asymmetry, possibly due to how alternatives passed as argument to $\textsc{Exh}$ are being pruned. Could this be better motivated by the current framework?

Thank you very much for your attention !

Selected references i

Wason, P. C. (1968). Reasoning about a rule. Quarterly Journal of Experimental Psychology, 20(3), 273–281. https://doi.org/10.1080/14640746808400161

Hamblin, C. L. (1973). Questions in montague english. Foundations of Language, 10(1), 41–53.

Hurford, J. R. (1974). Exclusive or inclusive disjunction. Foundations of language, 11(3), 409–411.

Stalnaker, R. (1974). Pragmatic presuppositions. In Context and content (pp. 47–62). Oxford University Press.

Karttunen, L. (1977). Syntax and semantics of questions. Linguistics and Philosophy, 1(1), 3–44. https://doi.org/10.1007/bf00351935

Groenendijk, J., & Stokhof, M. (1984). Studies in the semantics of questions and the pragmatics of answers (Doctoral dissertation) [(Unpublished doctoral dissertation)]. University of Amsterdam.

Heim, I. (1991). Artikel und definitheit. In A. Von Stechow & D. Wunderlich (Eds.), Semantics: An international handbook of contemporary research (pp. 487–535). Mouton de Gruyter.

Rooth, M. (1992). A theory of focus interpretation. Natural Language Semantics, 1(1), 75–116. https://doi.org/10.1007/bf02342617

Selected references ii

Van Kuppevelt, J. (1995). Main structure and side structure in discourse. Linguistics, 33(4), 809–833. https://doi.org/10.1515/ling.1995.33.4.809

Roberts, C. (1996). Information structure in discourse: Towards an integrated formal theory of pragmatics. Semantics and Pragmatics, 5. https://doi.org/10.3765/sp.5.6

Simons, M. (2001). Disjunction and alternativeness. Linguistics and Philosophy, 24(5), 597–619. https://doi.org/10.1023/a:1017597811833

von Fintel, K. (2001). Conditional strengthening: A case study in implicature [Unpublished manuscript, MIT].

Büring, D. (2003). On d-trees, beans, and b-accents. Linguistics & Philosophy, 26(5), 511–545.

Katzir, R. (2007). Structurally-defined alternatives. Linguistics and Philosophy, 30(6), 669–690. https://doi.org/10.1007/s10988-008-9029-y

Singh, R. (2008). On the interpretation of disjunction: Asymmetric, incremental, and eager for inconsistency. Linguistics and Philosophy, 31(2), 245–260. https://doi.org/10.1007/s10988-008-9038-x

Zondervan, A., & Meroni, A., L.and Gualmini. (2008). Experiments on the role of the question under discussion for ambiguity resolution and implicature computation in adults. Semantics and linguistic theory, 18, 765–777.

Selected references iii

Magri, G. (2009). A theory of individual-level predicates based on blind mandatory scalar implicatures. Natural Language Semantics, 17(3), 245–297. https://doi.org/10.1007/s11050-009-9042-x

Schlenker, P. (2009). Local contexts. Semantics and Pragmatics, 2. https://doi.org/10.3765/sp.2.3

Schoubye, A. J. (2009). Descriptions, truth value intuitions, and questions. Linguistics and Philosophy, 32(6), 583–617. https://doi.org/10.1007/s10988-010-9069-y

Simons, M., Tonhauser, D., J.and Beaver, & Roberts, C. (2010). What projects and why. In D. Lutz & N. Li (Eds.).

Katzir, R., & Singh, R. (2014). Hurford disjunctions: Embedded exhaustification and structural economy. Proceedings of Sinn und Bedeutung, 18, 201–216. https://ojs.ub.uni-konstanz.de/sub/index.php/sub/article/view/313

Heim, I. (2015). Unpublished lecture notes.

Katzir, R., & Singh, R. (2015). Economy of structure and information: Oddness, questions, and answers. In E. Csipak & H. Zeijlstra (Eds.), Proceedings of sinn und bedeutung 19 (pp. 322–339). Georg August Universität Göttingen.

Onea, E. (2016). Potential questions at the semantics-pragmatics interface. Brill.

Selected references iv

Mandelkern, M., & Romoli, J. (2018). Hurford conditionals. Journal of Semantics, 35(2), 357–367. https://doi.org/10.1093/jos/ffx022

Westera, M. (2018). A pragmatic approach to hurford disjunctions.

Onea, E. (2019). Underneath rhetorical relations: The case of result. In Questions in discourse (pp. 194–250). BRILL. https://doi.org/10.1163/9789004378322_008

Riester, A. (2019). Constructing qud trees. In Questions in discourse (pp. 164–193). BRILL. https://doi.org/10.1163/9789004378322_007

Marty, P., & Romoli, J. (2022). Varieties of hurford disjunctions. Semantics and Pragmatics, 15(3), 1–25. https://doi.org/10.3765/sp.15.3

Haslinger, N. (2023). Pragmatic constraints on imprecision and homogeneity (Doctoral dissertation). Georg-August-Universität Göttingen.

Kalomoiros, A. (2024). An approach to hurford conditionals. Semantics and Linguistic Theory, 724–743. https://doi.org/10.3765/68bn3095

Ciardelli, I., Groenendijk, J., & Roelofsen, F. (n.d.). Inquisitive semantics. Oxford University Press.

Zhang, Y. (n.d.). A questions-under-discussion-based account of redundancy. Unpublished manuscript.