

Scalarity, Information Structure and Relevance in varieties of Hurford Conditionals

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Abstract

Hurford Conditionals (HCs) involving scalemates appear felicitous, despite the fact that *exh* is not predicted to rescue such structures from SUPER REDUNDANCY, a principle introduced in Kalomoiros (2024) to capture HCs without scalemates. We thus propose an alternative to SUPER REDUNDANCY based on two main ideas: (1) expressions evoke QuDs locally, and when they combine via logical operators so do their respective QuDs; (2) a local QuD Q that gets incrementally combined with an existing QuD Q' should have its maximal true answers “fit” the information structure already introduced by Q' . This predicts that the consequent of a conditional has to evoke a question that properly refines some question evoked by the antecedent. The pattern is then captured with the additional assumption that scalar items can evoke fine-grained enough questions (generated by their scalemates) out-of-the-blue, while non-scalar items conveying different degrees of granularity cannot.

1 Introduction

Hurford Disjunctions (henceforth **HDs**, Hurford 1974) typically involve entailing disjuncts and appear infelicitous regardless of the linear order of the disjuncts. This is shown in (1).

- (1) a. # Jo studied in **France** or **Paris**. $\mathbf{p} \vee \mathbf{p}^+$
b. # Jo studied in **Paris** or **France**. $\mathbf{p}^+ \vee \mathbf{p}$

Gazdar (1979) observed that infelicity disappears when (i) the Hurford disjuncts are scalemates, and (ii) the **weak** disjunct precedes the **stronger** one, as in (2-a). However, when the order of the two disjuncts is reversed, as in (2-b), infelicity tends to remain (Singh 2008b; Singh 2008a).

- (2) a. Jo read **some** or **all** of the books. $\mathbf{s} \vee \mathbf{s}^+$
b. ??Jo read **all** or **some** of the books. $\mathbf{s}^+ \vee \mathbf{s}$

The asymmetry in (2) has received several accounts (Singh 2008b; Fox and Spector 2018; Tomioka 2021; Hénot-Mortier 2023 i.a.), all of which capitalize on the idea that (2-a) can be rescued *via* a local scalar implicature within the first disjunct (allowed by the covert operator *exh*, Fox 2007; Spector, Fox, and Chierchia 2009); while (2-b) cannot, due to an interaction between the first disjunct, and the licensing/timing of *exh* in the second disjunct. In particular, Fox and Spector (2018) suggest *exh* should not be applied to an expression E if it turns out to be Incrementally Weakening (abbreviated **IW**), i.e., if it leads to an equivalent/weaker meaning no matter the continuation Γ . The contrast in (2) then boils down to the fact *exh* is not IW in the first disjunct of (2-a) (cf. (3-a)), while it is in the second disjunct of (2-b) (cf. (3-b)).¹

- (3) a. $\exists \Gamma. \text{exh}(\mathbf{s}) \Gamma \equiv (\mathbf{s} \wedge \neg \mathbf{s}^+) \Gamma \not\equiv \mathbf{s} \Gamma$ (e.g., take Γ to be the empty continuation)
b. $\forall \Gamma. (\mathbf{s}^+ \vee \text{exh}(\mathbf{s})) \Gamma \equiv (\mathbf{s}^+ \vee (\mathbf{s} \wedge \neg \mathbf{s}^+)) \Gamma \equiv (\mathbf{s}^+ \vee \mathbf{s}) \Gamma$

¹(1-a) cannot be rescued like (2-a), either because *Paris* is not a natural alternative to *France* out-of-the blue, or because exhaustifying *France* by-city would lead to a “symmetry problem” (Kroch 1972; Fox 2007).

Does this pattern extend to structures isomorphic to HDs assuming material implication? Mandelkern and Romoli (2018) observed that an asymmetry arises in so-called Hurford Conditionals (henceforth **HCs**), when the antecedent and consequent are *not* natural scalemates, as in (4). Interestingly, we observe that the asymmetry *disappears*² in HCs involving scalemates (5).

- | | | |
|-----|---|--|
| (4) | a. If Jo studied in France she did not study in Paris . | $\mathbf{p} \rightarrow \neg \mathbf{p}^+$ |
| | b. #If Jo did not study in Paris she studied in France . | $\neg \mathbf{p}^+ \rightarrow \mathbf{p}$ |
| (5) | a. If Jo has read some of the books she hasn't read all . | $\mathbf{s} \rightarrow \neg \mathbf{s}^+$ |
| | b. If Jo hasn't read all of the books she has read some . | $\neg \mathbf{s}^+ \rightarrow \mathbf{s}$ |

HDs and HCs therefore pattern differently, in both the scalar and the non-scalar case. Kalomoiros (2024) proposed a constraint called SUPER REDUNDANCY accounting for (4), and spelled out in (6). (4-b) is Super Redundant (abbreviated **SR**), because any local strengthening of its antecedent yields an expression equivalent to its consequent. (4-a) on the other hand, is not SR. SR can also cover (1), and, together with IW, (2).

- (6) SUPER REDUNDANCY. A sentence S is infelicitous if it contains a subconstituent C such that $(S)_{\bar{C}}$ is defined and for all D , $(S)_{\bar{C}} \equiv S_{Str(C,D)}$. In this definition, $(S)_{\bar{C}}$ designates S where C got deleted. $Str(C,D)$ refers to a strengthening of C with D , which commutes with negation ($Str(\neg\alpha, D) = \neg(Str(\alpha, D))$) and with binary operators ($Str(O(\alpha, \beta), D) = O(Str(\alpha, D), Str(\beta, D))$). $S_{Str(C,D)}$ designates S where C is replaced by $Str(C, D)$.

What about (5-a) vs. (5-b)? (7) shows that (5-a) is isomorphic to (4-a), given that *exh* is IW in its antecedent and consequent.³ So (5-a) is correctly predicted to be non-SR.

- (7) a. *exh* is IW in the antecedent of (5-a).
 $\forall \Gamma. \text{exh}(\mathbf{s}) \rightarrow \Gamma \equiv \neg(\mathbf{s} \wedge \neg \mathbf{s}^+) \vee \Gamma \equiv \neg \mathbf{s} \vee \mathbf{s}^+ \vee \Gamma \equiv \neg \mathbf{s} \vee \Gamma \equiv \mathbf{s} \rightarrow \Gamma$
- b. *exh* is IW in the consequent of (5-a).
 $\forall \Gamma. (\mathbf{s} \rightarrow \text{exh}(\neg \mathbf{s}^+)) \Gamma \equiv (\neg \mathbf{s} \vee (\neg \mathbf{s}^+ \wedge \mathbf{s})) \Gamma \equiv (\neg \mathbf{s} \vee \neg \mathbf{s}^+) \Gamma \equiv (\mathbf{s} \rightarrow \neg \mathbf{s}^+) \Gamma$

(8) shows that this reasoning extends to (5-b): *exh* is IW in both the antecedent and the consequent of (5-b), so SR incorrectly predicts (5-b) to pattern like (4-b), i.e. to be infelicitous.

- (8) a. *exh* is IW in the consequent of (5-b).
 $\forall \Gamma. (\neg \mathbf{s}^+ \rightarrow \text{exh}(\mathbf{s})) \Gamma \equiv (\mathbf{s}^+ \vee (\mathbf{s} \wedge \neg \mathbf{s}^+)) \Gamma \equiv (\mathbf{s}^+ \vee \mathbf{s}) \Gamma \equiv (\neg \mathbf{s}^+ \rightarrow \mathbf{s}) \Gamma$
- b. *exh* is IW in the antecedent of (5-b).
 $\forall \Gamma. (\text{exh}(\neg \mathbf{s}^+) \rightarrow \mathbf{s}) \Gamma \equiv (\neg(\neg \mathbf{s}^+ \wedge \mathbf{s}) \vee \mathbf{s}) \Gamma \equiv (\mathbf{s}^+ \vee \neg \mathbf{s} \vee \mathbf{s}) \Gamma \equiv (\neg \mathbf{s}^+ \rightarrow \mathbf{s}) \Gamma$

At this point, one might want to revise IW, or SR. If SR is maintained and IW is assumed to be inactive in conditionals, then both HCs in (5) would be predicted to be felicitous, due to *exh* being licensed in the consequent of (5-b). An argument against this view comes from Long-Distance HCs (henceforth LDHC). Such structures, inspired from Long-Distance HDs (Marty and Romoli 2022) and exemplified in (9), are derived from (5) by further disjoining \mathbf{p}^+ with a proposition \mathbf{r} taken to be incompatible with \mathbf{p} . Felicity-wise, LDHCs seem quite degraded: (9-a) seems to convey the same kind of information twice (because having studied in France contextually entails not having studied in Brussels), while (9-b)'s consequent seems independent

²Some speakers I consulted reported that (5-a) was hard to make sense of in English (it is fine in my French). Note that this potential infelicity appears problematic for all accounts of Hurford Sentences. One way to explain it, in my framework, is to leverage the intuition that negated expressions (e.g. *not all*) more saliently evoke ‘‘polar’’ QuDs (e.g. $\forall/\neg\forall$) as opposed to other QuDs (e.g. $\forall/\exists \wedge \neg\forall/\neg\exists$). When combined with an antecedent QuD for *some*, a polar QuD for *not all* happens to violate Q-RELEVANCE.

³We show it for material conditionals here, but this extends to strict conditionals.

from the subject matter raised by the antecedent. Yet neither (9-a) nor (9-b) are predicted to be SR, due to the presence of **r**. Crucially, this incorrect prediction persists if we maintain SR and assume IW is not active in the consequent of conditionals.

- (9) a. ? If Jo studied in **France** she didn't study in **Paris** or **Brussels**. $\mathbf{p} \rightarrow \neg(\mathbf{p}^+ \vee \mathbf{r})$
 b. # If Jo didn't study in **Paris** or **Brussels** she studied in **France**. $\neg(\mathbf{p}^+ \vee \mathbf{r}) \rightarrow \mathbf{p}$

To capture (5) and (9) while retaining the right predictions for (1), (2) and (4), we thus suggest to maintain IW, and propose an alternative to SR based on three ideas: Questions under Discussion (**QuD**, Kuppevelt 1995; Roberts 1996) are compositionally accommodated when processing out-of-the-blue declaratives; scalemates may answer same-granularity QuDs; and QuD computation is constrained by Q-RELEVANCE (Hénot-Mortier 2024a). The scalar HCs in (5) can then escape a violation of Q-RELEVANCE, because their consequent can evoke a question of the form *none, some but not all, or all?* that is fine-grained enough to “fit” a question introduced by their antecedent. In the non-scalar case, (4-a) can do the same (*not Paris* evokes a proper subdivision of *France*), but crucially not (4-b) (*France* cannot evoke a proper subdivision of *not Paris*).

2 A compositional theory of accommodated QuDs

We argue that out-of-the-blue declaratives evoke the potential QuDs they may answer (Katzir and Singh 2019; Zhang 2024), and that the derivation of such implicit QuDs is compositional. A sentence compatible with no reasonable implicit QuD is deemed odd. We start by showing that the felicity of disjunctions and conditionals is sensitive to *overt* QuDs – but in different ways. We take this as evidence that out-of-the-blue disjunctions and conditionals accommodate different kinds of implicit QuDs.

If a context contrasting *Paris* and *France but not Paris* is set as in (10), (4-b) and (9-b) improve (cf. Haslinger 2023 for similar effects on disjunctions and conjunctions). This is strange: even if the context and question made *Paris* (but no other French city) a relevant alternative to *France*, *exh* would remain IW in the consequent of (4-b): *if Jo did not grow up in Paris, she grew up in France but not Paris*, is equivalent to *if Jo did not grow up in Paris, she grew up in France*. In other words, *exh* (as constrained by IW) cannot leverage the contextually provided alternatives to make (4-b) escape SR in (10). The same applies to (9-b).

- (10) Context: *French accents vary across countries and between Paris the rest of France.*
 Al: I'm wondering where Jo learned French.
 Lu: I'm not completely sure but... (4-b) ✓(9-b) ✓

This suggests that a purely LF-based view of redundancy such as SR, may be insufficient to capture the interaction between HCs and how their context of utterance packages information. Rather, it seems that the context of (10) makes a specific partition of the CS salient, and that this partition can be used to make otherwise infelicitous assertions accommodate a different question than the one they would evoke out-of-the-blue.

Additionally, conditionals and disjunctions seem to accommodate distinct QuDs. To show this, we use the construction *depending on Q, p* (Karttunen 1977; Kaufmann 2016), where *Q* is a question and *p* a proposition. This construction has been argued to force the partition conveyed by *Q* to match specific live issues raised by *p*. We understand such “live issues” as the maximal true answers of the QuD evoked by *p*. The contrast between (11-a) and (11-b) then suggests that the *France* and *Belgium* answers can be matched against *Q* in the disjunctive, but not in the conditional case. This in turn means that a disjunction introduces a QuD making both

disjuncts maximal true answers, while a conditional does not do the same with its consequent and the negation of its antecedent.

- (11) Depending on [how her accent sounds like]_Q...
- a. Jo grew up in France **or** in Belgium. $p \vee q$
 - b. ??if Jo didn't grow up in France she grew up in Belgium. $\neg p \rightarrow q$
 - c. ?if Jo didn't grow up in France, she grew up in Belgium **or** in Québec. $\neg p \rightarrow (q \vee r)$
 - d. ??if Jo didn't grow up in France **or** Belgium, she grew up in Québec. $\neg (p \vee q) \rightarrow r$

The existence of an improvement between (11-b) and (11-c), and the absence of a similar improvement in between (11-b) and (11-d), also implies that the answers targeted by *depending on Q*, when p is conditional, are the ones made available by the consequent of p (which is appropriately disjunctive in (11-c), but not (11-d)). Building on these observations and on the formalism introduced in Hénot-Mortier (2024a) and Hénot-Mortier (2024b) to account for non-scalar HCs and HDs, we now focus on explaining the novel datapoints (5).

The formalism we present here summarizes the more complete model set out in Hénot-Mortier (2024a). Building on Büring (2003), Riester (2019), Onea (2016), and Zhang (2024), we take QuDs to be trees (**Qtrees**), that have the Context Set (**CS**, Stalnaker 1974) as their root, and are such that each intermediate node is a subset of the CS, partitioned by its children nodes. Thus, the leaves of a Qtree partition the CS, and correspond to the standard denotation of questions (Hamblin 1958; Groenendijk 1999). Any subtree rooted in N can be seen as a conditional question, granted N . A proposition answers a Qtree if it can be identified with the union of a strict subset of the Qtree's nodes. Building on Katzir and Singh (2019), Hénot-Mortier (2024a), and Hénot-Mortier (2024b), we assume that any out-of-the-blue declarative sentence denoting a proposition p gets paired with the set of salient Qtrees p may answer. An LF that cannot be paired with any well-formed Qtree is deemed odd. Such Qtrees additionally carry information about how p answers them, in the form of specific nodes entailing p (**verifying nodes**). We refer to the structure formed by Qtrees, along with their verifying nodes, as “flagged Qtrees” (or sometimes just Qtrees). The pairing between LF and flagged Qtrees is compositional, meaning, the flagged Qtrees evoked by a complex LF, are derived from the flagged Qtrees derived from its parts, and from how these parts combine.

We start with a simplex LF X denoting p . We assume here that a Qtree for X may be a depth-1 Qtree whose leaves denote p and $\neg p$; or a depth-1 Qtree whose leaves correspond to the Hamblin partition of the CS generated by p and same-granularity alternatives to p .⁴ We take granularity as a primitive, but assume that scalemates such as *some* and *all may* be seen as same granularity alternatives to each other, while non-scalemates, like *Paris* and *France*, cannot be considered being so, at least out-of-the blue.⁵ In any case, Qtrees derived from simplex LFs get “flagged” by defining their verifying nodes as the set of nodes entailing p .

According to this definition, *Jo read all of the books* gets paired with a “polar” Qtree corresponding to whether or not she read all the books (cf. Fig. 1); and a “wh” Qtree corresponding to whether she read none, only some, or all of the books (generated by $\text{Alt}(\exists) = \{\exists, \forall\}$, cf. Fig. 2). Same can be done for *Jo read some of the books*, except the “polar” Qtree is different (cf. Fig. 3). For *Jo lives in Paris* (resp. *France*), *wh*-Qtrees are generated by city (resp. country) alternatives, cf. Fig. 4 and 5. Verifying nodes are boxed.

⁴Hénot-Mortier (2024a) proposes that simplex LFs may also evoke “tiered” Qtrees with more than one layer. We omit this assumption for brevity. This does not affect our main prediction about scalar HCs, which is based on a granularity distinction between *all/some* vs. *Paris/France*, that persists in the more elaborate model.

⁵This might relate to the symmetry problem with such alternatives: if *Paris* and *France* are considered same-granularity, then *France* and any city in France should be considered to be same-granularity. This seems counter-intuitive, given that at a certain level of abstraction, all French cities *together* cover France.



Figure 1: “Polar” Qtree for *Jo read all of the books*

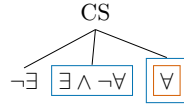


Figure 2: “Wh” Qtree for *Jo read {some/all} of the books*.



Figure 3: “Polar” Qtree for *Jo read some of the books*



Figure 4: Qtrees for *Jo studied in Paris*.



Figure 5: Qtrees for *Jo studied in France*.

Just like the meanings of simple sentences are incrementally composed, their sets of candidate Qtrees get incrementally combined. The Qtrees compatible with a negated LF $\neg X$, are Qtrees for X in which the set of compatible nodes is “flipped” on a layer-by-layer basis. *Jo did not read all of the books* is thus linked to the Qtrees in Fig. 6 and *Jo didn’t study in Paris* to those in Fig. 7. The Qtrees compatible a disjunctive LF $X \vee Y$, are all the Qtrees that result from the union of a tree for X , and a tree for Y . The union operation – understood as union over sets of nodes, sets of edges, and sets of verifying nodes – ensures that the Qtree of a disjunction addresses the QuDs evoked by *both* disjuncts in parallel (Simons 2001; Zhang 2024). *Jo read some or all of the books* is therefore only compatible with Tree 2 because all the other unions obtained from of Trees 1, 3 and 2 fail to generate proper Qtrees. The HDs (1) are compatible with no Qtree, because the Qtrees for *Paris* and those for *France* always subdivide the CS differently.⁶ The Qtrees compatible with a conditional LF $X \rightarrow Y$ are Qtrees for X , where each verifying node is replaced by its intersection with a Qtree for Y . Verifying nodes are inherited from the consequent Qtree (in line with the observations in (11)). (5-a) is then compatible with the Tree in Fig. 8; (5-b), with Fig. 9, (4-a) with Fig. 10 and (4-b) with Fig. 11. We proceed to show that both trees associated with (4-b) violate some notion of relevance; while no trees associated with (5-a), (5-b), and (4-a) do. Roughly, the issue is that none of the trees evoked by (4-b) fully preserve the answer conveyed by its consequent (the *France*-node); while those evoked by (5-a), (5-b) and (4-a) do.

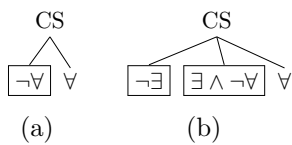


Figure 6: Qtrees for *Jo didn’t read all of the books*, derived from Fig. 1&2

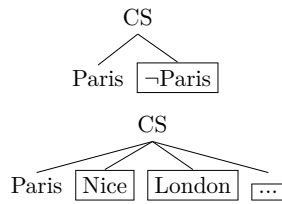


Figure 7: Qtrees for *Jo didn’t study in Paris*, derived from Fig. 4.

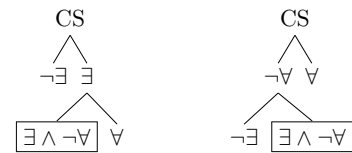


Figure 8: A Qtree compatible with (5-a) derived from Fig. 3&6a/6b

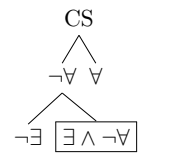


Figure 9: A Qtree compatible with (5-b) derived from Fig. 6a&2

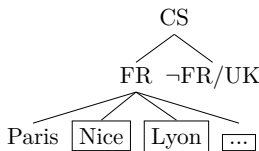


Figure 10: Qtree for (4-a), derived from Fig. 5&7.

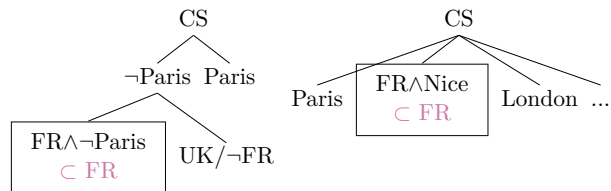


Figure 11: Qtree for (4-b), derived from Fig. 7&5.

⁶Hénot-Mortier (2024a) and Hénot-Mortier (2024b) predict that (1-a)-(1-b) do create proper Qtrees, but that such Qtrees (paired with their LFs) are Q-REDUNDANT.

3 Relevance as a constraint on QuD computation

Hénot-Mortier (2024a) defined Q-RELEVANCE as a constraint on Qtree computation: when combining Qtrees incrementally, none of the verifying nodes of the input Qtree should be cut across (i.e. be strictly entailed by some node) in the output Qtree. This allowed to account for the contrast in (4). Let us briefly summarize the argument. (4-a) corresponds to the Qtree in Fig. 10, which is obtained from a country-level antecedent Qtree and a city-level consequent Qtree; therefore, all verifying leaves of the consequent (city nodes different from Paris) are contained in some leaf of the antecedent Qtree, and can thus “fit” into the output Qtree without being cut across. Q-RELEVANCE is thus satisfied. (4-b) corresponds to the Qtrees in Fig. 11, which are obtained from a city-level antecedent Qtree and a country-level consequent Qtree; in such trees, the *France* verifying leaves are always cut across, either by *not Paris*, or by individual city-nodes different from *Paris*. Q-RELEVANCE is thus violated.

The same kind of reasoning shows that the Qtrees corresponding to (5-a) and (5-b), in resp. Fig. 8 and 9, verify Q-RELEVANCE. Starting with Qtree 8: it can be built by incrementally combining Qtree 3 (antecedent Qtree), with Qtree 6b (consequent Qtree). Qtree 6b has $\neg\exists$ and $\exists \wedge \neg\forall$ as verifying nodes; in the output Qtree 8, both nodes are fully preserved. So (5-a) is compatible with a Qtree and is thus felicitous. As for (5-b), its Qtree 9 can be built by incrementally combining Qtree 1 (antecedent Qtree), with Qtree 6b (consequent Qtree). Qtree 6b has $\neg\exists$ and $\exists \wedge \neg\forall$ as verifying nodes; in the output Qtree 8, both nodes are fully preserved. So (5-b) is compatible with a Qtree and is thus felicitous. In brief, (4-b) and (4-a) are both rescued by the fact their consequent can evoke a Qtree whose verifying nodes are fine-grained enough to properly “fit” the structure already introduced by the antecedent Qtree. This reasoning extends to the LDHCs (9-a) and (9-b), whose trees are given in Fig. 12 and 13. For (9-a), Q-RELEVANCE is satisfied because none of the verifying leaves from the consequent Qtree (cities different from Paris and Brussels) are cut across in the output Qtree. The feeling of redundancy in (9-a) may come from the fact removing *Brussels* from the sentence leads to the same overall meaning and Qtree.⁷ For (9-b), Q-RELEVANCE is violated because the compatible *France* leaf from the consequent Qtree cannot “fit” into the city-level nodes introduced by the antecedent.

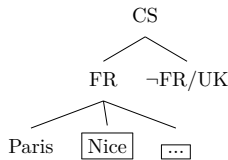


Figure 12: Qtree for (9-a).

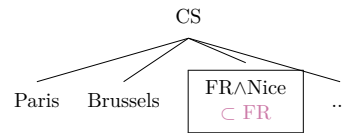


Figure 13: Qtree for (9-b).

4 Conclusion and outlook

We proposed an account of (scalar) HCs exploiting the intuitive idea that conditionals evoke “restricted” questions whose composition is constrained by a new notion of relevance, Q-RELEVANCE (Hénot-Mortier 2024a). The contrast between scalar and non-scalar HCs was thus captured, not *via exh per se*, but instead by appealing to how scalar vs. non-scalar pairs of items differ information-structurally. Specifically, it was assumed scalar items could evoke fine-grained enough questions (generated by their scalemates) out-of-the-blue, while non-scalar items with different granularities could not.

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⁷Following Hénot-Mortier (2024a) and Hénot-Mortier (2024b), this implies that (9-a) is Q-REDUNDANT.

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