Comments on Kaufmann

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The Plan

1. Some Comments on the Proposal
2. Experimenting on Probabilities
3. There are no conditionals

1 Some Comments on the Proposal

1.1 A Freakish Disease

Scientists have made new discoveries about a strange low-level disease. The disease is highly correlated with a particularly gene. 25% of the population has this gene. 90% of those with the gene develop the disease. Among the 75% majority, on the other hand, only 10% develop the disease. There is also a mysterious skin rash which can only occur in people who have the disease. Among the people who have the gene and develop the disease, 90% show the rash. Among the people without the gene that develop the disease, only 10% show the rash.

Question Quick – how likely is it that if Peter has the disease, he shows the rash?

Question Peter does not have the disease, fortunately. How likely is it that if he had had the disease, he would have shown the rash?

Outcome	Probability	D$\dashrightarrow$S	D$\dashrightarrow_G$S
GDS	0.25×0.81=0.2025	1	1
GD$\overline{\text{S}}$	0.25×0.09=0.0225	0	0
G$\overline{\text{D}}$	0.25×0.1=0.025	**0.3**	**0.9**
$\overline{\text{G}}$DS	0.75×0.01=0.0075	1	1
$\overline{\text{G}}$D$\overline{\text{S}}$	0.75×0.09=0.0675	0	0
$\overline{\text{G}}\overline{\text{D}}$	0.75×0.9=0.675	**0.3**	**0.1**

Conditional Probability P(S|D) = P(D$\dashrightarrow$S) = **0.7**

Local Reading P(D$\dashrightarrow_G$S) = **0.3**

1.2 Caution

One is tempted to judge the following as plainly false:

(1) If Peter has the disease, he shows the rash.

It seems just categorically false that there is the strong connection between the disease and showing the rash.

The obvious response is that this is a confusion of the truth-conditions of the conditional and the assertability conditions. You shouldn't assert (1) unless your subjective probability for it (= the conditional probability P(S|D)) is sufficiently high, and plausibly 0.7 is not high enough (and certainly 0.3 would not be high enough).

Morton [8] (and others) have pointed out that the threshold must be contextually variable. In lottery cases (like Stefan's marbles), we seem to have very high thresholds for assertability.

(2) If I buy a ticket for the Big Game, I will lose.

This has an incredibly high conditional probability. Nevertheless, it appears unassertable (and to the naked eye, plainly false).

One way to control for the interference from intuitions about assertability is to make the sentence not be used in a straightforward assertion. For example:

(3) Let me make a completely wild guess: if Peter has the disease, he shows the rash.

1.3 A Question about the X Factor(s)

- The local intepretation of conditionals, with its heavier weight to certain selected facts that are causally independent of the antecedent, seems very much like it implements a minimal change or nearness semantics for conditionals.
- Where in the family of minimal change semantics does it fall, formally? This may already be answered in Stefan's published papers [4, 5] on this proposal but maybe we can touch on this here today.

2 Experimenting on Probabilities

I'm not a psychologist – I don't even play one on TV. But here are some comments on what is presented as the crucially new part of the paper.

- Stefan plans to use experiments on judgments about the probability of conditionals as evidence for contextual variability of the interpretation of conditionals. This means that the experiments will face both the vagaries of context and the well-known issues with probability judgments.
- The experimental set-up doesn't make clear which hypotheses are in the running and being tested. Is the competing hypothesis that subjects will (or at least, should) zero in on the conditional probability? If so, what would the response from a defender of that hypothesis be? Presumably, that there is too much noise in the experiment.
- Tversky & Kahneman (who won the Nobel Prize for exploring how screwed up people's probability judgments are) demonstrated the "conjunction fallacy" [10]:

  (4) Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations. Which of these two alternatives is more probable?

  a. Linda is a bank teller.
  b. Linda is a bank teller and is active in the feminist movement.

  An astonishing number of people say that (b) is more probable than (a).
- Would we want to conclude that this reveals that the semantics for "and" is different from what we thought it was? Well, some researchers have tried that tack but most researchers go different ways.

- It is far from established that people's probability judgments are appropriately in tune with the semantics of the sentences whose probability they are asked to judge.
- There is reason to think that many "fifty-fifty" responses are really "don't know" responses in disguise [2]. If we add at least some of them to Stefan's "don't know" category, we get a better idea of how challenging his task is for subjects.
- Stefan mentions that subjects reported wanting to be able to report a judgment of "false". See our meditation above about the interference from intuitions about assertability. My suspicion is that it is quite plausible that at least some, if not many, of the "unlikely" judgments are judgments about the unassertability of the conditional (which a naive subject would not tell apart from a judgment of falsity). So, there may be an overestimate of the "unlikely" response, since that might conflate judgments of unacceptability.
- It is unclear to me why subjects weren't offered a continuous scale (either numerically from 0 to 1, or some graphic way – see Fischhoff *&* Bruine De Bruin for ideas) instead of the limited choices that they were offered. This might have biased the experiment towards the result that Stefan wants.
- An alternative set-up might be to ask which of the following is more probable: if A, C or if A, $\overline{\text{C}}$?
- It is unclear to me why subjects were told not to compute the numbers.
- Use of frequency numbers instead of probabilities often helps with performance problems [3]:

(5) Among 1000 people, 250 have the gene, 750 do not. 225 of the ones with the gene get the disease. 75 of the ones without the gene get the disease. 202 of the ones with the gene and the disease show the rash. 7 of the ones without the gene that have the disease show the rash.

   a. How likely is it that if a person has the disease, they will show the rash?
   b. Peter does not have the disease. How likely is it that he would have shown the rash if he had had the disease?

- Using artificial scenarios like the marbles may depress people's performance. More naturalistic scenarios may give a truer picture of how people evaluate conditionals.

3 There are No Conditionals!

The usual reactions to Lewis' proof that the conditional probability P(C|A) will not consistently equal the probability of a conditional proposition A→ C:

- Conditional sentences are exempt from the principle that their assertability goes with the probability that their truth-conditions are satisfied. Instead their truth-conditions are whatever they are (e.g. material implication) and their assertability goes with conditional probability. ⇒ Lewis, Jackson.
- Conditionals do not have truth-conditions, do not express propositions. Hence, the conditions on their felicitous use cannot go by the probability of their truth. That is at least part of the reason why usability goes by conditional probability. This is a more radical and more principled version of the first reaction. ⇒ Edgington, Bennett, …

The second reaction is almost right, but both overstates and understates the case:

- Some "conditional sentences" do have truth-conditions.
- Under probability expressions not only does the conditional not have truth-conditions, there isn't even a conditional there in the first place!

Edgington [1] comes close to the truth when she says: "Phrases of the form 'conditional X' are products of the concept X and the concept of conditionality. I advocate a uniform account of the role of an 'if'-clause across the board."

Lewis [7] very much bye the bye makes the suggestion that under probability expressions we do not have an embedded conditional: "The *if* of our restrictive *if*-clauses should not be regarded as a sentential connective. It has no meaning apart from the adverb it restricts. The *if* in *always if* …, …, *sometimes if* …, …, and the rest is on a par with the non-connective *and* in *between* … *and* …, with the non-connective *or* in *whether* … *or* …, or with the non-connective *if* in *the probability that* … *if* …. It serves merely to mark an argument-place in a polyadic construction."

Kratzer [6]: "The history of the conditional is the story of a syntactic mistake. There is no two-place *if* … *then* connective in the logical forms of natural languages. *If*-clauses are devices for restricting the domains of various operators."

In other words: *there are no conditionals*, just constructions involving an *if*-clause and an operator that the *if*-clause restricts.

When an *if*-clause occurs in the same structure as a probability operator, it is naturally read as restricting that operator, giving rise to a claim about conditional probability (assuming that the operator can be analyzed as a two-place operator, expecting a restriction – treatments of probability like that exist).

It is easy to see that a surface string can receive one parse and interpretation when occurring on its own and a very different one when occurring embedded:

(6) a. A randomly coin comes up heads.
    b. The probability that a randomly tossed coin comes up heads is fifty-fifty.

(7) a. On a given day, the Red Sox win.
    b. The probability that on a given day the Red Sox win is about 60%.

Kratzer conjectures that bare indicative conditionals are constructions where the *if*-clause restricts a covert epistemic necessity modal. (This seems quite consistent with the analysis of indicative conditionals proposed by Stalnaker, see also more recently Nolan [9]). Now, note that an overt epistemic conditional resists embedding under probability operators:

(8) a. If she threw an even number, it must have been a six.
    b. ?The probability that if she threw an even number it must have been a six is 1/3.

There are three reasons why structures where a conditional apparently occurs under a probability expression are (almost) always parsed as not involving an embedded conditional with a covert operator but as having the *if*-clause restrict the probability operator: (i) positing covert operator is a last resort strategy, (ii) the probability operator would like to be restricted, (iii) epistemic modals resist embedding under probability operators.

Objection: If the following two structures do not share a constituent corresponding to the "conditional", then how come they are felt to be talking about the same thing?

(9) a. If she is not in her office, she must be at home.
    b. Actually, it is not very likely that she is at home if she is not in her office.

Reply: because they both talk about possible scenarios in which she is not in her office. Compare:

(10) a. Every student smokes.
     b. Actually, very few students smoke.

Both of these make quantificational claims about students and thus talk about the same thing, without sharing a mythical constituent "students smoke".

Coda: Embedded Conditionals

- Stefan's analysis tailors the semantics of conditionals so as to explain their embedding under probability operators.
- But if I'm right, that situation doesn't actually arise normally.
- What about other embedded occurrences?
  - Stefan argues in his *L&P* paper that his account correctly covers cases of conditionals occurring as the consequent of another conditional.
  - But what about other cases of embedding?

    (11) Since the number will be a six if it is even, we have a good chance of winning.

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