Counterfactuals, Hyperintensionality and Hurford Phenomena

Hüseyin Güngör

hgungor1@jhu.edu

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Abstract

This paper investigates propositional hyperintensionality in counterfactuals. It starts with a scenario describing two children playing on a seesaw and studies the truth-value predictions for counterfactuals by four different semantic theories. The theories in question are Kit Fine's truthmaker semantics, Luis Alonso-Ovalle's alternative semantics, inquisitive semantics and Paolo Santorio's syntactic truthmaker semantics. These predictions suggest that the theories that distinguish more of a given set of intensionally equivalent sentences (Fine and Alonso-Ovalle's) fare better than those that do not (inquisitive semantics and Santorio's). Then we investigate how inquisitive semantics and Santorio can respond to these results. They can respond to them by helping themselves to considerations from Hurford disjunctions, disjunctions whose disjuncts stand in an entailment relation to one another. I argue that considerations from Hurford disjunctions are *ad hoc* modifications merely to predict the expected results. I conclude that the scenarios suggest a need for more fine-grained theories of sentential meaning in general.

Keywords: Hyperintensionality; Counterfactuals; Conditionals; Hurford disjunctions

1 Introduction

There has recently been a surge of arguments in the literature that put pressure on what is sometimes called *intensional* semantic theories such as Stalnaker (1968) and Lewis (1973).[1] For instance,

[1] As I will use it, an intensional semantic theory is one that takes the meaning of sentences to be sets of possible worlds where the proposition expressed by the sentence in question is true.

Ciardelli et al. (2018) have recently argued that intensional theories of counterfactuals are inadequate, because they cannot distinguish the meanings of antecedents that are De Morgan equivalents, e.g. $\neg(\varphi \wedge \psi)$ and $\neg\varphi \vee \neg\psi$. It has also been argued by many that a seemingly-valid inference pattern known as **Simplification of Disjunctive Antecedents (SDA)** seems to support semantic theories that can distinguish the meanings of intensionally equivalent sentences.[2] Such theories are generally called *hyperintensional*. Yet not all hyperintensional theories are created equal. They can be distinguished among themselves according to which intensionally equivalent sentences they accept and reject to be equivalent in their theories. In this paper, instead of providing more cases that make a case in favor of hyperintensional theories over intensional ones as in Ciardelli et al. (2018), I aim to provide a couple cases that speak in favor of some hyperintensional theories over others.

I aim to do this by relying on two observations from two versions of a scenario discussed by Romoli et al. (2020). It is best to start with these observations.[3] The first scenario goes as follows [N.B. for black-and-white version: the slightly darker t-shirt is Blue and the lighter one is Red]:

> Two children, Blue and Red according to their t-shirt colors, are playing on a seesaw. Their weights are exactly the same, so when they are sitting on the opposite sides of the seesaw, the seesaw is balanced and if they are sitting on the same side, the seesaw is unbalanced. The only places children can be are either the left or right of the seesaw. Right now both Blue and Red are on the right side and the seesaw is unbalanced as displayed in the figure below. But things could be otherwise...

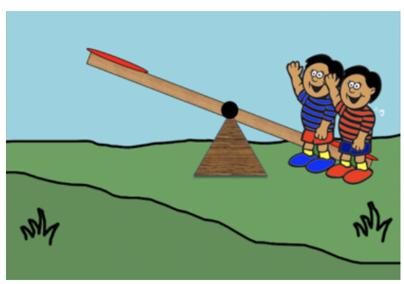

Figure 1. Scenario 1 describing two children sitting on the right side of a seesaw.

[2]**SDA** lets one infer *if it had rained, the picnic would have been cancelled* and *if it had snowed, the picnic would have been cancelled* from *if it had rained or snowed, the picnic would have been cancelled*. See Alonso-Ovalle (2009); Fine (2012); Santorio (2018) and Ciardelli et al. (2018) for defense of **SDA**. Also for a partial defense, see Khoo (2018).

[3]Origins of this scenario go back to Ciardelli et al. (2018). Similar arguments can be made using their scenario, but I find Romoli et al. (2020) scenario more intuitive.

Given this scenario, consider whether (1) sounds true or not:

(1) If Blue or both of them were on the left, the seesaw would be balanced.

Now take a different iteration of this scenario where the initial setup describes Blue on the left and Red on the right (as displayed in the figure below).

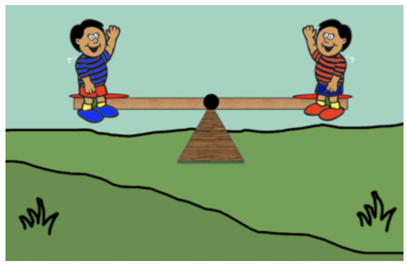

Figure 2. Scenario 2 describing children sitting on opposite sides of a seesaw.

Consider whether (2) sounds true or not:

(2) If Blue or both of them were on the right, the seesaw would be unbalanced.

If (1) sounds false, but (2) sounds true to the reader, then there arises a puzzle of sentential meaning affecting a number of semantic theories.

The goal of this paper is to investigate this puzzle. I aim to do this by comparing two classes of semantic theories and their predictions for (1) and (2). In §2 I will repeat Scenario 1 and consider two more counterfactuals in addition to (1) so that we get a better feeling of how intensional equivalents behave in antecedents. In §3 I look at the predictions by various semantic theories for these counterfactuals. These theories fit into two distinct classes for our purposes: given three intensionally equivalent sentences, those that distinguish the meaning of each of them (Alonso-Ovalle 2009; Fine 2012, 2017), which I call *more fine-grained theories*, and those that distinguish the meaning of some, but not all of them (Ciardelli et al. 2018; Santorio 2018), which I call *less fine-grained theories*. It turns out that less fine-grained theories predict the wrong truth-value for (1) whereas more fine-grained theories predict the right one. In §4 I discuss a way out of this result for less fine-grained theories.[4] The proposal stresses that the counterfactuals under investigation involve *Hurford disjunctions* and the covert logical form (LF) of these disjunctions allow less fine-grained theories to make the right predictions. In §5 I repeat Scenario 2 and show that less fine-grained theories with the adjustments from §4 predict the wrong truth-value for (2). These two results pose a dilemma for less fine-grained theories: either (i) accept that they cannot accommodate (1) and (2) together or (ii) face arbitrariness in applying the solution from §4. In §6 I discuss a proposal that relies on exploiting questions under discussion (QUD's) to avoid this dilemma.[5] I articulate this proposal and how a certain implementation of this proposal seems to accommodate both (1) and (2). In §7 I discuss two issues which together suggest that this solution is unstable and *ad hoc*. In §8 I address why (2) sounds odd despite being true and how this bears on the general conclusion of the paper. In §9 I conclude that the truth-value judgments for the cases are more easily accommodated by more fine-grained theories and less so by less fine-grained theories and this may suggest for a more fine-grained treatment of sentential meaning in general on account of unification.

2 Children on a Seesaw

First, I repeat Scenario 1 from Romoli et al. (2020).

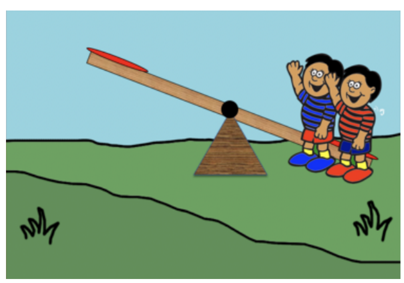

Figure 1. Scenario 1 describing two children sitting on the right side of a seesaw.

> Two children, Blue and Red according to their t-shirt colors, are playing on a seesaw. Their weights are exactly the same, so when they are sitting on the opposite sides of the seesaw, the seesaw is balanced and when they sit on the same side, the seesaw is not balanced. Right now both Blue and Red are on the right side and the seesaw is unbalanced. But things could be otherwise...

[4]This route is suggested to me by Paolo Santorio (p.c.).
[5]This suggestion is made by Ivano Ciardelli and Floris Roelofsen (p.c.).

Consider again (3-a) ((1) above) given Scenario 1:[6]

(3) a. If Blue or both of them were on the left, the seesaw would be balanced.
$[Blue_{left} \vee (Blue_{left} \wedge Red_{left})] > Balance$

Then consider (4-a) and (4-b):

(4) a. If Blue was on the left, the seesaw would be balanced.
$Blue_{left} > Balance$

b. If Blue was on the left and Red was on the right, or both of them were on the left, the seesaw would be balanced.
$[(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})] > Balance$

Given Scenario 1, (4-a) sounds true, whereas (3-a) and (4-b) do not (I summarize these judgments below in a table for ease of access).[7]

	True	Not true
(3-a)		✓
(4-a)	✓	
(4-b)		✓

Table 1. Expected truth-values in Scenario 1.

3 Hyperintensionality

Note that antecedents of (3-a), (4-a) and (4-b) are all intensional equivalents of each other, that is, these antecedents are all true in the same possible worlds. So it seems unlikely for an intensional theory of counterfactuals such as Stalnaker's (1968) or Lewis's (1973) to account for diverging truth-values for these counterfactuals, since the closest possible worlds where these antecedents are true will be the same set of closest possible worlds.[8]

[6] I will add the surface logical forms of the examples right after the example to keep track of equivalence among them.

[7] The intuitive truth-value judgments throughout the paper are confirmed by the audiences at various presentations of this material as well as my editor and two reviewers for this journal.

[8] A reviewer helpfully notes that the fate of these theories might not be decided as fast as I make it sound here. See footnote 28 for further discussion.

We need hyperintensional theories—that is, theories that can distinguish the meanings of intensionally equivalent sentences—such as Alonso-Ovalle's (2009), Fine's (2012; 2017), Santorio's (2018) and inquisitive semantics (Ciardelli et al. 2018). However, these theories do not predict the same set of intensional equivalents to be equivalent in their theories. For our purposes, these theories fit into two families that distinguish the meaning of (3-a), (4-a) and (4-b)'s antecedents to different extents. I will call the family to which Alonso-Ovalle's and Fine's theories belong, *more fine-grained theories*, and the family to which Ciardelli et al. and Santorio's theories belong *less fine-grained theories*. Our naming convention will make sense after we study these theories a bit more.

3.1 More fine-grained theories

Given Scenario 1, more fine-grained theories predict different semantic values for antecedents of (3-a), (4-a) and (4-b):[9]

$$[\![Blue_{left}]\!]_{MFG}$$
$$\neq$$
$$[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{MFG}$$
$$\neq$$
$$[\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_{MFG}$$

We briefly explain how these predictions come about. For Fine, sentence meanings are sets of exact truthmakers and falsemakers. An exact truthmaker for a sentence is a state that not only makes the sentence true, but it is also *wholly relevant* to the sentence (Fine 2017, p. 558). The semantics is given relative to a partially ordered set of states that play the role of truthmakers and falsemakers for sentences. The states in Scenario 1 can be represented as $blue_{left}/blue_{right}$, red_{left}/red_{right} and $seesaw_{balance}/seesaw_{unbalance}$ for the state of Blue/Red being on the left/right and the seesaw being balanced/unbalanced respectively. These states are the exact truthmakers for $Blue_{left}/Blue_{right}$, Red_{left}/Red_{right} and $Balance/Unbalance$.

[9] I use the conventional double-bracket notation $[\![\cdot]\!]_X$ for the semantic value function with a subscript denoting the semantic framework; italic uppercase letters for sentences. I will suppress indices of evaluation for the semantic value function. In the course of the discussion, I will sometimes use sentences to stand for the things they mean, but the context should not cause any confusion about this.

The truthmakers for negation, conjunction and disjunction are given recursively. Exact truthmakers for $\neg Blue_{left}$ are the exact falsemakers for $Blue_{left}$. Given the possible sides the children can be on in Scenario 1, this is the state of Blue being on the right, i.e. $blue_{right}$.[10] The exact truthmaker for the conjunction $Blue_{left} \wedge Red_{left}$ is the *mereological sum* of the exact truthmakers for $Blue_{left}$ and Red_{left}, denoted $blue_{left} \sqcup red_{left}$.[11] Exact truthmakers for the disjunction $Blue_{left} \vee Red_{left}$ is the set of exact truthmakers for each disjunct, i.e. $\{blue_{left}, red_{left}\}$. Given these clauses, the semantic values of (3-a), (4-a) and (4-b)'s antecedents are as follows in Finean truthmaker semantics:

$$
\begin{gathered}
[\![Blue_{left}]\!]_F = \{blue_{left}\} \\
\neq \\
[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_F = \{blue_{left}, blue_{left} \sqcup red_{left}\} \\
\neq \\
[\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_F = \{blue_{left} \sqcup red_{right}, blue_{left} \sqcup red_{left}\}
\end{gathered}
$$

For Alonso-Ovalle (2009, §2.2.2), sentence meanings are sets of alternatives for a given sentence. Alternatives are interpreted to be intensional propositions, that is, sets of possible worlds. Meanings of non-disjunctive sentences are singleton sets of propositions, since non-disjunctive sentences have only themselves as alternatives, i.e. $[\![Blue_{left}]\!]_{AO} = \{|Blue_{left}|\}$.[12] Meanings of disjunctive sentences are sets of alternatives corresponding to each disjunct:

$$
\begin{gathered}
[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{AO} = \{|Blue_{left}|, |Blue_{left} \wedge Red_{left}|\} \\
[\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_{AO} = \{|Blue_{left} \wedge Red_{right}|, |Blue_{left} \wedge Red_{left}|\}
\end{gathered}
$$

We summarize the semantic values predicted by Alonso-Ovalle's framework as follows:

$$
\begin{gathered}
[\![Blue_{left}]\!]_{AO} = \{|Blue_{left}|\} \\
\neq
\end{gathered}
$$

[10] I will assume for the rest of the paper is that *Blue is on the right* is the negation of *Blue is on the left* (similarly for Red) and ignore the possibility that one of the children might not be sitting on either side.

[11] Formally, this would correspond to the least upper bound of the subset of truthmakers for $Blue_{left}$ and Red_{left}.

[12] I write $|\alpha|$ to denote the intensional proposition expressed by α.

$$[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{AO} = \{|Blue_{left}|, |Blue_{left} \wedge Red_{left}|\}$$
$$\neq$$
$$[\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_{AO} = \{|Blue_{left} \wedge Red_{right})|, |Blue_{left} \wedge Red_{left}|\}$$

Thus we see that more fine-grained theories predict different semantic values for each antecedent in (3-a), (4-a) and (4-b).

3.2 Less fine-grained theories

There are hyperintensional theories that distinguish fewer of these intensional equivalents due to further restrictions on the range of semantic values they allow (Santorio 2018; Ciardelli et al. 2018; Ciardelli et al. 2018). In these theories, some of the intensional equivalents are still equivalent:

$$[\![Blue_{left}]\!]_{LFG} = [\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{LFG}$$

But some of them are not:

$$[\![Blue_{left}]\!]_{LFG} \neq [\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_{LFG}$$
$$[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{LFG} \neq [\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_{LFG}$$

For inquisitive semantics, the meaning of a sentence is the set of *weakest information states* (with respect to entailment) that *support* the proposition expressed by the sentence (Ciardelli et al. 2018, §2.3).[13] Information states are sets of possible worlds. An information state supports a proposition expressed by a sentence, if it contains enough information to entail the proposition. We compute sentential meanings in two steps. First, we find the set of information states that support a proposition and then find the set containing the weakest of these information states. For example, we compute the meaning of an atomic sentence $Blue_{left}$ as follows. Writing s for information states, we designate $\{s : s \subseteq |Blue_{left}|\}$. Since the weakest s is just $|Blue_{left}|$, we end up with the singleton

[13]This presentation slightly distorts the formulation of inquisitive semantics, but not in a way that matters for the issues under investigation in this paper. What I call *sentential meaning* here is actually the set of alternatives associated with a sentence or the *inquisitive proposition* expressed by the sentence in inquisitive semantics (Ciardelli et al. 2018, §2.4.2). I take this set of alternatives to be the meaning of a sentence. This assumption is harmless in this paper, because we will be working with antecedents of conditionals and these are alternative-sensitive environments (Ciardelli et al. 2018, §3.1).

$\{|Blue_{left}|\}$. The meaning of a disjunction $Blue_{left} \vee Red_{left}$ is given by the union of propositions expressed by each disjunct, i.e. $\{|Red_{left}|, |Red_{left}|\}$. However, if one of the disjuncts entails the other as in $Blue_{left} \vee (Blue_{left} \wedge Red_{left})$, then the proposition expressed is the set containing the weakest information state that supports the proposition expressed by the weaker disjunct, $Blue_{left}$. We can show this by computing the meaning of (3-a)'s antecedent:

$$\begin{gathered}
[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{IS} \\
= \\
\{s : s \subseteq |Blue_{left}|\} \cup \{s : s \subseteq |Blue_{left} \wedge Red_{left}|\} \\
= \\
\{s : s \subseteq |Blue_{left}| \text{ or } s \subseteq |Blue_{left} \wedge Red_{left}|\} \\
= \\
\{s : s \subseteq |Blue_{left}|\} \\
= \\
\{|Blue_{left}|\}
\end{gathered}$$

For (4-b)'s antecedent: since there neither $Blue_{left} \wedge Red_{right}$ entails $Blue_{left} \wedge Red_{left}$ nor vice versa, the inquisitive recipe yields the following:

$$\{|Blue_{left} \wedge Red_{right}|, |Blue_{left} \wedge Red_{left}|\}$$

We sum up the semantic values predicted by inquisitive semantics as follows:

$$\begin{gathered}
[\![Blue_{left}]\!]_{IS} = \{|Blue_{left}|\} = [\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{IS} \\
\neq \\
[\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_{IS} = \{|Blue_{left} \wedge Red_{right}|, |Blue_{left} \wedge Red_{left}|\}
\end{gathered}$$

For Santorio, the meaning of sentences are sets of syntactic truthmakers, that is, sets of sentences. These syntactic truthmakers are computed from Katzir's complexity-based theory of alternatives (2007). Santorio proposes a recipe that generates *stable* and *minimal* subsets of Katzir alternatives. Truthmakers are the conjunctions of sentences in each of these minimal stable subsets. For our purposes, all we need to know about Katzir's theory of alternatives is that the alternatives for a disjunction is the set containing both disjuncts, the disjunction itself and the conjunction of these two disjuncts:

$$ALT_{Katzir}(P \vee Q) = \{P \vee Q, P, Q, P \wedge Q\}$$

A stable subset $A \subseteq ALT_{Katzir}$ for a sentence means that the sentences in A are consistent with the negations of the rest of the alternatives in ALT_{Katzir}. Computing the truthmakers for (3-a), (4-a) and (4-b)'s antecedents, we find that $Blue_{left}$ is the only truthmaker for both $Blue_{left}$ and $Blue_{left} \vee (Blue_{left} \wedge Red_{left})$. The latter might not be obvious, so I give a brief derivation. Let us write the Katzir alternatives for $Blue_{left} \vee (Blue_{left} \wedge Red_{left})$ as follows:

$$ALT_{Katzir}([Blue_{left} \vee (Blue_{left} \wedge Red_{left})]) = \left\{\begin{array}{l} Blue_{left} \vee (Blue_{left} \wedge Red_{left}), \\ Blue_{left}, \\ Blue_{left} \wedge Red_{left} \end{array}\right\}$$

The subset $\{[Blue_{left} \vee (Blue_{left} \wedge Red_{left})], Blue_{left}\}$ is a stable subset, because the conjunction of these sentences is consistent with the leftover alternative $\neg(Blue_{left} \wedge Red_{left})$. This implies $Blue_{left}$ is a truthmaker. However, the subset $\{[Blue_{left} \vee (Blue_{left} \wedge Red_{left})], Blue_{left} \wedge Red_{left}\}$ is not a stable subset, because the conjunction of $Blue_{left} \wedge Red_{left}$ and $\neg Blue_{left}$ is not consistent. This implies that $Blue_{left} \wedge Red_{left}$ is not a truthmaker for Santorio. Checking all other possible stable subsets, we find that $Blue_{left}$ is the only truthmaker for $Blue_{left} \vee (Blue_{left} \wedge Red_{left})$.

Going through the same procedure for (4-b), we find that $Blue_{left} \wedge Red_{right}$ and $Blue_{left} \wedge Red_{left}$ are the truthmakers for $(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})$. We sum up the semantic values for Santorio as follows:

$$[\![Blue_{left}]\!]_S = \{Blue_{left}\} = [\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_S$$

$$\neq$$

$$[\![(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})]\!]_S = \{Blue_{left} \wedge Red_{right}, Blue_{left} \wedge Red_{left}\}$$

For an interim summary: what we have done so far is to observe that Fine's and Alonso-Ovalle's theories predict different semantic values for the antecedents of (3-a), (4-a) and (4-b), whereas inquisitive semantics and Santorio's theory predict the same semantic value for the antecedents of (3-a) and (4-b), while they assign a distinct semantic value for (4-b). The reason why we called the former theories *more fine-grained* and the latter *less fine-grained* should be clear—the former make more distinctions among intensionally equivalent sentences, whereas the latter make fewer distinctions. Now we move on to analyze the verdicts by these theories for (3-a), (4-a) and (4-b).

3.3 Predictions

We do not yet have a semantic entry for the counterfactual connective $>$ for these theories. Fortunately, in various writings both more and less fine-grained theories subscribe to slightly different versions of the essentially same semantic clause for $>$:[14]

($>$) $\varphi > \psi$ is true in a world w iff all the closest-to-w P-worlds for each $P \in [\![\varphi]\!]$ are worlds where some $Q \in [\![\psi]\!]$ *holds*.[15]

This clause is general enough to apply to both more and less fine-grained theories. Intuitively, ($>$) is asking us to consider all the closest worlds where each element in the semantic content of the antecedent holds. A counterfactual is not true if there exists a closest world for some $P \in [\![\varphi]\!]$ such that the consequent is not true there. Why are we saying *not true* instead of *false*? This is because such an assumption is controversial and unnecessarily strong for our purposes. Some might want to say that when only some of the closest worlds are where the consequent is true, the counterfactual is indeterminate rather than false.[16] The weaker result is sufficient for the conclusions of the paper

[14]See Santorio (2018, §4); Ciardelli et al. (2018, §3.2); Alonso-Ovalle (2009, §2); and Fine (2012, p. 237). The differences between these theories do not matter for our purposes. Ciardelli et al. use *background semantics*, which makes different predictions for cases involving narrow-scope negation, but our cases do not fall into that category. Fine employs a *transition relation* that represents *causal outcomes* of imposing changes as demanded by counterfactual antecedents. Here this relation can be interpreted as putting out the closest worlds where the truthmakers for the antecedent hold (Fine 2012, p. 241). What matters for our purposes is the double universal quantification in ($>$) that requires universal quantification not only on all the closest worlds for one of the semantic values for the antecedents, but also over all of the semantic values for the antecedent. This allows these theories to validate the inference pattern called **Simplification of Disjunctive Antecedents (SDA)**, which lets one infer *if it had rained, the party would have been ruined* and *if it had snowed, the party would have been ruined* from *if it had rained or snowed, the party would have been ruined*. The validation of this inference pattern is essential for the expected judgments for the counterfactuals in question here.

[15]I use *hold* to mean either that some $P \in [\![\varphi]\!]$ is a part of that world or that it is true in that world. The former clause is for Fine's truthmaker semantics (2012, p. 236), whereas the latter is for the rest of frameworks under discussion.

[16]For instance, von Fintel (1997, §7.2.2); Schlenker (2004) and Križ, (2015, §7).

to go through.

Given ($>$), the truth-value of (3-a) is a problem for less fine-grained theories. This is because less fine-grained theories have a single alternative for (3-a)'s antecedent, i.e. $[\![Blue_{left} \vee (Blue_{left} \wedge Red_{left})]\!]_{LFG} = \{Blue_{left}\}$, and all the closest worlds where this alternative holds are worlds where the seesaw is balanced. This means that ($>$) coupled to less fine-grained theories predicts (3-a) to be true contrary to expectations. As a result, less fine-grained theories cannot predict the truth-value divergence of (3-a) and (4-a). Still they predict (4-b) to be false in line with the expectations. This is because one of the alternatives for (4-b)'s antecedent corresponds to both of the children being on the left and the closest worlds where this is the case are worlds where the seesaw is unbalanced. Since the consequent is not true in all the antecedent-worlds, (4-b) is not true (Results are summed up in the table below.).

LFG	True	Not true
(3-a)	✗	
(4-a)	✓	
(4-b)		✓

Table 2. Truth-value predictions of less fine-grained theories for Scenario 1.

On the other hand, more fine-grained theories coupled with ($>$) will predict (3-a) and (4-a) to have different truth-values. In particular, more fine-grained theories predict (4-a) to be true, while (3-a) and (4-b) to be *not* true as expected. Importantly, (3-a) is predicted not true, because more fine-grained theories predicts the existence of an alternative corresponding to both children being on the left of the seesaw for (3-a)'s antecedent. The closest worlds where this alternative is true are worlds where the consequent of (3-a) is not true. So it seems that the extra grain that more fine-grained theories bring to the table is needed to predict the right result for (3-a) (Results again summed up in the table below.).

MFG	True	Not true
(3-a)		✓
(4-a)	✓	
(4-b)		✓

Table 3. Truth-value predictions of more fine-grained theories for Scenario 1.

4 Hurford Disjunctions and Exhaustification

As matters stand in §3, less fine-grained theories underpredict for (3-a). Is there a way to accommodate (3-a) in less fine-grained theories? In this section I will discuss one proposal to do so.[17] We have briefly mentioned that one of the disjuncts in the antecedent of (3-a) entails the other. This is essentially why less fine-grained theories made identical predictions for (3-a) and (4-a). Such disjunctions are called *Hurford disjunctions*. They received a lot of attention in the linguistics literature.[18]

Hurford disjunctions are of the type $P \vee Q$ where one of disjuncts entails the other. Hurford observed that such disjunctions are infelicitous:

(5) a. # Sonya is either American or Californian.
    b. # Bogazici is either in Turkey or in İstanbul.

However, as observed by Gazdar (1979), some Hurford disjunctions are perfectly fine:

(6) a. Either Blue or both children are on the left.
    b. John has three or four children.

Although their disjuncts stand in an entailment relation, there is an asymmetry between (5-a)-(5-b) and (6-a)-(6-b). Recent work on Hurford disjunctions explains the infelicity of (5-a) and (5-b) by appealing to redundancy.[19] Redundancy here means that the whole disjunction is equivalent to one of its disjuncts. Given the classical treatment of disjunction, (5-a) is equivalent to its weaker disjunct, i.e. *Sonya is American*. This renders the whole disjunction redundant, since the weaker disjunct would have conveyed the exact same meaning as the whole disjunction.

There are two prominent approaches to explaining the asymmetry between (5-a)-(5-b) and (6-a)-(6-b): *global-pragmatic approach* and *local-grammatical approach*. Here I assume the local-grammatical approach.[20] Local approach explains the felicity of (6-a)-(6-b) by postulating covert *exhaustification*

[17]Thanks to Paolo Santorio for suggesting this proposal (p.c.).

[18]For more on Hurford disjunctions, see Hurford (1974), Gazdar (1979), Simons (2001), Fox and Spector (2018), Ciardelli and Roelofsen (2017).

[19]What kind of redundancy? The literature splits into two: some argue it is grammatical redundancy (Chierchia 2006; Fox 2007; Ciardelli and Roelofsen 2017; Katzir and Singh 2014) and some argue it is pragmatic redundancy (Simons 2001).

[20]See Horn (1972), Simons (2001) and Sauerland (2004) for global-pragmatic approach. Global approach does not impose any LF change on the sentence in question. One reason why I prefer the local approach is because the change in LF seems required to get the desired truth-value predictions for our cases. Another reason is because there is independent

operators at the grammatical level (denoted henceforth as exh). Exhaustification operators work essentially like sticking an *only* to weaker disjuncts in Hurford disjunctions. For instance, *Blue or both of them are on the left* is interpreted as *Only Blue or both of them are on the left*. Applying such an operator to the weaker disjunct breaks the entailment and in consequence the redundancy. Formally, exh is defined with respect to a set of alternatives ALT for a given sentence. The exhaustification operator exh acts on a sentence α and yields a stronger sentence α' by conjoining α with the denial of α's alternatives other than itself.

Two questions need answering here: (i) what is the procedure for determining alternatives? and (ii) which alternatives are denied? Answering (i): it is generally agreed that the set of alternatives are codetermined by the grammar and context (e.g. Fox and Spector 2018). Both supply a set of alternatives and their intersection is the ultimate set of alternatives relative to which exhaustification operators are defined. However, grammatical alternatives are usually invoked only for scalar items such as numerals and quantifiers. For nonscalar items, the alternatives for exh are assumed to be provided by questions under discussion (QUD).[21] Answering (ii): we do not deny every alternative in ALT. There are two reasons for this. The first is that every sentence is an alternative to itself and strengthening any sentence with its own negation leads to a contradiction. The second reason is that sometimes the alternatives are given by a set of sentences each of which can individually be denied without a contradiction, but not together.[22] Therefore, only a special subset called *innocently excludable alternatives* are denied. An innocently excludable subset $IALT_P$ of ALT_P is the *largest* set of alternative sentences for P such that conjoining P with the negation of any A in $IALT_P$ does not lead to a contradiction. Given this definition, exh strengthens the entailed disjunct by denying the sentences in the innocently excludable subset of alternatives.

Now let us see what this means for (6-a) (and ultimately for (3-a)):

(6) a. Either Blue or both children are on the left.

For (6-a), the set of alternatives for the entailed disjunct is $ALT_{Blue_{left}} = \{Blue_{left}, Red_{left}, Blue_{left} \wedge Red_{left}\}$. Here $ALT_{Blue_{left}}$ is determined by the QUD *Who is on the left side (of the seesaw)?*

evidence that global approach may not be able to explain embedded exhaustification operators (Chierchia 2009). Ultimately, exhaustification operators required for our purposes have to be doubly embedded. Not only they are embedded in a disjunction, but the disjunction itself is embedded in the antecedent of a conditional.

[21] Many adopt this proposal. See van Rooij (2004), Spector (2007) and Singh (2008). For more discussion of QUD's, see Hamblin (1973), Groenendijk and Stokhof (1984); Ginzburg (1996); van Kuppevelt (1996) and Roberts (2012).

[22] For motivation and further discussion, see Fox 2007 (§6.1).

We take the denotation of QUD's to be Hamblin sets (1973) in line with Fox and Hackl (2006) and Singh (2008). This yields the following alternative set for (6-a):

$$Q_{Left} = \{Blue_{left}, Red_{left}, Blue_{left} \wedge Red_{left}\}$$[23]

The only innocently excludable subset of Q_{Left} is $\{Red_{left}, Blue_{left} \wedge Red_{left}\}$, because $Blue_{left} \wedge \neg Blue_{left}$ is obviously a contradiction. This gives us the final result:

$$\mathsf{exh}(Blue_{left}) \vee (Blue_{left} \wedge Red_{left})$$
$$\equiv$$
$$[Blue_{left} \wedge \neg Red_{left} \wedge \neg(Blue_{left} \wedge Red_{left})] \vee (Blue_{left} \wedge Red_{left})$$
$$\equiv$$
$$(Blue_{left} \wedge \neg Red_{left}) \vee (Blue_{left} \wedge Red_{left})$$

The left disjunct is equivalent to saying that only Blue is on the left. Hence the whole disjunction (3-a) is equivalent to the following:

(7) Only Blue or both children are on the left.
$(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})$

Exhaustifying (6-a) prevents the whole disjunction from being equivalent to one of its disjuncts and the entailment between the disjuncts is also blocked. According to the local approach, the existence of such covert exhaustification is the reason why (6-a) sounds fine.

Applying this to (3-a) given Scenario 1, we exhaustify the left disjunct of (3-a)'s antecedent, yielding:

(8) If only Blue or both children were on the left, the seesaw would be balanced.
$[\mathsf{exh}(Blue_{left}) \vee (Blue_{left} \wedge Red_{left})] > Balance$

Note that (8) is just equivalent to (4-b):

(4) b. If Blue was on the left and Red was on the right, or both of them were on the left, the seesaw would be balanced.
$[(Blue_{left} \wedge Red_{right}) \vee (Blue_{left} \wedge Red_{left})] > Balance.$

[23] The elements of this set is to be taken as a set of sentences for Santorio and set of sets of possible worlds for inquisitive semantics.

This way less fine-grained theories predict (4-b) to be not true by less fine-grained theories in line with the expectations. Appealing to the relevant exhaustification on the disjunction in (3-a), less fine-grained theories can predict the right results for (3-a), (4-a) and (4-b). This way less fine-grained theories make up for the underprediction for (3-a) by utilizing the tools afforded by the literature on Hurford disjunctions (summarizing these results in the table below).[24]

LFG+EXH	True	Not true
(3-a)		✓
(4-a)	✓	
(4-b)		✓

Table 4. Truth-value predictions of less fine-grained theories for Scenario 1 with exhaustification.

5 Children on a Seesaw, v.2

Thus far more fine-grained theories predict the right results for (3-a), (4-a) and (4-b) due to their semantic entries for logical operators and less fine-grained ones predict the right results due to exhaustification on Hurford disjunctions. We may think at this point that predictions are extensionally equivalent and this is the end of the debate. Fortunately, that is not the case and we can tease these predictions apart. First, we change Scenario 1 to Scenario 2 (depicted in the figure below).

[24]Even though more fine-grained theories need not appeal to Hurford-type explanations, could they, if they wanted to? This is not totally clear. Ciardelli and Roelofsen (2017) argue that more fine-grained theories are unable to predict the semantic redundancy in Hurford disjunctions, since in more fine-grained theories the meaning of Hurford disjunctions is not equivalent to one of their disjuncts. However, there might be other ways for these theories to explain why Hurford disjunctions sound bad without sacrificing their extra propositional grain. For instance, Fine might be able to say that the infelicitous Hurford disjunctions such as (5-a) and (5-b) sound bad because one of the disjuncts is a *disjunctive part* of the other (Fine 2017, p. 565). For (5-a), this means that being Californian is a disjunctive part of being American, since being American is plausibly a covert disjunction of being Californian, being Texan, being Alaskan *et cetera*. On the other hand, felicitous Hurford disjunctions such as (6-a) and (6-b) sound fine, because one of the disjuncts is a *conjunctive part* of the other. If we couple this story with a truthmaker dynamics where an update with a context is by way of adding or fusing truthmakers of the assertions, then a context updated with an infelicitous Hurford disjunction is the same context as a context updated with the weaker disjunct of the same infelicitous Hurford disjunction. However, a context updated with a felicitous Hurford disjunction is not the same as a context updated with either disjunct of a felicitous Hurford disjunction. Thus, infelicitous Hurford disjunctions make the same contribution to the context as one of their disjuncts, whereas felicitous Hurford disjunctions make a different contribution to the context from either of its disjuncts does. One advantage of this explanation is that it does not require any covert exhaustification to block entailment between disjuncts, since the prediction of felicity/infelicity is made through the type of entailment between the disjuncts. There is much to say about such a pragmatic story in truthmaker semantics, but I aim to pursue it elsewhere.

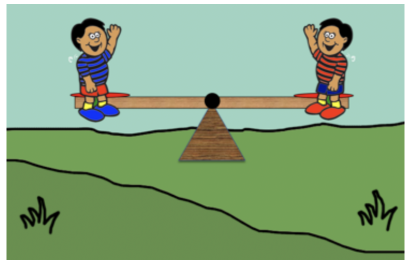

Figure 2. Scenario 2 describing children sitting on opposite sides of a seesaw.

In Scenario 2 the initial setup describes Blue on the left, Red on the right and the seesaw as balanced. First, consider (9-a) ((2) in the introduction):

(9) a. If Blue or both children were on the right, the seesaw would be *un*balanced.
$[Blue_{right} \vee (Blue_{right} \wedge Red_{right})] > Unbalance$

(9-a) sounds true given the setup. Also consider (10-a) and (10-b):

(10) a. If Blue was on the right, the seesaw would be unbalanced.
$Blue_{right} > Unbalance$

b. If Blue was on the right and Red was on the left, or both of them were on the right, the seesaw would be unbalanced.
$[(Blue_{right} \wedge Red_{left}) \vee (Blue_{right} \wedge Red_{right})] > Unbalance$

Here (10-a) sounds true, whereas (10-b) sounds not true. Expected truth-value judgments for (9-a), (10-a) and (10-b) are given in the table below.

	True	Not true
(9-a)	✓	
(10-a)	✓	
(10-b)		✓

Table 5. Expected truth-value judgments for Scenario 2.

Now we look at the predictions. First, more fine-grained theories coupled with (>) predict (9-a) and (10-a) to be true and (10-b) to be *not* true in line with the expectations. This is because the closest worlds for each $P \in [\![B_{right} \vee (B_{right} \wedge R_{right})]\!]_{MFG}$ are those where the seesaw is unbalanced. The closest worlds where Blue is on the right are also worlds where Red is on the right and the seesaw is accordingly unbalanced just as for the closest worlds where both children are on the right. Hence (9-a) and (10-a) are true. By similar reasoning, (10-b) is not true.

MFG	True	Not true
(9-a)	✓	
(10-a)	✓	
(10-b)		✓

Table 6. Truth-value predictions of more fine-grained theories for Scenario 2.

For less fine-grained theories, we note that the disjunction of (9-a) is a Hurford disjunction as in (3-a), so we exhaustify it before computing the truth-value:

(11) If only Blue or both children were on the right, the seesaw would be unbalanced.
$[(Blue_{right} \wedge Red_{left}) \vee (Blue_{right} \wedge Red_{right})] > Unbalance$

However, note that (11) is equivalent to (10-b) and (10-b) is predicted to be not true by less fine-grained theories. This is because the closest worlds where $Blue_{right} \wedge Red_{left}$ is true are worlds where the seesaw is balanced and this implies (10-b) is not true. Thus, it appears less fine-grained theories strengthened with exh operators seem to predict (9-a) to be not true and this is the wrong prediction.

LFG+EXH	True	Not true
(9-a)		✗
(10-a)	✓	
(10-b)		✓

Table 7. Truth-value predictions of less fine-grained theories for Scenario 2 with exhaustification.

Here is an informal gloss on what has been happening so far. Less fine-grained theories initially make the wrong prediction for (3-a) due to not distinguishing $\varphi \vee (\varphi \wedge \psi)$ from φ in general. So, these theories need to strengthen themselves to ensure that the weaker disjunct in $\varphi \vee (\varphi \wedge \psi)$ says *only* φ, which helps them get (3-a) right. This treatment forces less fine-grained theories to apply the same recipe to (9-a), since the antecedent of (9-a) is also a Hurford disjunction. However, getting (9-a) right requires *not* distinguishing between $\varphi \vee (\varphi \wedge \psi)$ and φ and consequently not exhaustifying (9-a)'s antecedent for less fine-grained theories. In sum, less fine-grained theories seem to face an arbitrary choice in terms of when to exhaustify at this stage.[25] It is important to note that this arbitrary choice is only facing less fine-grained theories, since more fine-grained theories semantically distinguish $\varphi \vee (\varphi \wedge \psi)$ from φ *and* get the right results both for (3-a) and (9-a) as seen above. It is only when a theory does not semantically distinguish between $\varphi \vee (\varphi \wedge \psi)$ and φ, and explain (3-a) via exhaustification that it faces this problem of arbitrary choice.[26]

6 Determining the set ALT

We have started with Scenario 1 and observed that less fine-grained theories predicts the wrong results for (3-a) given Scenario 1, whereas more fine-grained theories predict the right results. Then we considered a way less fine-grained theories can accommodate (3-a). But this proposal turned out to make the wrong predictions for (9-a). Where do we go from here?

I would like to consider a further modification to the exhaustification story that may be able to enable less fine-grained theories to accommodate both (3-a) and (9-a).[27] We have seen that defining exhaustification relative to the same set of alternatives for (3-a) and (9-a) yields the incorrect predictions for (9-a), even if it does the right ones for (3-a). The relevant QUD for these predictions was *who is on the left?*, which yielded the following set of alternatives:

$$ALT_{Blue_{left}} = \{Blue_{left}, Red_{left}, Blue_{left} \wedge Red_{left}\}$$

In counterfactual contexts, the salient QUD might be the one representing the changes invoked by the antecedent such as *Who switches sides in the counterfactual alternatives?* rather than *Who is on*

[25] A reviewer notes that less fine-grained theories at this point can point out that exhaustification is an optional phenomenon and so perhaps less fine-grained theories can take exhaustification on board for (3-a), but leave it out for (9-a). However, the reviewer also correctly comments that this behooves less fine-grained theories to explain what forces the insertion of exhaustification in (3-a) while leaving it out for (9-a), since both of their antecedents share the exact same logical form. Without this further explanation the optionality of exhaustification does not help with our cases.

[26] Thanks to a reviewer for providing this informal gloss. Also an editor of this journal helpfully points out that the arbitrariness of when to exhaustify might be an independent challenge for those who already favor less fine-grained theories for independent reasons and is otherwise unfazed by our argument in the paper. The editor also conjectures that interactions with focus might be relevant here. I leave this investigation to future work.

[27] Thanks to Ivano Ciardelli and Floris Roelofsen for proposing this defense on behalf of less fine-grained theories and a reviewer for bolstering it further.

the left of the seesaw? This is a salient possibility, because sometimes QUD's may not be explicit, but 'inferred on the basis of other cues' (Roberts 2012, p. 68). Here the relevant cue might be the subjunctive marking of antecedents. So perhaps exhaustification is not applied relative to the QUD *Who is on the left*, but to the QUD *Who switches sides in the counterfactual alternatives?*.

There is one wrinkle before us before we can evaluate the merits of this story. The surface form of (3-a) and (9-a)'s antecedents are disjunctions expressing which sides Blue and Red are sitting on, while not saying anything about children switching sides. The possibility of children switching sides is raised to salience by the contrary-to-fact situations expressed by the antecedents in question. In order to formulate an exhaustification operator that can exhaustify the antecedents of (3-a) and (9-a) in the intended way, we need the surface forms of (3-a) and (9-a)'s antecedents to match with the alternatives provided by the QUD *which children switch sides?*.

First, the Hamblin set corresponding to the QUD *Who switches sides in the counterfactual alternatives?* is as follows:

$$Q_{Switch} = \begin{Bmatrix} Blue_{switch}, \\ Red_{switch}, \\ Blue_{switch} \wedge Red_{switch} \end{Bmatrix}$$

Here $Blue_{switch}/Red_{switch}$ stands for *Blue/Red switches sides*. Given Q_{Switch}, we can translate (3-a) and (9-a)'s antecedents into forms that correspond to children switching sides as expressed by the subjunctive antecedents. This would provide matching surface forms between the alternatives and antecedents for exhaustification. For instance, we can translate (3-a)'s antecedent as (12):

(3) a. If Blue or both children were on the left, the seesaw would be balanced.
$[Blue_{left} \vee (Blue_{left} \wedge Red_{left})] > Balance$

(12) Blue or both children switch sides.
$Blue_{switch} \vee (Blue_{switch} \wedge Red_{switch})$

(12) reflects the changes demanded by the antecedent given Scenario 1. In Scenario 1 Blue switching sides leads to Blue being on the left and both children switching sides end up with both of them on the left just as in (3-a). We can exhaustify (3-a)'s antecedent with respect to Q_{Switch}. Since the only innocently excludable subset is $\{Red_{switch}, Blue_{switch} \wedge Red_{switch}\}$, we strengthen $Blue_{switch}$

as follows:

$$[Blue_{switch} \wedge \neg Red_{switch} \wedge \neg(Blue_{switch} \wedge Red_{switch})] \vee (Blue_{switch} \wedge Red_{switch})$$
$$\equiv$$
$$(Blue_{switch} \wedge \neg Red_{switch}) \vee (Blue_{switch} \wedge Red_{switch})$$

This reproduces the right result for (3-a) in Scenario 1 (reprinted below):

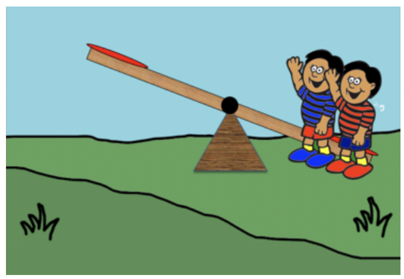

Figure 1. Scenario 1 describing two children sitting on the right side of a seesaw.

Since both children changing sides (hence being on the left) causes seesaw to unbalance, (3-a) is not true. Shifting to Q_{Switch} seems to reproduce the right results for Scenario 1.

What about (9-a)? Recall Scenario 2 (reprinted below).

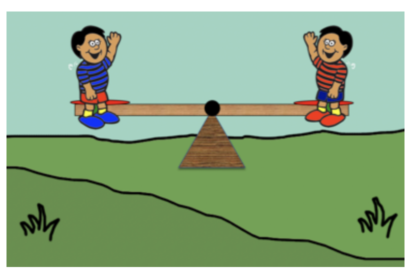

Figure 2. Scenario 2 describing children sitting on opposite sides of a seesaw.

We translate (9-a)'s antecedent just as in the case of (3-a):

(9) a. If Blue or both children were on the right, the seesaw would be unbalanced.
$[Blue_{right} \vee (Blue_{right} \wedge Red_{right})] > Unbalance$

(13) Blue switches sides or Blue switches sides and Red stays the same.
$Blue_{switch} \vee (Blue_{switch} \wedge Red_{same})$

One important thing to note here is that the conjunction in (13) has Red staying the same rather than changing sides, since Red is already on the right. Now we exhaustify (9-a)'s antecedent. Alternatives given by Q_{Switch} are as follows:

$$ALT_{Blue_{switch}} = \begin{Bmatrix} Blue_{switch}, \\ Red_{switch}, \\ Blue_{switch} \wedge Red_{switch} \end{Bmatrix}$$

The only innocently excludable subset of $ALT_{Blue_{switch}}$ is $\{Red_{switch}, Blue_{switch} \wedge Red_{switch}\}$. Strengthening Red_{switch} with the negation of other alternatives yields the following:

$$\begin{gathered} \mathsf{exh}(Blue_{switch}) \vee (Blue_{switch} \wedge Red_{same}) \\ \equiv \\ (Blue_{switch} \wedge \neg Red_{switch}) \vee (Blue_{switch} \wedge Red_{same}) \\ \equiv \\ (Blue_{switch} \wedge Red_{same}) \vee (Blue_{switch} \wedge Red_{same}) \end{gathered}$$

Note that the entailment between the disjuncts is not blocked. But given the set of alternatives $ALT_{Blue_{switch}}$, there is really no way of exhaustifying $Blue_{switch}$ such that the entailment *is* blocked. So, this LF is our only option. This exhaustification yields the following form for (9-a)'s antecedent:

(14) $(Blue_{switch} \wedge Red_{same}) \vee (Blue_{switch} \wedge Red_{same})$

When (9-a)'s antecedent is interpreted as (14), less fine-grained theories predict (9-a) to be true, because only Blue switching sides leads to Blue being on the right, which the seesaw to unbalance. In this way, less fine-grained theories predict (9-a) and (10-a) to be true, while predicting (10-b) to be not true in line with expectations.

LFG+EXH+QUD	True	Not true
(9-a)	✓	
(10-a)	✓	
(10-b)		✓

Table 8. Truth-value predictions of less fine-grained theories for Scenario 2 with exhaustification and QUD-adjusting.

It appears that changing the QUD to reflect the changes in the counterfactual possibilities invoked by (3-a) and (9-a)'s antecedents provides the right results for less fine-grained theories. By taking exhaustification along with some QUD-sensitivity on board less fine-grained theories seem to replicate the results provided by more fine-grained theories.[28]

7 Problems with the Counterfactual-sensitive QUD proposal

We have seen above that less fine-grained theories with the *right* type of exhaustification gets the right result. I will argue in this section that this maneuver is unsatisfactory because of two related reasons: (i) it fails to accommodate ***only* implicature generalization (OIG)** proposed by Singh (2008) and (ii) slightly different, but nearby QUD's lead to extensionally inadequate predictions by less fine-grained theories. We will see that interpreted in the right way (i) may not be a problem, but a boon for less fine-grained theories, since the fact that (9-a) cannot be exhaustified in the way a Hurford disjunction would seems to be attested by the oddness of (9-a) even when true. I will still discuss this issue, because it provides a smooth transition to (ii), which is the real problem for less fine-grained theories. (ii) illustrates that there are similar QUD's to the one picked to get the right results for (9-a) which generates readings of (9-a) that are false and intuitively not attested. This

[28] It is also important to note that this story may help intensional theories as well, since a different set of non-trivial changes to the LF's of our cases due to exhaustification on different QUD's may break the intensional equivalence of these antecedents. This might help intensional theories pry apart the truth-value predictions for (9-a)-(10-b) in principle. However, it also requires a more radical departure from the story told in §6, because the exhaustification story in §6 preserves intensional equivalence of the antecedents of (9-a), (10-a) and (10-b). Intensional theories need break the intensional equivalence especially between (9-a)/(10-a) and (10-b) to predict (10-b) false. Otherwise, even if they can get (9-a) and (10-a) right for Scenario 2, they cannot still get (10-b) right, since the antecedent of (10-b) would still only be true in worlds where Blue switches to the right and seesaw becomes unbalanced, even though the antecedent of (10-b) explicitly instructs us to consider the possibility where Blue switches to right, Red switches to left and seesaw consequently becomes balanced. Without breaking intensional equivalence of these antecedents intensional theories cannot generate the intuitively false reading of (10-b). Thanks to a reviewer for discussion here.

suggests that less fine-grained theories get the right results for (9-a) only by way of an arbitrary selection from a class of available QUD's for Scenario 2.

7.1 *Only* Implicature Generalization

First, there is a plausible principle for what a legitimate insertion of the exhaustification operator does for Hurford disjunctions. Such an exhaustification is supposed to generate an *only* implicature on the weaker disjunct so that the stronger disjunct does not entail the weaker one:[29]

> ***Only* Implicature Generalization (OIG)**: The meaning of a sentence S strengthened by exh can always be paraphrased by asserting *only* S', where S' is like S but with focus on the relevant items.

What this principle achieves is to break the entailment among disjuncts in a Hurford disjunction thereby removing redundancy. If two disjuncts stand in an entailment relation, then a legitimate insertion of exh should be able to strengthen the weaker disjunct to generate an *only* implicature that can disrupt the entailment. For instance, let us take a felicitous unembedded Hurford disjunction:

(15) Either Blue or both children are on the left.

Exhaustifying the former disjunct of (15) with the relevant alternatives generates the strengthened sentence *Only Blue is on the left*. Here *only* plays the crucial role in establishing that the latter disjunct does not entail the former. The insertion of exh in the weaker disjunct of (15) leads to an instance of exhaustification that satisfies **OIG**.[30]

Does exhaustification relative to the QUD *Who switches sides in the counterfactual alternatives?* satisfy this principle in Scenario 1 and Scenario 2? For Scenario 1, it does, since (3-a) as exhaustified relative to the QUD *Who switches sides in the counterfactual alternatives?* is equivalent to saying that only Blue changes position:

(16) Only Blue or both children switch sides.

$(Blue_{switch} \wedge Red_{same}) \vee (Blue_{switch} \wedge Red_{switch})$

[29] I borrow the principle from Singh (2008, p. 254) who borrows it from Fox (2007, p. 79). Singh uses the *only* implicature generalization as a test for whether a linguistic item can be exhaustified.

[30] Singh argues (2008, p. 255) that strengtening the weaker disjunct should make it *inconsistent* with the stronger disjunct. Here I help myself only to the weaker case that the strengthening should break the entailment among the disjuncts.

And this breaks the entailment between the disjuncts. However, for Scenario 2, exhaustification relative to the QUD *Who switches sides in the counterfactual alternatives?* does not satisfy **OIG** when applied to the antecedent of (9-a). This is because the relevant exhaustification yields the following for the antecedent of (9-a):

(17) # Only Blue or only Blue switches sides.
$(Blue_{switch} \wedge Red_{same}) \vee (Blue_{switch} \wedge Red_{same})$

Even though exhaustification generates the *only* implicature for the former disjunct of (17), this implicature does not break the entailment between the disjuncts, because the latter disjunct already says that only Blue switches sides. Such an application of exhaustification makes both disjuncts equivalent to each other rather than exhaustifying the weaker disjunct to ensure that it is not entailed by the stronger disjunct. If less fine-grained theories are to predict the right results both for (3-a) and for (9-a) through a general mechanism of exhaustification, this exhaustification should *not* break the entailment between the disjuncts of (9-a)'s antecedent. Only then can they predict the right result for (9-a). Conversely, if the role of exhaustification is to break the entailment between a conjunction and a conjunct in a Hurford disjunction, then less fine-grained theories cannot exhaustify (9-a) to get the right results.

This suggests that the antecedent of (9-a) cannot be exhaustified relative to the QUD *Who switches sides in the counterfactual scenarios?*, since such an exhaustification violates **OIG**.[31] Perhaps this is the right result after all, since (9-a) sounds odd, even if true, and perhaps this is due to the fact that we cannot exhaustify (9-a)'s antecedent. Given the story we have told so far, this is because we have assumed a particular QUD that yielded a set of alternatives relative to which we could exhaustify the antecedent of (3-a) in the right way. At the same time this set of alternatives also prevented us from exhaustifying the antecedent of (9-a) in a way that satisfies **OIG**.

Perhaps we should conclude from this result that *Who switches sides in the counterfactual alternatives?* is the QUD when the reader evaluate (3-a) and (9-a) in their respective scenarios and less fine-grained theories accommodate the right results for (3-a) and (9-a). However, this would be too hasty. In the next section I argue that holding onto a particular QUD for the puzzle we have raised above is an unstable solution for less fine-grained theories, since it relies on less fine-grained

[31] Thanks here to two reviewers and the editor for pressing me to clarify what this objection exactly means for the less fine-grained theories and making me see in the process that two objections I have in this section are indeed related to each other.

theories making an arbitrary choice among similar QUD's.

7.2 Nearby QUD's

The set of alternatives generated by the QUD *Who switches sides in the counterfactual alternatives?* is exactly the right set of alternatives to exhaustify (9-a)'s antecedent such that the exhaustified antecedent still receives a redundant interpretation and suffices to predict the right truth-value for (9-a). Is there anything special about this QUD given the scenarios and counterfactuals we are considering? For instance, is there anything about the scenarios and the fact that we are assessing counterfactuals relative to these scenarios which force this QUD to generate alternatives? I think not. For instance, there are other candidates for a QUD suitable for Scenario 2 such as *What happens to the children in the relevant counterfactual alternatives?*:

$$Q_{Happens} = \begin{Bmatrix} Blue_{same}, \\ Red_{same}, \\ Blue_{same} \wedge Red_{same}, \\ Blue_{switch}, \\ Red_{switch}, \\ Blue_{switch} \wedge Red_{switch} \end{Bmatrix}$$

$Q_{Happens}$ is fairly close to *Who switches sides in the counterfactual alternatives?* in that it merely adds the possibilities where children may retain their sides. One can even argue that such possibilities are especially salient for (9-a), because the stronger disjunct in (9-a)'s antecedent explicitly raises to salience the situation that Red stays the same, while Blue switches sides. When this QUD is salient, we can exhaustify (9-a)'s antecedent and break the entailment between disjuncts. When we exhaustify (9-a)'s antecedent relative to $Q_{Happens}$, we end up with two candidates for the innocently excludable sets of alternatives. One of them generates the inexhaustified reading of (9-a) as we saw above. But now there is also the non-redundant interpretation (18) generated by the subset of alternatives that includes children remaining the same on the seesaw:

(18) $(Blue_{switch} \wedge \neg Red_{same}) \vee (Blue_{switch} \wedge Red_{same})$

(18) is equivalent to (19):

(19) $(Blue_{switch} \wedge Red_{switch}) \vee (Blue_{switch} \wedge Red_{same})$

This yields (20) as a reading for (9-a):

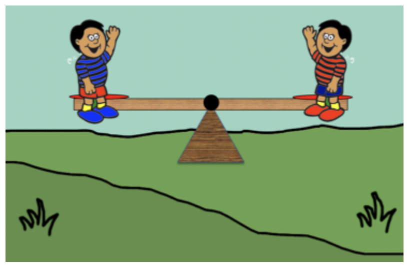

Figure 2. Scenario 2 describing children sitting on opposite sides of a seesaw.

(20) If both children switched sides or Blue switched sides and Red stayed the same, the seesaw would be unbalanced.
$[(Blue_{switch} \wedge Red_{switch}) \vee (Blue_{switch} \wedge Red_{same})] > Unbalance$

(20) is false, since both children switching sides would cause the seesaw to be balanced after all. This reading should be available for (9-a)'s antecedent with $Q_{Happens}$ if there is a preference for non-redundancy. But it is manifestly not available. The complaint here is that, if less fine-grained theories explain the infelicity of (9-a) by arguing that (9-a) is not exhaustifiable, then here we have provided here a plausible route with a salient QUD through which we can exhaustify (9-a). Why is such a reading not available at all?[32] Compare this to more fine-grained theories. More fine-grained theories predict that (19) as an interpretation of (9-a) is not available, because it is semantically ruled out. The semantic explanation for the unavailability of (19) is more rigid than that of exhaustification provided by less fine-grained theories and such rigidity in (9-a) seems to be attested.

I take this argument to suggest that the solution less fine-grained theories bring to the table requires quite a bit of fine-tuning in picking QUD's to get the right results for (3-a) and (9-a). Slight variation in QUD's, e.g. switching from Q_{Switch} to $Q_{Happens}$, makes some non-redundant readings available for (9-a) that cannot actually be attested. The predictions by more fine-grained

[32]Thanks here to the editor who is drawing my attention to the nonexistence of such a reading and the importance thereof to our argument.

theories, on the other hand, are semantically fixed and do not allow this variation. The rigidity in the interpretation of (9-a) is better explained by the semantic rigidity of more fine-grained theories.

7.3 General Moral from the Problems

In hindsight, we can see what the twists and turns with exhaustification and carefully picking QUD's are supposed to do for less fine-grained theories. I believe that less fine-grained theories are trying to capture a phenomenon that does not really belong to the realm of exhaustification. They are trying to capture the similarity considerations that come with counterfactuals by adjusting the QUD. Let me illustrate this with (9-a):

(9) a. If Blue or both children were on the right, the seesaw would be unbalanced.

A straightforward evaluation of (9-a) seems to be a two-step procedure. We take the former disjunct and look at the most similar worlds where it is true. These are all worlds where the seesaw is unbalanced, since we keep the rest of the facts fixed. Then we take the second disjunct and look at the most similar worlds where it is true. Again the seesaw is unbalanced in these worlds. Since both disjuncts affirm the consequent, (9-a) rings true. While evaluating (9-a), we keep certain background facts about the scenario fixed. This includes the position of Red while varying the location of Blue. This share of the burden about the evaluation of counterfactuals is contributed by the similarity-based nature of ($>$). However, a theory can help itself to this explanation *only if* one admits multiple alternatives for the antecedent of (9-a). Because less fine-grained theories by their very formulation does not predict the existence of these alternatives, they are appealing to gerrymandering QUD's for exhaustification.

In sum, I have provided two related considerations against employing exhaustification to explain why (3-a) does not sound true, whereas (9-a) does. Even though these considerations do not kill the prospect of explaining (3-a) and (9-a) under less fine-grained theories, they raise worries that these solutions are *ad hoc*. I believe that they at least provide enough evidence to shift the burden of explanation to less fine-grained theories.

8 Redundancy and Pragmatics of Counterfactuals

While concluding §7.1, we have mentioned that (9-a) is odd, even if true. This oddness is attested by many.[33] As it stands, more fine-grained theories seem to say nothing about this widely attested oddness, even if they get the right truth-value of (9-a) in a more uniform way. The situation might even be comparatively worse for more fine-grained theories, since we have observed that less fine-grained theories might have a way of explaining the oddness of (9-a), e.g. by simply pointing out that its antecedent cannot be exhaustified for a particular choice of QUD. This would put less fine-grained theories in a better position to explain the felt oddness of (9-a), notwithstanding the issues raised so far.[34] In this section I argue that there is a general pragmatic explanation of this oddness independently of Hurford disjunctions. After detailing this pragmatic explanation, I will also conjecture that such an explanation might even be related to explaining the infelicity of so-called *true-antecedent counterfactuals*.[35] If such a conjecture is true, then this will also make more fine-grained theories more parsimonious than less fine-grained ones, since less fine-grained theories should also appeal to this pragmatic explanation in cases of true-antecedent conditionals.

Pragmatic explanation I have in mind is roughly as follows. When we evaluate a counterfactual whose antecedent gives rise to multiple alternatives, we expect the antecedent to give rise to qualitatively different scenarios or closest possible worlds relative to which we assess the consequent. Otherwise, the counterfactual would have redundant components in its evaluation. After establishing whether the consequent holds in one of these qualitatively identical hypothetical scenarios, checking other scenarios makes no informative contribution to the overall evaluation of the counterfactual. Crucially, this is not merely a matter of an antecedent's LF. Such informativeness is codetermined by the antecedent *and* the background conditions against which the counterfactual is evaluated. (9-a) illustrates this perfectly:

[33] For instance, the editor and reviewers attest to it along with many others to whom I presented this material.
[34] Thanks to a reviewer for providing this line of defense on behalf of less fine-grained theories.
[35] For a discussion of true-antecedent counterfactuals, see Lewis 1973 (§1.7).

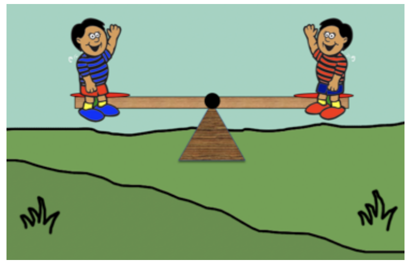

Figure 2. Scenario 2 describing children sitting on opposite sides of a seesaw.

(9) a. If Blue or both children were on the right, the seesaw would be unbalanced.

The antecedent of (9-a) invokes multiple alternatives and gives rise to two scenarios which are qualitatively identical: one where Blue hops to the right and both children end up on the right and another where again only Blue hops to the right (since Red is already on the right) and both children again end up on the right. This is a roundabout way of ending up in the exact same situation, namely, one where the seesaw is not balanced with both children sitting on the right. (9-a) prompts us to consider identical hypothetical scenarios where we evaluate the consequent and such a counterfactual contains redundancy in the hypothetical scenarios it raises to salience. This is what explains the oddness of (9-a). It is important to note that explanation for this redundancy cannot be complete by appeal to the LF of the antecedent *alone*. What gives rise to this redundancy is the combination of the alternatives generated by (9-a)'s antecedent *and* background conditions for Scenario 2, e.g. the fact that Scenario 2 starts with Red being on the right. This is a pragmatic explanation in that it is constraining the range of informative counterfactuals in a given context. In short, each component of the counterfactual must make an informative contribution to the evaluation of its consequent.

I suspect this pragmatic explanation also has something to do with the infelicity of true-antecedent counterfactuals. Philosophers and linguists have discussed the oddness of counterfactuals with true antecedents. The consensus is that there is nothing semantically wrong with a true-antecedent counterfactual, but it is *mistaken* or *misleading* (Lewis 1973, p. 27). What grounds this pragmatic response is not usually made explicit, but it is usually asserted without explanation that using a counterfactual has a pragmatic presupposition that its antecedent is false.[36] This may be a brute

[36]See Pears (1949), Hampshire (1948) and Weinberg (1951).

fact about the use of counterfactuals, but armed with the pragmatic explanation we have given above, perhaps we can explain the existence of such a pragmatic presupposition by appeal to the pragmatic explanation we have used to explain the oddness of (9-a). Here is an attempt.

We have said above that a counterfactual must not involve redundant scenarios it brings to salience for evaluation of its consequent. However, we can suppose in a context that one usually has the actual scenario available to them when they are evaluating a counterfactual. When one says *if it had rained, the picnic would have been canceled*, they compare the actual situation to the hypothetical one raised by the counterfactual. Because these scenarios qualitatively differ, there is nothing odd about the counterfactual. On the contrary, suppose that we both know that it did indeed rain and the picnic was cancelled. Then the counterfactual does not generate a hypothetical scenario that differs from the actual scenario taken for granted and hence it is not informative. The relevance of the pragmatic explanation for (9-a) to true-antecedent counterfactuals is that (9-a) gives rise to two identical *hypothetical* scenarios, while true-antecedent counterfactuals involve the identity of a hypothetical and an actual scenario. However, in both cases there is arguably a case of redundancy in the use of a counterfactual, since neither makes a non-trivial contrast between the scenarios they invoke for the evaluation of their consequents.[37]

Arguing for the thesis that this pragmatic rule is what explains the oddness of true-antecedent counterfactuals will take much more work than I can undertake here. But if such a pragmatic explanation turns out also to ground the oddness of true-antecedent counterfactuals, then this will be needed by more and less fine-grained theories alike. But then more fine-grained theories will be more parsimonious in general, because they will have to employ only this pragmatic principle about the use of counterfactuals to explain both the oddness of (9-a) and that of true-antecedent

[37]One test case for this explanation is the felicitous use of true-antecedent counterfactuals as investigated by Anderson (1951). Anderson uses an example like *If Jones had taken arsenic, he would have shown just exactly those symptoms which he does in fact show* to show that sometimes a counterfactual is perfectly fine when its antecedent is true. If the story we have told was correct, then we should have expected this counterfactual to sound bad, since the actual scenario is identical to the one invoked by the counterfactual. But this charge ignores the conditions under which true-antecedent counterfactuals are felicitous. Most notable analyses of felicitous true-antecedent counterfactuals argue that the felicitous use of those counterfactuals involve *making an argument for* their antecedent, e.g. the fact that Jones has taken the arsenic above (see Anderson 1951 and Mandelkern 2020, §4). The question is: why make an argument? One reason is that some of the interlocutors are not aware that the actual situation *is* identical to the hypothetical situation for the counterfactual. Our pragmatic explanation anticipates this. In a context where a true-antecedent counterfactual is felicitous the actual and hypothetical situations are not *known* to be identical by at least some of the interlocutors. But this means that the counterfactual invokes a hypothetical scenario that is not accepted to be identical to the actual scenario at least by some interlocutors. This ensures that the assertion of the true-antecedent counterfactual is not redundant. This seems right, especially because the counterfactual would again feel odd if everyone accepted that John took the arsenic. Our pragmatic explanation paves the way for a non-trivial prediction for the use of true-antecedent counterfactuals, namely that true-antecedent counterfactuals will be felicitous *only when* the identity of the actual and hypothetical situation is not shared by the interlocutors.

counterfactuals. By contrast, less fine-grained theories will have to appeal to both this pragmatic principle and facts about exhaustification to get all of the data right. No matter which way the story goes, it would be nice to confirm or refute whether pragmatic facts about true-antecedent counterfactuals rise and fall with the oddness of (9-a).

9 Conclusion

In this paper I have argued that we need the extra semantic fine-grain at least for antecedents of counterfactuals. I have done this by systematically investigating the predictions of various hyper-intensional theories for two cases. In order to account for the intuitively correct results for these counterfactuals, we seem to need either the extra fine-grain for propositions that more fine-grained theories provide or we need some complicated mechanism for handling Hurford disjunctions in antecedent environments. The latter horn seems to face difficulties in telling a non-arbitrary story about Hurford disjunctions in embedded environments that can systematically explain the intuitive verdicts for our cases. By contrast, more fine-grained theories get the right results without getting entangled in issues faced by less fine-grained theories. This suggests that the extra propositional fineness-of-grain is desired for the right verdicts of the cases considered. The argument of this paper does not spell doom for less fine-grained theories, but it shifts the burden of explanation from more fine-grained theories to less fine-grained ones.

Shifting this burden does not mean that more fine-grained theories semantics does not have their own burden to bear. Embedded and unembedded Hurford disjunctions need to be handled in a principled way and nothing said in this paper can explain why the bad-sounding Hurford disjunctions are bad and the good-sounding ones are good, though footnote 23 might constitute the foundation of such an explanation for Finean truthmaker semantics. It seems to me that more fine-grained theories have a much easier time explaining the correct verdicts for (3-a) and (9-a). Even if this conclusion was not convincing to everyone, I hope to have at least provided interesting cases where the seemingly unrelated literatures on counterfactuals, hyperintensional semantics and Hurford disjunctions converge. Whatever turns out to be the last word on (3-a) and (9-a), it is apparent that we require tools both from hyperintensional semantics and from Hurford disjunctions.

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References

Alonso-Ovalle, L. (2009), 'Counterfactuals, correlatives, and disjunction', *Linguistics and Philosophy* **32**(2), 207–244.

Anderson, A. R. (1951), 'A note on subjunctive and counterfactual conditionals', *Analysis* **12**(2), 35–38.

Chierchia, G. (2006), 'Broaden your views: Implicatures of domain widening and the ''logicality'' of language', *Linguistic Inquiry* **37**, 535–590.

Chierchia, G., Fox, D. and Spector, B. (2009), 'Hurford's constraint and the theory of scalar implicatures: Evidence for embedded implicatures', *Presuppositions and Implicatures: Proceedings of the MIT-Paris Workshop* pp. 47–62.

Ciardelli, I., Groenendijk, J. and Roelofsen, F. (2018), *Inquisitive Semantics*, Oxford University Press.

Ciardelli, I. and Roelofsen, F. (2017), 'Hurford's constraint, the semantics of disjunction, and the nature of alternatives', *Natural Language Semantics* **25**(3), 199–222.

Ciardelli, I., Zhang, L. and Champollion, L. (2018), 'Two switches in the theory of counterfactuals: A study of truth conditionality and minimal change', *Linguistics and Philosophy* (6).

Fine, K. (2012), 'Counterfactuals without possible worlds', *Journal of Philosophy* **109**(3), 221–246.

Fine, K. (2017), 'A theory of truthmaker content i: Conjunction, disjunction and negation', *Journal of Philosophical Logic* **46**(6), 625–674.

Fox, D. (2007), *Free Choice and the Theory of Scalar Implicatures*, Palgrave Macmillan UK, London, pp. 71–120.
URL: *https://doi.org/10.1057/9780230210752_4*

Fox, D. and Hackl, M. (2006), 'The universal density of measurement', *Linguistics and Philosophy* **29**(5), 537–586.

Fox, D. and Spector, B. (2018), 'Economy and embedded exhaustification', *Natural Language Semantics* **26**(1), 1–50.

Gazdar, G. (1979), *Pragmatics: Implicature, Presupposition and Logical Form*, Academic Press.
URL: *https://books.google.com/books?id=CtnWAAAAMAAJ*

Ginzburg, J. (1996), Dynamics and the semantics of dialogue, *in* J. Seligman and D. Westerstähl, eds, 'Logic, Language, and Computation, Vol. 1 (CSLI Lecture Notes 58)', CSLI Publications, pp. 221–237.

Groenendijk, J. and Stokhof, M. (1984), On the semantics of questions and the pragmatics of answers, *in* F. Landman and F. Veltman, eds, 'Varieties of Formal Semantics: Proceedings of the Fourth Amsterdam Colloquium', Foris, pp. 143–170.

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

Hampshire, S. (1948), 'Subjunctive conditionals', *Analysis* **9**(1), 9–14.

Horn, L. (1972), The Semantic Properties of Logical Operators in English, PhD thesis, Yale University.

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

Katzir, R. (2007), 'Structurally-defined alternatives', *Linguistics and Philosophy* **30**(6), 669–690.

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

Khoo, J. (2018), 'Disjunctive antecedent conditionals', *Synthese* **198**(8), 7401–7430.

Križ, M. (2015), Aspects of Homogeneity in the Semantics of Natural Language, PhD thesis, University of Vienna.

Lewis, D. K. (1973), *Counterfactuals*, Blackwell.

Mandelkern, M. (2020), 'A counterexample to modus ponenses', *Journal of Philosophy* **117**(6), 315–331.

Pears, D. (1949), 'Hypotheticals', *Analysis* **10**(3), 49–63.

Roberts, C. (2012), 'Information structure in discourse: Towards an integrated formal theory of pragmatics', *Semantics and Pragmatics* **5**, 1–69.

Romoli, J., Wittenberg, E. and Santorio, P. (2020), Alternatives in counterfactuals: what is *right* and what is *not*. under review.
URL: *https://ling.auf.net/lingbuzz/005921*

Santorio, P. (2018), 'Alternatives and truthmakers in conditional semantics', *Journal of Philosophy* **115**(10), 513–549.

Sauerland, U. (2004), 'Scalar implicatures in complex sentences', *Linguistics and Philosophy* **27**(3), 367–391.

Schlenker, P. (2004), 'Conditionals as definite descriptions (a referential analysis)', *Reseach On Language And Computation* **2**, 417–462.

Simons, M. (2001), 'Disjunction and alternativeness', *Linguistics and Philosophy* **24**(5), 597–619.

Singh, R. (2008), 'On the interpretation of disjunction: Asymmetric, incremental, and eager for inconsistency', *Linguistics and Philosophy* **31**(2), 245–260.

Spector, B. (2007), *Scalar Implicatures: Exhaustivity and Gricean Reasoning*, Brill, Leiden, The Netherlands, pp. 225 – 249.
URL: *https://brill.com/view/book/edcoll/9780080470993/B9780080470993s011.xml*

Stalnaker, R. C. (1968), A theory of conditionals, *in* N. Rescher, ed., 'Studies in Logical Theory (American Philosophical Quarterly Monographs 2)', Oxford: Blackwell, pp. 98–112.

van Kuppevelt, J. (1996), 'Inferring from topics: Scalar implicatures as topic-dependent inferences', *Linguistics and Philosophy* **19**(4), 393–443.

van Rooij, R. and Schulz, K. (2004), 'Exhaustive interpretation of complex sentences', *Journal of Logic, Language and Information* **13**(4), 491–519.

von Fintel, K. (1997), 'Bare plurals, bare conditionals, and only', *Journal of Semantics* **14**(1), 1–56.

Weinberg, J. R. (1951), 'Contrary-to-fact conditionals', *Journal of Philosophy* **48**(1), 17–22.