

Because, focus, and exhaustification*

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*One interesting operator which I am not certain
where to classify is the connective because.
— Partee (1991: 176)*

1 Overview

- It is well-known that *because* is focus-sensitive (Dretske 1972, Partee 1991, von Stechow 1994, Rooth 1999, Schaffer 2005, 2010, Beaver and Clark 2008).
- Focus-sensitivity of *because* is interesting...
 1. as a test case for theories of the semantic effects of focus.
 2. as a test case for semantics of causal claims.
- We will examine one previous account of the focus sensitivity of *because*: free association with focus (Beaver and Clark 2008).
 - We will see evidence against Beaver and Clark’s free association account.
 - Based on idea that *because* does not only express counterfactual dependence, but also the sufficiency of the cause for the effect.
- Alternative: counterfactual dependence is the result of exhaustification.
- Two implementations
 - (1) *Alt* associates with focus
 $\llbracket q \text{ because } p \rrbracket = \text{exh}_{alt} \Box(p)(q) = \Box(p)(q) \wedge \neg \Box(r)(q) \wedge \dots$
 - (2) Lexical restriction to polar alternatives
 $\llbracket q \text{ because } p \rrbracket = \text{exh}_{\{p, \neg p\}} \Box(p)(q) = \Box(p)(q) \wedge \neg \Box(\neg p)(q)$

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2 Data

Focus marking on the cause.

- (3) *Sam ruined Ali's jumper while ironing it.*
- a. *Context A: the jumper is iron-safe cotton. Ali knows how to iron, Sam does not.*
 - (i) Ali: The jumper is ruined because [Sam]_F ironed it.
 - (ii) Ali: # The jumper is ruined because Sam [ironed]_F it.
 - b. *Context B: the jumper is cashmere and ruined by ironing. Both know how to iron.*
 - (i) Ali: The jumper is ruined because Sam [ironed]_F it.
 - (ii) Ali: # The jumper is ruined because [Sam]_F ironed it.

Focus marking on the effect. Beaver and Clark (2008: §3.3), based on Dretske (1972: 417–18). See also Rooth (1999).

Pat had two daughters, one named Bertha; the other was named Aretha and was indispensable to him in his business. He had made a commitment to marry one of the daughters to one of the sons of a man who once saved his life. There were two such sons, the elder son Clyde and the younger son Derek. According to a custom of the society and period, an elder son had to marry before his younger brothers; this was known as seniority. Given the contract, seniority, and the desirability of leaving Aretha free to run his business for him, he figured out that the best thing to do was to marry Bertha to Clyde, and that is what he did.

- (4)
- a. He married [Bertha]_F to Clyde because Aretha was indispensable in the business. (true)
 - b. He married Bertha to [Clyde]_F because Aretha was indispensable in the business. (false)
- (Beaver and Clark 2008: p. 64)

3 Semantics of *because*

- $\Box(p)(q)$ to be a counterfactual modal (in the sense of Kratzer 1981) with restrictor p and nuclear scope q .
- Semantics for *because* based on Lewis (1973), Schlenker (2008) and Beckers and Vennekens (2018):¹

- (5) **Entry for *because*.** $\llbracket q \text{ because } p \rrbracket = 1$ iff $\Box(p)(q)$ and $\neg\Box(\neg p)(q)$.

¹This is a simplification of the semantics presented by Beckers and Vennekens (2018), which is designed to handle cases of overdetermination (i.e. where if the cause hadn't occurred, a backup cause would have produced the effect anyway). We do not consider any cases of overdetermination here, so we may use the simplified semantics in (5).

3.1 Aside: Why wide-scope negation?

(6) **Stronger entry for *because*.** $\llbracket q \text{ because } p \rrbracket = 1$ iff $\Box(p)(q)$ and $\Box(\neg p)(\neg q)$.

- (6) makes incorrect predictions when the cause is stronger than strictly required for the claim to be true (for discussion see [McHugh 2020](#)).

(7) Reyna was born at Royal Bolton Hospital but received a Danish passport because her mother was born in Copenhagen.²

- If Reyna's mother hadn't been born in Copenhagen, Reyna might have still received a Danish passport (e.g. if her mother had been born in Aarhus instead).
- The truth of (7) is compatible with $\neg > \Box$ in (5), but not with $\Box > \neg$ (6).

4 Free association with focus (Beaver & Clark 2008)

Modals have context-dependent parameters in their semantics: a modal base f and an ordering source g ([Kratzer 1981](#)).

(8) $\llbracket q \text{ because } p \rrbracket = \Box_{f,g}(p)(q) \wedge \neg \Box_{f,g}(\neg p)(q)$

4.1 Free association with focus

Account of [Beaver and Clark \(2008: §3.3\)](#), building on [Rooth \(1992\)](#) and [von Stechow \(1994\)](#).

- In general, free variables create focus-sensitivity.
- Examples (list taken from [Beaver and Clark 2008](#)):
 - quantificational adverbs (e.g. *always, usually, mostly, and 8 out of 10 times*)
 - some quantificational determiners
 - generics
 - superlatives
 - counterfactuals
 - modals
 - emotive factive verbs
 - verbs of desire
 - *because-clauses*

Examples of free association with focus:

(9) **Quantificational adverbs** ([Rooth 1985: 164](#))

- a. In Saint Petersburg, officers always escorted BALLERINAS
- b. In Saint Petersburg, OFFICERS always escorted ballerinas

²*The Bolton News*, 12 February 2020. [Original source](#); [permalink](#).

“If some officers ever escorted some non-ballerinas, (9a) is false but (9b) may still be true. If some non-officers ever escorted some ballerinas, (9b) is false but (9a) may be true” (Rooth 1985: 164).

(10) **Quantificational determiner**

- a. Mary reads every book [twice]_F.
(Every [book]_{restrictor} [Mary reads [twice]_F]_{scope})
- b. \Leftrightarrow Every book that Mary reads, she reads twice.

The interaction between free variables and focus is mediated by context. This is a consequence of the following two observations.

1. Focus places constraints on the context.
2. Context determines the values of free variables.

How does focus constrain the context?

(11) **Current Question Rule:** The Current Question must contain at least one true alternative, and contain multiple alternatives which are not resolved as true or false in the common ground. (Beaver and Clark 2008: 36)

- Focus signals a question under discussion (QUD), determined by replacing focused material with a wh-word.
- The Current Question Rule (11) requires the context be compatible with at least two answers to the QUD.
- Heim (1992: 204–5): counterfactuals are interpreted with respect to worlds where the presuppositions of the antecedent are true (see also Ippolito 2003).
- “When it is already in the common ground that Mary attended, that seems to license (60) as much as (59).

(59) If John attended too, ...

(60) If John had attended too, ... ”

4.2 Integration with semantics of *because*

How does Beaver and Clark’s (2008) free association account combine with the semantics of *because*?

(5) **Entry for *because*.** $\llbracket q \text{ because } p \rrbracket = 1$ iff $\Box(p)(q)$ and $\neg\Box(\neg p)(q)$.

- (4) a. He married [Bertha]_F to Clyde because Aretha was indispensable in the business. (true)
- b. He married Bertha to [Clyde]_F because Aretha was indispensable in the business. (false)

- Local accommodation of QUD + Current Question Rule results in presuppositions:
 - He married someone to Clyde in (4a).
 - He married Bertha to someone (4b).
- Modal base $f = \emptyset \cup |\text{presuppositions of antecedent}|$.

4.3 Beaver & Clark's free association account of focus in *because*

4.3.1 Free association with focus marking in the cause

This free association account also makes the right predictions for (3), where focus-marking appears on the cause. Consider (3a), repeated below.

- (3) *Sam ruined Ali's jumper while ironing it.*
- b. Context B: *the jumper is cashmere and ruined by ironing. Both know how to iron.*
- (i) Ali: The jumper is ruined because Sam [ironed]_F it.
- (ii) Ali: # The jumper is ruined because [Sam]_F ironed it.

- The free association account correctly predicts that (3b-i) is true.
 - Focus on *ironed* signals local accommodation of the QUD *Sam Xed the jumper*.
 - By the Current Question Rule, this must contain at least one true alternative, so (3a-ii) presupposes that Sam did something to the jumper.
 - By Heim's (1992) observation that presuppositions of counterfactual antecedents are added to the modal base—applied to the modal in the semantics of *because*—the modal base only contains worlds where Sam did something to the jumper.
 - If the cause had not occurred, i.e. Sam had done something other than ironing to the jumper, presumably the jumper would not have been ruined, so (3b-i) is predicted to be true.³
- Free association account also correctly predicts that (3b-ii) is false.
 - Focus on *Sam* in (3b-ii) signals local accommodation of the QUD *Who ironed the jumper?*
 - By the Current Question Rule, (3a-i) presupposes that someone ironed the jumper.
 - This restricts the modal base in the semantics of *because* to worlds where someone ironed the jumper.
 - If Sam had not ironed the jumper, someone else would have, in which case the jumper would have still been ruined.

³Recall (section 3.1) that the semantics of *because* does not in fact require that in *all* cases where Sam does something else to the jumper, it is ruined. It only requires it to not be necessary that if Sam had done something other than ironing to the jumper, it would have been ruined.

4.3.2 Free association with focus marking in the effect

Free association analysis of (3.30):

- (3.30) If he hadn't married [Bertha]_F to Clyde, Aretha couldn't have continued to run the business.

“The antecedent is congruent to the question: who did he marry to Clyde? The Current Question Rule in [(11)] produces the requirement that he (i.e. Pat) married someone to Clyde. This requirement is typically presupposed by the speaker, and so respected by the modal base of the counterfactual.” (Beaver and Clark 2008: 66)

Beaver and Clark apply the same analysis to the effects of focus in causal claims such as (4), repeated below.

- (4) a. Pat married [Bertha]_F to Clyde because Aretha was indispensable in the business. (true)
b. Pat married Bertha to [Clyde]_F because Aretha was indispensable in the business. (false)

- Focus on *Bertha* leads to local accommodation of the QUD *Who did Pat marry to Clyde?*
- By the Current Question Rule, the QUD presupposes Pat married someone to Clyde.
- This presupposition added to the modal base of the modals contributed by *because*.

- (12) Given that Pat married someone to Clyde, ...
a. If Aretha had been indispensable in the business, Pat would have married Bertha to Clyde, and (true)
b. It is not the case that, if Aretha had not been indispensable in the business, Pat would have married Bertha to Clyde. (true)

- Focus on *Clyde* leads to presupposition that Pat married Bertha to someone.

- (13) Given that Pat married Bertha to someone, ...
a. If Aretha had been indispensable in the business, Pat would have married Bertha to Clyde, and (false)
b. It is not the case that, if Aretha had not been indispensable in the business, Pat would have married Bertha to Clyde. (true)

5 A problem for the free association account

5.1 Sufficiency

Causes are sufficient for their effects:

E because C.

⇒ *C* was sufficient for *E* (with respect to the given circumstantial modal base).

Evidence for sufficiency:

- (14) Bob got the promotion because he knows how to read and write.
Implies the job was easy to get.
- (15) Serena won the tournament because she won the semi-final.
Implies the challenger in the final was easy to beat.
- (16) [Context: see Figure 1] The robot took Road B because it took 1st Street.

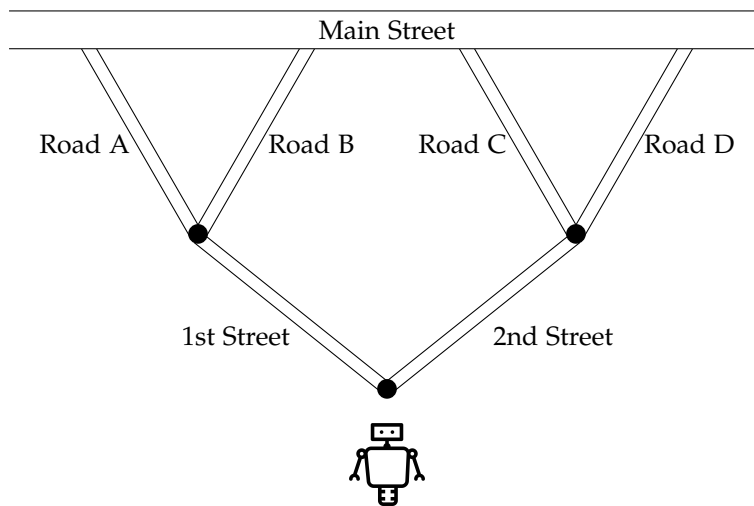


Figure 1: The robot has to get to Main Street, choosing randomly at each fork in the road. Today it took 1st Street and then Road B.

- A robot must get to Main Street, with four ways to do so (see Figure 2).
- Robot would have preferred East Elm Street, but there are roadworks there. If there hadn't been roadworks on East Elm Street the robot would have taken that street.
- The remaining streets—Oak Street, West Elm Street and Maple Street—are each equally good, so the robot decided which one to take at random.
- On this particular day, the robot took West Elm Street.

5.2 Sufficiency and focus

- (17) a. The robot took [West]_F Elm Street because of the roadworks.

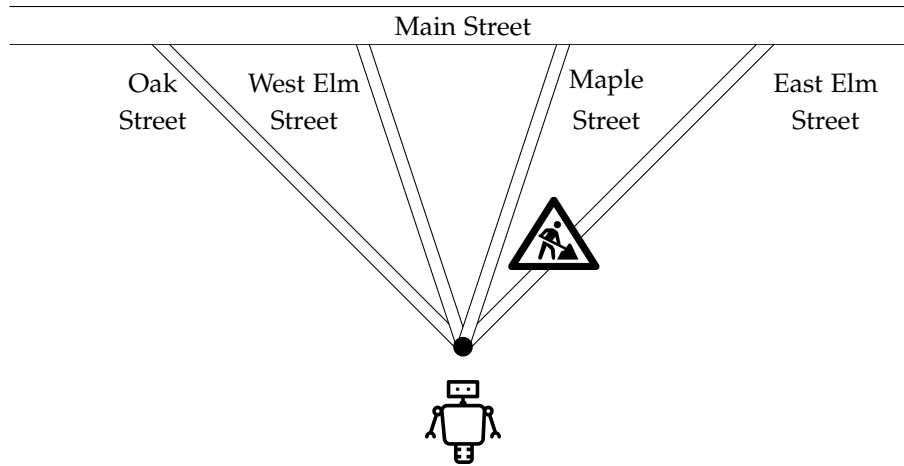


Figure 2: The robot has to get anywhere on Main Street, choosing between the remaining three streets—Oak Street, West Elm Street and Maple Street—at random.

- Keeping in mind that the robot chose among the remaining three streets at random, intuitively, the sentences in (17) are not true.
- The free association account of Section 4.3 predicts the sentences in (17) to be true.
 - Focus on *West* in (17) leads to local accommodation of the QUD, *Which Elm Street did the robot take?*
 - By the Current Question Rule, the speaker presupposes that the robot took some Elm Street.
 - This presupposition restricts not only the actual common ground, but also the modal base of the modals contributed by *because*. Thus focus restricts the modal in the production condition to worlds where the robot took some Elm Street.⁴
- The free association account: (17) is interpreted as if Oak and Maple Streets are not there (Figure 3). Under this restriction, (17) are intuitively true.

5.3 Why does the free association account not apply to *because*?

- One might take (17) to show that the understanding of free association with focus shown in Section 4.3 is mistaken.
- But each of the steps of the free association account of 4.3 is independently motivated. In general, focus can lead to local accommodation of QUDs, that QUDs

⁴One option available to the free association account would be to claim that free association can interact with the modal of the difference making condition but not the production condition. However, since both modal bases are free variables of the same type, we expect that focus should interact with both modals in the same way. There does not appear to be any independent motivation for this constraint.

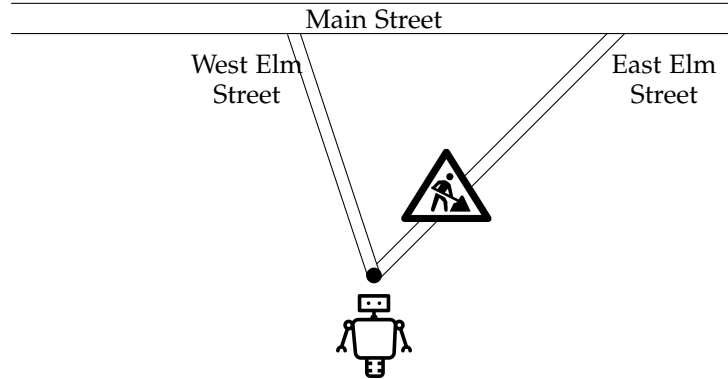


Figure 3: The robot has to get anywhere on Main Street, choosing between the remaining three streets—Oak Street, West Elm Street and Maple Street—at random.

presuppose that one of their answers is true, and that presuppositions can restrict free variables.

- Given that the account makes the wrong predictions with *because*, a more plausible reaction to (17) is that the free association account does not apply in this case.
- Since the free association account worked well for Dretske’s (1972) example of Aretha and Bertha, one might wish to point to some difference between the Aretha–Bertha case and the robot case to explain why free association would apply in the former but not the latter. This would seem difficult, however, since the mechanism of free association with focus is designed to be domain-general.
- A further possibility is that the mechanism of free association is correct but does not apply to *because*.
- One explanation for this is that free association requires the resolution of the free variable in question to be context dependent, whereas the modal base in the semantics of causal claims is not context dependent, but specified lexically.
 - Condoravdi (2002): metaphysical modal base is determined by temporal perspective of the modal.
 - Ippolito (2013) extends this analysis to conditionals.

6 New proposal: exhaustification in *because*

Two ways to go about this:

(18) **Free alternatives.**

$$\begin{aligned} \llbracket q \text{ because } p \rrbracket &= \text{exh}_{alt} \Box(p)(q) \\ &= \Box(p)(q) \wedge \forall r \in IE(\Box(p)(q), alt), \neg \Box(r)(q) \end{aligned}$$

where *alt* associates with the restrictor (*p*).

(19) **Polar alternatives.**

$$\begin{aligned} \llbracket q \text{ because } p \rrbracket &= exh_{\{p, \neg p\}} \Box(p)(q) \\ &= \Box(p)(q) \wedge \neg \Box(\neg p)(q) \wedge \\ &\quad \forall r \in IE(\Box(p)(q) \wedge \neg \Box(\neg p)(q), alt), \neg \Box(r)(q) \vee \Box(\neg r)(q) \end{aligned}$$

6.1 Focus-sensitivity with difference making by exhaustification

- The contribution of the exhaustification operator *exh* depends on a set of alternatives *alt*.
- It is standardly assumed that *alt* is sensitive to focus (Fox and Katzir 2011).
- The exhaustification approach to difference making can account for the focus-sensitivity of causal claims via conventional association with *alt*.

6.1.1 Focus marking in the cause

Let us examine how the exhaustification approach to difference making handles the contrast in (3b).

(3) *Sam ruined Ali's jumper while ironing it.*

b. *Context B: the jumper is cashmere and ruined by ironing. Both know how to iron.*

- (i) Ali: The jumper is ruined because Sam [ironed]_F it.
- (ii) Ali: # The jumper is ruined because [Sam]_F ironed it.

- Following Fox and Katzir (2011), we assume that *alt* is determined by replacing focused constituents with elements from a contextually-given substitution source.
- The difference in focus in (3b) thus results in different alternative sets, which when combined with *exh* produces a truth-conditional effect.

(20) a. $exh_{\{p, \neg p\}} \Box(p)(q) \Leftrightarrow \Box(p)(q) \wedge \neg \Box(\neg p)(q)$

(21) a. $exh_{\{p, r\}} \Box(p)(q) \Leftrightarrow \Box(p)(q) \wedge \neg \Box(\neg r)(q)$

(Assuming *r* is innocently excludable.)

- (22) a. $exh_{\{p, r\}} exh_{\{p, \neg p\}} \Box(p)(q)$
 b. $\Leftrightarrow exh_{\{p, r\}} [\Box(p)(q) \wedge \neg \Box(\neg p)(q)]$
 c. $\Leftrightarrow \Box(p)(q) \wedge \neg \Box(\neg p)(q) \wedge \neg (\Box(r)(q) \wedge \neg \Box(\neg r)(q))$
 d. $\Leftrightarrow \Box(p)(q) \wedge \neg \Box(\neg p)(q) \wedge (\neg \Box(r)(q) \vee \Box(\neg r)(q))$

- (23) a. Ali: The jumper is ruined because Sam [ironed]_F it.
 b. *alt* contains alternatives to ironing the jumper; for example,
alt = {jumper ruined because Sam ironed it,
 jumper ruined because Sam didn't iron it}

- (24) $\llbracket(3b-i)\rrbracket = 1$ iff $\Box(\text{Sam iron jumper})(\text{jumper ruined})$ and $\neg\Box(\neg\text{Sam iron jumper})(\text{jumper ruined})$. ✓
✓

Since both of these conditions are satisfied in the context of (3b), the exhaustification approach to difference-making predicts (3b-i) to be true.

- (25) a. Ali: The jumper is ruined because [Sam]_F ironed it.
 b. *alt* = {jumper ruined because Sam ironed it,
 jumper ruined because Ali ironed it}
- (26) **Free alternatives.** $exh_{\{\text{Sam}, \text{Ali}\}}\Box(p)(q)$
 $\llbracket(3b-ii)\rrbracket = 1$ iff $\Box(\text{Sam iron jumper})(\text{jumper ruined})$ and $\neg\Box(\text{Ali iron jumper})(\text{jumper ruined})$. ✓
✗
- (27) **Polar alternatives.** $exh_{\{\text{Sam}, \text{Ali}\}}exh_{\{p, \neg p\}}\Box(p)(q)$
 $\llbracket(3b-ii)\rrbracket = 1$ iff $\Box(\text{Sam iron jumper})(\text{jumper ruined})$ and $\neg\Box(\neg\text{Sam iron jumper})(\text{jumper ruined})$ and $(\neg\Box(\text{Ali iron jumper})(\text{jumper ruined})$ or $\Box(\neg\text{Ali iron jumper})(\text{jumper ruined}))$. ✓
✓
✗
✗

Since the context establishes that the jumper would be ruined if anyone irons it, the difference-making condition is false and (3b-ii) is predicted to be false.

6.1.2 Focus marking in the effect

- The *exh* operator in (18) is restricted to the cause argument.
- For this reason, association with focus in the effect argument of a causal claim must be derived in another way.
- In this section we show that the contrast in (4), repeated below, is predicted by pre-existing accounts of the focus sensitivity of implicatures.

- (4) a. He married [Bertha]_F to Clyde because Aretha was indispensable in the business. (true)
 b. He married Bertha to [Clyde]_F because Aretha was indispensable in the business. (false)

(28) illustrates how the inferences licensed by an utterance can be sensitive to focus.

- (28) How did the exam go? (Rooth 1992: ex. 16-17)
 a. Well, I [passed]_F. Inference: The speaker didn't ace the exam.
 b. Well, [I]_F passed. Inference: A contextually salient individual failed.

- Fox and Katzir (2011) propose that scalar implicatures are generated by an operator *exh* whose alternatives are determined by replacing focused constituents of the prejacent.
- The contrast in (28) can be predicted by matrix *exh* as follows.

- (29) a. Well, I [passed]_F.
 (i) $alt = \{I \text{ passed}, I \text{ did well}\}$
 (ii) $exh_{alt}[I \text{ passed}] \Leftrightarrow I \text{ passed} \wedge I \text{ did not do well}$
 b. Well, [I]_F passed.
 (i) $alt = \{I \text{ passed}, x \text{ passed}, y \text{ passed}, \dots\}$ for some salient x, y, \dots
 (ii) $exh_{alt}[I \text{ passed}] \Leftrightarrow I \text{ passed} \wedge x \text{ did not pass} \wedge y \text{ did not pass} \dots$

Similarly, matrix *exh* predicts the following implicatures in (4).

- (4) a. He married [Bertha]_F to Clyde because Aretha was indispensable in the business. (true)
 (i) $alt = \{\text{He married Bertha to Clyde because Aretha was indispensable, He married Aretha to Clyde because Aretha was indispensable}\}$
 (ii) $\Box(A \text{ indispensable})(\text{marry B to C}) \wedge \neg\Box(\neg A \text{ indispensable})(\neg\text{marry B to C}) \wedge (\neg\Box(A \text{ indispensable})\text{marry A to C}) \vee \Box(\neg A \text{ indispensable})(\neg\text{marry A to C})$
 b. He married Bertha to [Clyde]_F because Aretha was indispensable in the business. (false)
 (i) $alt = \{\text{He married Bertha to Clyde because Aretha was indispensable, He married Bertha to Derek because Aretha was indispensable}\}$
 (ii) $\Box(A \text{ indispensable})(\text{marry B to C}) \wedge \neg\Box(\neg A \text{ indispensable})(\neg\text{marry B to C}) \wedge (\neg\Box(A \text{ indispensable})(\text{marry B to D}) \vee \Box(\neg A \text{ indispensable})(\neg\text{marry B to D}))$

7 Economy

Exh + free alternatives violates Fox and Spector's (2018) Economy Condition on Exhaustification.

7.1 *Because* in downward entailing environments

Consider *because* in a downward entailing environment, illustrated in (30) and (31), on the reading where negation takes scope over *because*.

- (30) *Context C: Rose pulls a lever, making an oncoming train take a different track. No matter which track the train takes, it reaches the station.*
 The train did not reach the station because Rose pulled the lever. ($\neg > \textit{because}$)
- (31) *Context D: Tom, and then Helen, independently flip a fair coin. Both coins land heads.*
 Helen's coin did not land heads because Tom's coin landed heads. ($\neg > \textit{because}$)

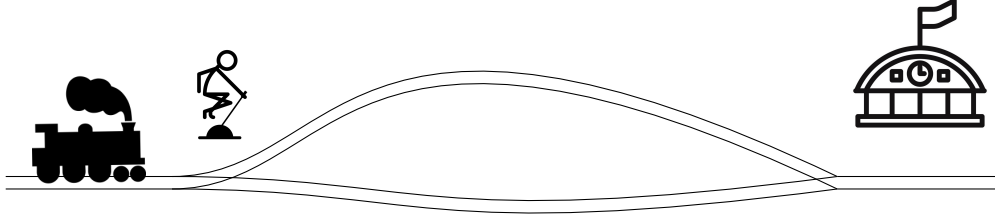


Figure 4: Switching scenario from Hall (2000: p. 205).

7.2 Lexical *exh* in *because* violates economy.

- Intuitively, each sentence is true in its given context, on the $\neg > \textit{because}$ reading
 - Context C satisfies $\Box(p)(q) \wedge \Box(\neg p)(q)$ and D satisfies $\neg\Box(p)(q) \wedge \neg\Box(\neg p)(q)$.
- Table 1 overleaf calculates the predictions for (30) and (31) under the four plausible parses of $\neg(p \textit{ because } q)$ generated by *exh*
 - where $\textit{alt} = \{p, \neg p\}$,
 - and following Fox and Spector (2018: ex. 70), $\textit{alt}' = \{\neg\textit{exh}_{\textit{alt}}[\Box(p)(q)], \neg\Box(p)(q)\}$.
- As Table 1 shows, only $\neg\textit{exh}_{\textit{alt}}[\Box(p)(q)] \Leftrightarrow \neg\Box(p)(q) \vee \Box(\neg p)(q)$ correctly predicts that (30) and (31) are both true.
- This is also the only parse that violates Fox and Spector’s (2018) Economy Condition on Exhaustification.
- As Economy is motivated by general principles of discourse rationality, this suggests that, strikingly, lexical *exh* is not subject to such constraints.

Parse of <i>not ... because</i>	Truth conditions of parse	(30)	(31)	Economy
$\neg\Box(p)(q)$	$\neg\Box(p)(q)$	F ✗	T ✓	✓
$\textit{exh}_{\textit{alt}}[\neg\Box(p)(q)]$	$\neg\Box(p)(q) \wedge \Box(\neg p)(q)$	F ✗	F ✗	✓
$\neg\textit{exh}_{\textit{alt}}[\Box(p)(q)]$	$\neg\Box(p)(q) \vee \Box(\neg p)(q)$	T ✓	T ✓	✗
$\textit{exh}_{\textit{alt}'}[\neg\textit{exh}_{\textit{alt}}[\Box(p)(q)]]$	$\Box(p)(q) \wedge \Box(\neg p)(q)$	T ✓	F ✗	✓

Table 1: Possible parses of *not ... because*, and their predictions for (30), (31) and Economy.

8 Theoretical outlook: comparing the direct and exhaustification approaches to difference making

1. The exhaustification account uses an independently motivated operator (*exh*) to generate the difference making condition.

2. On the direct account, one may wonder why English would evolve to lexicalize a condition almost identical to the result of *exh*—copying the production condition but replacing *p* with its negation and negating the result—and differing only in cases of association with focus.
3. This would be remarkable. Natural language would lexicalise a pragmatic inference, but this process of lexicalisation would be unique to the semantics of causal claims, and not be the result of a more general mechanism.
4. On the exhaustification account, the semantics of causal claims is another instance of grammatical exhaustification.
5. There is evidence from the domains of quantifiers and connectives that *exh* can block natural language from lexicalizing other operators (*nand*, *nall*) already produced by implicatures (Horn 1989, Katzir and Singh 2013). If implicatures are calculated by *exh*, then there is independent evidence that *exh* can block the lexicalization of operators already expressed by *exh*.

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