Interventionist Conditionals: some linguistic applications

Katrin Schulz
ILLC, University of Amsterdam
The Plan

❖ Introduce the interventionist approach to (counterfactual) conditionals

❖ Discuss some linguistic evidence for this approach
Suppose there is a circuit such that the light is on (L) exactly when both switches are in the same position (up or down). At the moment switch one is down (¬S1), switch two is up (S2) and the lamp is off (L).
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(1) If switch one had been up, the lamp would have been on. 
(S1 > L)
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1 Structural Conditionals

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King Ludwig of Bavaria likes to spend his weekends in Leoni Castle. Whenever the king is in the castle, the lights will be on and the royal flag will be up. A traveler watches the castle from a distance and sees that the lights are on. The flag, however, is not up. He says ...

(2) If the flag had been up, the king would have been in the castle.
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It is a simple fact of basic math that if you add two natural numbers that are both even or uneven, the sum will be even. If one of the numbers is even and the other uneven, their sum is uneven. Suppose you are explaining this fact to someone and you wrote down as an example $3 + 4 = 7$. You say …

(3) If the first number had been even, the result would have been even.
1 Structural Conditionals

- similarity approach
- causal network approach

- same logic for recursive systems [Pearl (2000), Halpern (2013)]
- there is a similarity order modelling the causal network approach [Marti & Pinosio (2014)]
- non-recursive models with unique solutions witness divergence [Halpern (2013), Santorio (ms) for a concrete example]
1 Structural Conditionals

- flexible order -> better results in some cases
- can deal with complex formula
- but are the predictions correct - see Ciardelli et al (ms) for criticism

\[(A \lor B) > C \equiv (A > C) \land (B > C) \quad (SA)\]

- cognitive more plausible
- better results for non-recursive systems
The Plan

- Introduce the interventionist approach to subjunctive conditionals
- Discuss linguistic evidence:
  1. Backtracking
  2. Fake Tense
  3. Presupposition projection in conditionals
2 Backtracking
Suppose there is a circuit such that the light is on (L) exactly when both switches are in the same position (up or down). At the moment switch one is down (¬S1), switch two is up (S2) and the lamp is off (L).

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2 Backtracking

Does counterfactual reasoning work by intervention?

**YES.** [Sloman & Lagnado (2005), Waldmann & Hagmayer (2005)]

**NO:** [Rips (2010), Rips & Edwards (2013), Dehghani et al. (2012).]

*But why should it?*

it depends ... on the order of question: [Gerstenberg et al. (2013)]
2 Backtracking

**Solution 1:** yes, intervention, but there is another reading …

- **observing** (conditioning)
  - models epistemic reasoning
  - evidential inferences / backtracking possible

- **doing** (intervention)
  - models “metaphysical” reasoning
  - evidential inferences / backtracking **not** possible
2 Backtracking

Solution 2: intervention is not the right model

• We need a different account, one that allows for backtracking under certain circumstances.
  ‣ Hiddleston’s (2005) minimal models.
Solution 2: intervention is not the right model

- We need a different account, one that allows for backtracking under certain circumstances.
- local models of causal inference (based on ideas in Rips et al. (2013) and Gerstenberg (2013))
Solution 2: intervention is not the right model

- We need a different account, one that allows for backtracking under certain circumstances.
- local models of causal inference

\[
\neg B > \neg D \\
> \neg C? \\
> \neg A?
\]
conclusions:

• When it comes to backtracking there is some evidence for the interventionist approach to counterfactuals.
• But the approach can only explain part of the data for backtracking.
• (And even for the data it explains it might not be the right algorithm.)
• The challenge now is to tear apart the ambiguity solution from the question whether we need a different mechanism to model causal inference.
3 Fake Tense

In English subjunctive conditionals the Simple Past, and also the Past Perfect appear not to be interpreted as semantic past tense or past perfect.

(2) If Peter left in time, he will be in Amsterdam this evening.

(3) If Peter left in time, he would be in Amsterdam this evening.

(4) If Peter had left in time, he would have been in Amsterdam this evening.
3 Fake Tense

In English subjunctive conditionals the Simple Past, and also the Past Perfect appear not to be interpreted as semantic past tense or past perfect.

- Fake Tense occurs in other contexts as well

(5) I wish(ed) I owned a car.
(6) He behaves like he was sick.
(7) Suppose she failed the test.
(8) It’s time we left.
3 Fake Tense

In English subjunctive conditionals the Simple Past, and also the Past Perfect appear not to be interpreted as semantic past tense or past perfect.

- Fake Tense occurs in other contexts as well.
- It occurs in various languages from different language families.

English, French, Latin, Classic Greek, Russian, and Old Irish (Indo-European), Cree (Algonquian), Tonga and Haya (Bantu), Chipewyan (Athabascan), Garo (Tibeto Burman), Nitinaht (Wakashan), and Proto-Uto-Aztecan (in the reconstruction of Steele). [James 1982]
3 Fake Tense

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- Fake Tense occurs in other contexts as well.
- It occurs in various languages from different language families.
- Fake Tense is something a tense language can develop diachronically.
3 Fake Tense

In English subjunctive conditionals the Simple Past, and also the Past Perfect appear not to be interpreted as semantic past tense or past perfect.

(2) If Peter left in time, he will be in Amsterdam this evening.  ➞ indicative conditional

(3) If Peter left in time, he would be in Amsterdam this evening.  ➞ simple past subjunctive  SPC

(4) If Peter had left in time, he would have been in Amsterdam this evening.  ➞ past perfect subjunctive  PPC
The Past-as-Past approach

Assumptions

• conditionals are quantificational structures
• subjunctive conditionals explore historical alternatives (Thomason).

Central Idea/Reasoning

- we observe that subjunctive conditionals can be counterfactual
  - the historical accessibility relation needs to be evaluated at some past time point
  - this is the function of the Simple Past in SPCs
3 Fake Tense

The Past-as-Past approach

- Subjunctive conditionals explore historical alternatives (Thomason).
- The simple Past shifts the temporal variable of the accessibility relation into the past.
3 Fake Tense

Problems

- The temporal backshift is not always needed: what about subjunctive conditionals about the future? (Actually it’s even worse: backshift makes bad predictions in these case.)
- The temporal backshift is not always possible: what about generic counterfactuals/counterpossibles?
- We need additional similarity restrictions (Morgenbesser cases) …
- … and an answer to this problem might make the backshift superfluous.
3 Fake Tense

Problems

- Even then we need additional similarity restrictions (Morgenbesser cases) …
3 Fake Tense

Solution

Replace quantification over historical alternatives with intervention (in the antecedent).
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3 Fake Tense

Solution

Replace quantification over historical alternatives with intervention (in the antecedent).

- no need to refer to the past to make counterfactual statements about the utterance time true
- no need of temporal reference for generic/counterpossible conditionals
- the Morgenbesser cases come out nicely
- … but there might be a problem …
What if the intervention violates conceptual/metaphysical laws?

"This is not a proper model!!!"

3 Fake Tense

Challenge

- What if the intervention violates conceptual/metaphysical laws?
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- What if the intervention violates conceptual/metaphysical laws?
We do actually seem to care about these cases of model violations:

**Observation** (Ippolito 2013, p. 55)

“SPCs can in principle be counterfactual, but if the particular eventuality in the antecedent has already happened in the past or if any presupposition of the antecedent is inconsistent with the actual history at the utterance time, then a SPC is infelicitous.”

[... and a PPC needs to be used.]
Intervention doesn’t always happen in the antecedent.

Sometimes we need to change the past (by intervention) to make the antecedent true (to avoid violations of conceptual/metaphysical laws).

We use the Perfect in PPCs to express this past-shift of the intervention.
Intervention can be restated in terms of a similarity relation.

We can extend this order to indexes, consisting of an event structure and a time, and select for the minimal indices that make the antecedent true (with model restrictions on proper event structures).

\[
\text{Int}(i_0, A) = \{ i \mid i \models A \land \neg \exists i'(i' \models A \land i' < i) \}
\]

The selected event structures will work with the latest possible intervention that makes the consequent true - as intended.
Past-as-Past for the Simple Past is out, but there are other options (Iatridou 2000, Schulz 2014).

The order on event-structures is difficult to define, because it involves answering questions involving the relation between causation, time and event-structures.

Discussion

★ Past-as-Past for the Simple Past is out, but there are other options (Iatridou 2000, Schulz 2014)

★ The order on event-structures is difficult to define, because it involves answering questions involving the relation between causation, time and event-structures.
4 Presupposition Projection

What is a presupposition?

- $p$ presupposes $r$ if from the utterance of $p$ one can reasonably infer that the speaker takes for granted $p$, i.e. $c \vDash r$ (and there is a presupposition trigger for $r$ in $p$).

What about the presuppositions of complex sentences?

- $p$ presupposes whatever is required to ensure that all of $p$’s constituents have their presuppositions locally entailed in any context.

What if a presupposition is not satisfied?

- If a presupposition $r$ is not satisfied in the context $c$ where $p$ is uttered, the context is strengthened minimally as to support the presupposition.
If C presupposes r in a context c and c+A ⊨ r, then the conditional A > C does not presuppose r in c.

observation (Goebel, talk, 2017)

- There needs to be a causal dependency between antecedent A and presupposition r.

... but empirical testing necessary
Zeevat (2016)

causal and identity inference generalisation (CIG)

Whenever one encounters an LSR-type exception to the cumulative hypothesis, then there is a causal or identity inference in the text “A. P.” where A is the antecedent of the conditional and P the presupposition of the trigger in the consequent.
local satisfaction for conditionals (LSC)

- If C presupposes r in a context c and c+A ⊨ r, then the conditional A > C does not presuppose r in c.

preliminary solution

use an interventionist notion of entailment

- only the antecedent and its effects can support the consequent
- evidential inference are out

One would need an interventionist approach to indicative conditionals. (But why not, at least for talk about the future?)
observation

- Maybe it’s actually not causal dependence, but something else …
another preliminary solution (vRooij & Schulz):

- use *contingency* from Behavioral Psychology to capture the dependency between antecedent and consequent of conditional sentences

- \( A \rightarrow C \) is assertable (simple version) iff

\[
P(C \mid A)(P(C \mid A) - P(C \mid \neg A)) \text{ is high for } C.
\]

weighting \( P(C \mid A) \)
with contingency
4 Presupposition Projection

another preliminary solution:

- A \textit{t-supports} C iff

\[ P(C \mid A)(P(C \mid A) - P(C \mid \neg A)) \] is high for C.

- It explains the observations.
- But empirical testing is needed.
5 Conclusions

- The interventionist approach is not the whole story about subjunctive conditionals (backtracking).
- But the concept of an intervention (even though we might have to model it differently) captures something important about the way we interpret conditional sentences (fake tense).
References

- Ciardelli et al. (ms.). Two switches in the theory of counterfactuals.
- Zeevat (2016). Local satisfaction explained away. SALT 26: 264-283