THE HAMBURGER CASE

or: how to account for counterfactuals - again

Katrin Schulz
ILLC/UvA
THE TOPIC

Our case study:

• conditional sentences
• the assumption that there are two different types of conditional reasoning: an epistemic type (often associated with indicative conditionals, and an metaphysical type (often associated with counterfactuals)

“... they are logically distinct species.” (Adams, 1970); “

“Therefore there really are two different sorts of conditional; not a single conditional that can appear as indicative or as counterfactual depending on the speaker’s opinion about the truth of the antecedent.” (Lewis, 1973).
The duchess has been murdered, and you are supposed to find the murderer. At some point only the butler and the gardener are left as suspects.

At this point you believe

(1) If the butler did not kill her, the gardener did.

Still, somewhat later after you found out convincing evidence showing that the butler did it, and that the gardener had nothing to do with it you get in a state, in which you will reject the sentence

(2) If the butler had not killed her, the gardener would have.
THE TOPIC

question:
• Do we need to distinguish two types of conditionals?

answer:
• No! There is only one conditional, one interpretation mechanism.

Why?:
• There is cross-linguistic no evidence for a distinction of two types of conditionals.
• It’s certainly not the indicative/subjunctive distinction.
THE CHALLENGE FOR TODAY

You enter a town which you believe to have just two snackbars, A and B. There you see a man walking along the street with a hamburger, and you form the belief that at least one of the snackbars is open. At the same time you form the belief that if A is not open then B is. Now as you approach one of the snackbars, it happens to be A, you see that the lights are on there. As a result you form the belief that that A is open. You also believe:

* If A had not been open, B would have been open.
THE CHALLENGE FOR TODAY

scenario 1:
facts: A open; man with hamburger
counterfactual: ¬ A open > B open is true
THE CHALLENGE FOR TODAY

• account for the hamburger case
• in my favourite account of counterfactuals
  • (Schulz ’11)

plan:
• Motivate and introduce Schulz ’11
• account with this approach for the hamburger case
SIMILARITY APPROACH - IF NEEDED
A SEMANTICS FOR COUNTERFACTUALS

motivation:

• similarity approach is too general, we need to be more specific on what we can keep when travelling to hypothetical scenarios
• Lewis: keep laws, if possible
• Veltman: keep those singular facts from which, given the laws, everything else can be derived
• however, this leads to problems: Lifschitz example
Lifschitz example

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 ($\neg S_1$), switch two is up (S2) and the lamp is off (L).

(4) If switch one had been up, the lamp would have been on.  
      ($S_1 > L$)
motivation:

• similarity approach is too general, we need to be more specific on what we can keep when travelling to hypothetical scenarios
• Lewis: keep laws, if possible
• Veltman: keep those singular facts from which, given the laws, everything else can be inferred
• however, this leads to problems: Lifschitz example
  ➔ we need a different notion of inference; an asymmetric notion of inference
solution 1:
• Pearl 2000 (and others)

objection:
• the notion of inference is not asymmetric, the asymmetry is forced by the selection of the input
• very clear distinction between epistemic reasoning (probabilistic update) and causal reasoning (see example); for counterfactuals Pearl focuses on the second
solution 2:
• Logic Programming (Schulz 2011)

first: asymmetric notion of inference
second: application to counterfactuals
A CAUSAL NOTION OF CONSEQUENCE

The operator \( \tau_P \) associated to a program \( P \) is a function on the set of three-valued models. For every proposition letter \( p \) the value \( \tau_P(M)(p) \) is defined as follows.

1. If \( M(p) \neq u \), then \( \tau_P(M)(p) = M(p) \).
2. If \( M(p) = u \), then
   a. \( \tau_P(M)(p) = 1 \) if there is a clause \( p \leftarrow \Phi \) in \( P \) such that \( M(\Phi) = 1 \).
   b. \( \tau_P(M)(p) = 0 \) if there is a clause \( p \leftarrow \Phi \) in \( P \) and for all such clauses \( M(\Phi) = 0 \).
solution 2:

- Logic Programming (Schulz 2011)

advantages:

- causal premise semantics
- no manipulation of laws necessary - you just allow for exceptional facts
- easily extensible with abnormality reasoning
- reasoning via finite constructions

disadvantages:

- restricted expressibility
- no (easy) probabilistic extension
- rather strong predictions for independent variables
scenario 1:
facts: A open; man with hamburger
counterfactual: \( \neg A \text{ open} > B \text{ open} \) is true

challenges:
• we need to allow for things that are unknown
  ➔ introduce a forth truth-value \( x \)
• we need to allow for abduction (reason to an explanation) if things are unknown
  ➔ extend immediate consequence operator with clause for abduction
• we need to redefine the notion of a ground as \textit{actual} ground
  ➔ use Pearl’s notion of an actual cause
solution:
• Logic Programming with abduction

advantages:
• as before, plus:
• allows for partial knowledge

disadvantages:
• as before, in particular:
• rather strong predictions for independent variables
What if somewhat later you find out that snackbar B is in fact closed. Would you still believe:

*If A had not been open, B would have been open.*

If so, why this rather than:

*If A had not been open, we would not have seen the man with the hamburger.*