# The relevance of conditional answers*

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## 1 Conditional Perfection

- Conditional perfection (Geis and Zwicky 1971; de Cornulier 1983; van der Auwera 1997; von Fintel 2001; van Canegem-Ardijns and van Belle 2008; van Canegem-Ardijns 2010) is the pragmatic strengthening of a conditional to a biconditional:

  (1) If you mow the lawn, I will give you $5. (Geis and Zwicky 1971)
  implicature: if you don't mow the lawn, I won't give you $5

  (2) If you pay your contribution, you may participate in the barbecue. (van Canegem-Ardijns and van Belle 2008)
  implicature: if you don't pay, you may not participate

  (3) One can take this seat if one is disabled or one is older than 70. (de Cornulier 1983)
  implicature: one cannot take this seat if one is not disabled and younger than 70

- Many pragmatic accounts for conditional perfection have been proposed over the years (see van der Auwera 1997 for an overview):
  - Q-implicature; classic scalar implicature (e.g. ⟨if, iff⟩, or ⟨'if $p, q$', 'if $p, q$ and if $r, q$', …⟩)
  - R-implicature (Horn 2000: when 'if $p$, $q$' is said instead of just '$q$', 'if $p$' is inferred to be relevant; necessity makes it relevant)
  - exhaustivity (Herburger 2015)
- Recent views on conditional perfection suggest that perfection happens when a conditional answer is interpreted exhaustively (see e.g. Herburger 2015, cf. von Fintel 2001).

  (4) If you work hard you will succeed. (Herburger 2015)
  Exhaustification: ⟨…and only if you work hard you will succeed⟩

### Restrictions on conditional perfection

- Claims have been made in the literature that conditional perfection is not as widespread a phenomenon as sometimes claimed (e.g. von Fintel 2001).

  (5) If this cactus grows native to Idaho, then it is not an *Astrophytum*.
  ↛ If this cactus doesn't grow native to Idaho, it is an *Astrophytum*.

*Section 1 of this talk is based on my Ph.D. dissertation, Tellings (2016), the rest is newer work. I thank Stefan Kaufmann for useful discussion on a number of topics reported on in this talk.

- Many authors have claimed that additional ways to earn $5 in (1) lead to cancellation of conditional perfection:
  - Lilje (1972: 540): in contexts in which there may be "some other way he could earn five dollars, by cleaning up the garage or whatever";
  - van der Auwera (1997): if statements like "If you mow the lawn, I will give you five dollars and if you wash my car I will give you five dollars" are taken to be false;
  - van Canegem-Ardijns and van Belle (2008: 372): "by the addition of an alternative way" to earn 5 dollars, such as "paint the garage";
  - van Tiel and Schaeken (2017: 1128): when "the speaker might also give five dollars if the hearer cleans up the garage or does the dishes".
- I proposed the generalization that conditional perfection does not arise when additional conditions are available (Tellings 2016):

(6) *Generalization*
A conditional 'if $p$, $q$' is not perfected in case additional alternative conditions $p_i$ are salient for $q$ ('if $p_i$, then $q$').

- Recent experimental work (Cariani and Rips, ms.) suggests that this is not enough – the exhaustive answer must furthermore be "in the respondent's interest" (p. 24).
- In unrelated work on **mention-some** vs. **mention-all** answers, it has been proposed that whether an answer is interpreted as mention-some or not depends on "human concerns" underlying the asking of the question (van Rooij 2004), which can be modeled in terms of the *decision problem* the speaker is trying to solve.

⇒ in order to understand conditional perfection better, we need to understand when conditionals are interpreted as *mention-some* answers, and how conditional answers correspond to the speakers' interests.

## 2 Conditional Answers

### Three types of conditional answers

1. **Conditional answers to conditional questions**
A conditional answer can be an answer to a *conditional question*:[1]

(7) A: If Alfonso comes to the party, will Joanna leave? (Isaacs and Rawlins 2008: 276)
B: If he comes, Joanna will leave.

(8) [CQUD: If the weather had been fine, would Jones be wearing his hat?] (Ippolito 2013)
If the weather had been fine, Jones would be wearing his hat.

[1] In the discussion of question-answer pairs, I will call the question-asker A(lice), and the answerer B(ob).

Here we might say that the conditional answer merely mimics the conditional form of the question.[2] Conditional questions and responses to them have been well studied in previous literature (Isaacs and Rawlins 2008; Ippolito 2013), including in recent work on inquisitive semantics (Ciardelli, Groenendijk, and Roelofsen 2018).

Farr (2011) discusses focus patterns in conditionals, distinguishing between 'what-if-$p$' and 'when-$q$' questions.

(9) A: What happens if I sell an eel? [what-if-$p$]
B: If you sell an eel, you get € 2.50.

(10) A: When/Under which conditions do I get € 2.50? [when-$q$]
B: If you sell an eel, you get € 2.50.

Her experimental results indicate that conditional perfection occurs more often in the when-$q$ questions than in the what-if-$p$ questions.

2. **Biscuit conditional answers**
Hesse et al. (2018) study *biscuit conditionals* (or *speech act conditionals*) as answers to polar questions. They give the following example, illustrating positive, negative, and alternative speech act conditionals:

(11) A: Is there a restaurant close to the apartment?

a. B: If you enjoy eating out, there is an Italian restaurant in the street. [PSAC]

b. B: If you enjoy eating out, there is an Italian restaurant in the neighboring quarter. [NSAC]

c. B: If you enjoy eating out, there is an Italian restaurant as well as a food court nearby. [ASAC]

Hesse et al. provide a model based on this specific example of a client asking a real estate agent questions about an apartment. A notion of utility of a requirement is introduced: on the basis of A's question, B infers that 'eating out' is a requirement of A. If the expected utility is above some

[2] There are some issues here regarding the status of the antecedent. While it seems that it merely repeats the antecedent of the question, it cannot be simply left out:

(i) A: If Alfonso comes to the party, will Joanna leave?
a. If he comes, Joanna will leave.
b. Joanna will leave. [≠ If he comes, Joanna will leave.]

The antecedent can be left out, though, if the answer is a particle like 'yes':

(ii) A: If Alfonso comes to the party, will Joanna leave?
a. If he comes, yes.
b. Yes. [= If he comes, Joanna will leave.]

threshold, a SAC is generated with the requirement as its antecedent. The model does not, however, address the issue of why the relevant requirement is expressed by a SAC, and not by some other linguistic construction. For example, it could also be expressed as follows:

(12) A: Is there a restaurant close to the apartment?
B: Ah, you like eating out? Yes, there is an Italian restaurant in the street.

Hesse et al. state that the choice between SACs and other ways to express A's inferred requirement "depends on discourse-dependent and stylistic reasons" (p. 103).

3. **Normal conditional answers**
Normal (non-biscuit) conditionals can be answers to polar questions:

(13) A: Will John come to the party?

a. B: I don't know. / Maybe. [ignorance answer]

b. B: If he finished his work, he will. [conditional answer]

Conditional answers can be natural responses not just to polar questions, but to other types of questions too:

(14) a. Will John come to the party? [polar question]
If he finishes his work, he will.

b. Do you want coffee or tea? [alternative question]
If it is freshly made, I would like coffee.

c. What will John cook for dinner? [*wh*-question]
If he managed to buy parmesan cheese, he will make pasta.

These crucially involve *partial knowledge*: B does not know for a fact whether John will come. However, he is not completely ignorant about the situation, he has *conditional knowledge*: B knows that if John finishes his work, he will come. In this situation, the complete answers 'Yes' and 'No' are ruled out. This is different from the SACs.

I will be concerned with this third type of conditional answers, which are less well studied (but see e.g. Groenendijk and Stokhof 1984: 324 and von Fintel 2001: 17 for some remarks).

The existence of conditional answers as a general response strategy to questions of any type raises the question of when a conditional answer is relevant. And how do speakers choose if there is an option between conditional and non-conditional answers, or between more than one conditional answer?

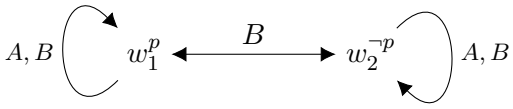
## 3 Relevance of conditional answers

### *3.1 Two factors*

I outline two factors for the relevance of conditional answers.

**Representation of epistemic state of A**

- The relevance of '$p \to q$' depends on how likely B thinks it is that A knows whether $p$: if A knows that $p$, then $q$ follows by modus ponens.
- On one end of the scale is the situation in which B knows for a fact that A knows whether $p$.




(15) [Alice calls to the IT helpdesk]
A: Did I install my printer correctly?
B: If there is a printer icon on the desktop, you installed it correctly.

B does not have access to A's screen, but knows that A does. The conditional answer is relevant here, because together with the truth value of $p$ (whether there is a printer icon on the desktop), by modus ponens, it answers A's initial question.

- In a scenario like this, (15) is mostly equivalent to the following interchange, in which the antecedent of the conditional answer is instead a subquestion:

(15′) [Alice calls to the IT helpdesk]
A: Did I install my printer correctly?
$B_1$: Is there a printer icon on the desktop?
A: Yes.
$B_2$: Then you installed it correctly.[3]

Here, instead of answering by a conditional answer 'if $p$, then $q$', B responds to A's initial question by a question corresponding to the antecedent $p$. A will reason that this question response must be relevant to A's question. B will only ask the question if he has good grounds that A will be able to answer the question.

- At the other end of the scale is a situation like (16). Here B's answer is uncooperative because A does not have a simple way of finding out whether $p$:

(16) A: Did it rain yesterday?
B: If the atmospheric pressure was no higher than 1020 mBar and the squall line progression halted over Western Massachusetts, it did.

[3]Observe that in $B_2$, some sort of anaphoric expression 'then' or 'in that case' is required.

**A second factor: baseline relevance**

- The following conditional answer may be given even though B is aware that A does not know of the progress of John's work.

  (17) A: Is John coming to the party?
  B: If he finishes his work he will.

- This situation is different from (15): here the counterpart of (15′) would not make a felicitous interchange:

  (18) A: Is John coming to the party?
  ?B: Did he finish his work?
  …

- The relevance of the conditional answer in (17) lies in the conditional dependency (cf. van Rooij and Schulz 2019): B informs A that John's coming to the party depends on whether he finishes his work. This counts as a partial answer to A's question.
- It is clear that not all types of conditional knowledge make relevant conditional answers. For example, the following conditional answers to the question 'Will John come to the party?' are non-cooperative:

  (19) A: Will John come to the party?

  a. If John comes to the party, it will be fun.

  b. If John decides to go the party, he will come.

  So a notion of relevance of conditional answers will have to be able to distinguish between different types of conditionals.

### *3.2 Theory: implementing the factors*

- Formally this means that the discourse model should contain as a parameter a set of representations that B has for the knowledge state of A. This gets dynamically updated as the discourse progresses. This can be added to a model like Farkas and Bruce (2010).[4]
- We have seen that Bob's (incomplete) representation of Alice's knowledge state is important. Because, by assumption, Bob knows that Alice knows whether $p$, we can have a (simplified) representation in which Bob entertains two candidates for A's knowledge state:

[4]The authors point out that "representations of [participants'] private doxastic states" may be added to their model (p. 89), but don't provide further details.

(20) state $S_1$: Alice knows that $p$ ($S_1 \models p$)
state $S_2$: Alice knows that $\neg p$ ($S_2 \models \neg p$)
$P_B(S_1) = P_B(S_2) = \frac{1}{2}$

Updating $S_1$ with $p \supset q$ yields a state that entails $q$, and is thus highly relevant to A's initial question $?q$. Updating $S_2$ with $p \supset q$ yields a state that does not entail $q$ or $\neg q$, unless the conditional is perfected: $S_2 + (p \leftrightarrow q) \models \neg q$.

- Note that (15)/(17) have natural perfection readings. This may be due to backward reasoning on the part of A about B's answer only being relevant in $S_2$ if it is perfected.
- Law-like conditionals are not answers to polar questions:

(21) [explaining the rules of a card game]
If you draw a queen of hearts, you lose the game.

- In a case like (5), repeated below, the negative consequent seems to play a role in there being no perfection inference:

(22) [Is this an *Astrophytum*?]
If this cactus grows native to Idaho, then it is not an *Astrophytum*.

### *3.3 Utilities*

**Basic concepts**

- One general way of comparing answers is to measure their *utility* with respect to the *decision problem* that A tries to solve (van Rooij 2004; Benz and van Rooij 2007).
- A decision problem for agent X is a tuple $\langle (W, P), \mathcal{A}, U \rangle$, with $(W, P)$ a set of worlds with probabilities, $\mathcal{A}$ a set of actions, and $U$ the utility function that maps an action $a \in \mathcal{A}$ and a world $w \in W$ to a utility value $U(a, w)$.
- A basic example, from van Rooij (2004):

(23) a. Where can I buy an Italian newspaper?

b.

| $P$ | $\frac{1}{3}$ | $\frac{1}{3}$ | $\frac{1}{3}$ |
|---|---|---|---|
| $W$ | $w_1$ : only @A | $w_2$ : only @B | $w_3$ : @A&B |
| $a_1$: go to A | 6 | 0 | 4 |
| $a_2$: go to B | 0 | 6 | 4 |

- We can then calculated expected utilities:

(24) a. Expected utility of an action: $\mathrm{EU}(a) = \sum_w P(w) \cdot U(a, w)$

b. Expected utility of $a$ given $f$: $\mathrm{EU}(a|f) = \sum_w P(w|f) \cdot U(a, w)$

- Various notions for the *utility value* of a proposition $f$ exist (van Rooij 2004; Benz 2006; Benz and van Rooij 2007). For example, $\mathrm{UV}(f) = \max_i \mathrm{EU}(a_i|f) - \max_i \mathrm{EU}(a_i)$.
- Note that in (23) above, the decision problem is set up in such a way that the actions of going to A or B are in $\mathcal{A}$, so already considered by Alice before asking the question.

### Conditionals

- This problem also appears when a conditional answers a non-conditional question [?q; p → q]. For a polar question $?q$, Alice will only distinguish between $q$-worlds and non-$q$-worlds for her utility function. She is not aware of the relevance of $p$.

(25)

| | w c | w $\bar{c}$ | $\bar{w}$ c | $\bar{w}$ $\bar{c}$ |
|---|---|---|---|---|
| | $w_1$ | $w_2$ | $w_3$ | $w_4$ |
| $a_1$: buy more drinks | 5 | -3 | 5 | -3 |
| $a_2$: do nothing | -5 | 0 | -5 | 0 |

(w = work, c = come)

- Note that updating with the material conditional $[p \supset q] = \{w_1, w_3, w_4\}$ is the same as updating with $[p \vee q] = \{w_1, w_2, w_3\}$ as far as utilities are concerned.

$$\begin{aligned} \mathrm{EU}(a_1, p \supset q) = \mathrm{EU}(a_1, p \vee q) &= 2.3333; \\ \mathrm{UV}(p \supset q) = \mathrm{UV}(p \vee q) &= 1.3333 \end{aligned}$$

- There are independent reasons against taking a conditional answer as a (material) conditional proposition. The consequent of the conditional answers can be a fragment answer:

(26) a. Do you want coffee or tea?
Coffee.
If it is freshly made, coffee.

b. Will John come to the party?
Yes.
If he finished his work, yes.

c. What will John cook for dinner?
Pasta.
If he was able to buy some parmesan cheese, pasta.

This suggests that (at least some) conditional answers should not be considered as conditional propositions, but as conditional speech acts (see e.g. Stalnaker 2011).

### Dynamic updates and utilities

- In a probabilistic dynamic semantics information update goes together with probability revision. Adopting Yalcin's (2012) version, an information state $i$ is a pair $\langle s_i, Pr_i \rangle$, where $s_i$ is a set of worlds, and $Pr_i$ is a probability measure over $s_i$. The update function updates the set of worlds as in standard dynamic semantics, but also updates the probability distribution at the same time.

$$\text{Atomic update}: \quad i[p] = \langle s_i \cap I(p), Pr_i(\cdot | s_i \cap I(p)) \rangle.$$

- Now we can define the expected utility of an action $a$ in an information state $i$ as:

$$\mathrm{EU}(a, i) = \sum_{w \in s_i} Pr_i(w) \cdot U(a, w).$$

For the atomic update $i[p]$ we get:

$$\mathrm{EU}(a, i[p]) = \sum_{w \in s_i \cap I(p)} Pr_i(w | s_i \cap I(p)) \cdot U(a, w)$$

This is quite similar to (24b), but the conditional probability now comes from the dynamic semantics. Informally, the utility of $a$ given $p$ is given by the difference $\mathrm{EU}(a, i[p]) - \mathrm{EU}(a, i)$.

- In Yalcin's framework, the update rule for a conditional is a 'test' (following Gillies):

(27) $i[\phi \to \psi] = i$ iff $i[\phi] = i[\phi][\psi]$, $\langle \varnothing, Pr_i(\cdot|\varnothing)\rangle$ otherwise (Yalcin 2012)

What does this mean for the expected utility of a conditional?[5]

- I suggest this means that A will update her utility function. In (25) we saw that $U$ does not distinguish between $p$-worlds and non-$p$-worlds when it comes to solving the decision problem $?q$. Learning the conditional dependency will lead A to update her utility function $U$ so that it reflects this dependency.

## 4 Conclusion

- Conditional perfection does not arise when alternative conditions are salient, which can be linked to the non-exhaustive interpretation of the conditional as an answer to the question under discussion.
- Conditionals can be answers not only to conditional questions, but to any type of question (polar, alternative, *wh*-question, ...).
- Determining the relevance of conditional answers in terms of utilities requires a speech act perspective: updating with a conditional is a two-step procedure.
- Investigating conditional perfection requires a discourse perspective: the type of question a conditional answers is crucial in whether or not a perfection inference arises.

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[5] The same question applies to other tests, such as 'might': $i[\text{might } p] = i$ iff $s_{i[p]} \neq \varnothing$, otherwise $\langle \varnothing, Pr_i(\cdot|\varnothing)\rangle$. It leads to a more general issue about the "relevance of tests".

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