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Inference and Epistemic Conditionals

Nobuo Nakashima

1. Epistemic Conditionals

The purpose of this paper is to elucidate semantico-pragmatic properties of conditionals like these:

(1) a. If Mary typed his thesis, she loves him.
   b. 'If the sightings are real,' Voyless aid quietly in Tarrance’s face, 'we’re wasting our time here.’
   \[ \text{J. Grisham The Firm} \]
   c. Things were getting serious. If Evans identified Mrs Templeton and Mrs Nicholson as one and the same person matters were going to become difficult.
   \[ \text{A. Christie Why Didn’t They Ask Evans?} \]

Sweetser (1990) refers to sentences like these as epistemic conditionals. They differ from the following sentences, which she calls content conditionals, in some essential respects:

(2) a. If Mary loves him, she will type his thesis.
   b. If light cannot escape from an object, this object appears black from the outside. Hence the name “black hole.”
   c. If I went to a new place I was with Frans or my mother or father and felt no threat.

\[ \text{T. Chevalier Girl With A Pearl Earring} \]

While content conditionals represent the causal links between situations at the content level, epistemic conditionals are concerned with the validity of inferential reasoning processes involving both the propositions expressed in the protases and those expressed in the apodoses.

For example, conditional (1a) expresses the idea that, whenever a speaker knows that Mary typed her thesis, that speaker concludes that she loves him. In other words, in (1a), the knowledge of the truth of the premise proposition expressed in the protasis is a precondition for concluding the truth of the proposition expressed in the apodosis—the knowledge causes the conclusion. Thus, unlike a content conditional, the connecting link in (1a) is between the epistemic states or situations. Also the linking relation in (1a) appears to be in the reverse direction; the state of affairs described in the apodosis is causally prior to that described in the protasis. This is contrasted with the causal relation in (2a), where the loving is a precondition for the typing.

If-clauses in epistemic conditionals are both syntactically and semantically fairly independent of their matrix clauses. To begin with, they can have the independent or deictic tense, as shown in:

(i) Deictic present tense:

(3) a. If you’ve been travelling all night, you probably need a rest.
   \[ \text{Hornby (1975: 229)} \]
   b. If it is raining (now), the lawn will be too wet to play on this afternoon.
   \[ \text{Haegeman (1983: 147)} \]
   c. 'Forgery,' said Frankie thoughtfully. 'That letter from you, Bobby, was remarkably well done. I wonder how he knew your handwriting?'
   \[ \text{'If he’s in with the Caymans he probably saw my letter about the Evans business.'} \]
   \[ \text{A. Christie Why Didn’t They Ask Evans?} \]

(ii) Deictic past tense\ (Hornby (1975: 229–230):

(4) a. If he arrived only yesterday, he’s unlikely to leave today.
   b. If that was what he told you he was telling lies.
   c. If she promised to be here she’ll certainly come.

(iii) Deictic future tense:

(5) a. If Claude will be here tomorrow, there’s no need to call him now.
   \[ \text{Declerck (1984: 286)} \]
   b. If the camp will start soon, it will enjoy some good
The peculiar behavior of epistemic conditionals reflects the fact that the grammatical mechanism utilizes peculiar pragmatic or semantic tools for their construction. In the following two sections, I will investigate how the mechanism works in the use of those conditionals.

2. Echoic Uses in Epistemic Conditionals

As Declerck and Reed (2001) point out, protases in epistemic conditionals are ‘always echoic in one sense or another.’ Consider:

(12) a. ‘... She thinks he’s in love with Sylvia. Well, as to that, of course, I can’t say.’
    ‘If she thinks so, she’s probably right,’ interrupted Frankie.
    ‘A woman would know all right about her own husband.’

a. ‘... She thinks so’ and ‘it is missing’ echo the preceding statements ‘She thinks he’s in love with Sylvia.’ and ‘... the key was missing.’ respectively. Declerck and Reed (2001: 83) further say that protasis clauses ‘may also be echoes of an internal or mental proposition.’ For example:

(13) (watching the clock) If it’s a already 8.45, I’d better hurry up.

Declerck and Reed also claim that the speaker takes it for granted that the fulfillment of the condition expressed in a if-clause is a fact, that is, (though not necessarily committed to its truth) she is willing to assume the condition as true\(^1\). Therefore the echoes in (12) and (13) are not the same as reporting utterances like that in (14):

(14) Mary: What did John say?
    Joan: ‘I’m a nice person.’

In reporting John’s utterance, Joan does not express any
attitude toward the truth of what he said. By contrast, the speakers in (12) and (13) assume some attitude toward the truth of the protasis clauses being echoed. In other words, the echoed protases are playing a dual role in the sense that the speaker does not only echo someone else’s or their own utterance or statement, but also express some epistemic attitude toward the echoed propositions. In this respect, they are similar to repeated utterances. Consider:

(15) Foley: ... You better stop eye-ballin’ me boy! You’re not worthy enough to look your superiors in the eye! Understand?

Perryman: Yes, sir.

Foley: Now, every time I say, “Understand?” I want the whole group to say, “Yes, sir!”

Group: Yes, sir!

Foley: ... (yells) Understand?

Group: ... (shouts) Yes, sir!

From the movie An Officer and a Gentleman

In his underlined utterance ‘Understand?’ Foley is repeating his preceding utterance and, at the same time, asking the group whether they understand what he says. In the next example, the captain recites the pledge for a commencement as all the class raises their hands and repeat after him:

(16) Captain: Class Fifteen Eighty-One, raise your right hand and repeat after me.

I do solemnly swear...

Class: I do solemnly swear...

Captain: ... that I will support and defend the Constitution of the United States of America...

Class: ... that I will support and defend the Constitution of the United States of America...

ibid.

The captain’s original utterance is just demonstrating a specimen of a pledge and does not perform any illocutionary act of pledging. Yet the class are not only mimicking his utterance, but also performing a genuine pledge. In the following example, the repeated utterance is assertive:

(17) And he went back to meet the fox.

‘Good-bye,’ he said.

‘Good-bye,’ said the fox. ‘And now here is my secret: It is only with the heart that one can see rightly; what is essential is invisible to the eye.’

‘What is essential is invisible to the eye,’ the little prince repeated, so that he would be sure to remember.

A. de Saint-Exupéry The Little Prince Tr. by K. Woods

In repeating the fox’s utterance, ‘what is essential is invisible to the eye,’ the prince performs an assertive speech act, committed to the truth of the proposition it expresses.

Both the echoed protases and repeated utterances are of the use of quotation that Recanati calls a hybrid. Consider:

(18) That boy is really ‘smart’.

The speaker of (18) uses the word smart ‘while at the same time implicitly ascribing that use to some other person... whose usage [she] is blatantly echoing or mimicking’. Thus utterance (18) entails the following obtained by removing the quotation marks:

(19) That boy is really smart.

In (18), the quotation is local and only the limited portion of the utterance is quoted. In the cases of (12), (13), (15), (16) and (17), however, the quotation has the whole utterance within its scope and the whole sentence is used to depict another usage while doing its normal semantic work.

3. Closed Quotations in Epistemic Conditionals

Recanati (2001) differentiates between two types of quotation: the open and closed type. Let us look at his examples:

(20) Stop that John! ‘Nobody likes me’, ‘I am miserable’ ... Don’t you think you exaggerates a bit?

(21) John keeps crying and saying ‘Nobody like me’. In (20), quotations ‘Nobody likes me’ occurs on its own, not as part of a construction. In (21), it fills a slot in the sentence ‘John keeps crying and saying ___’, and serves as a singular term. Recanati says that the former is open and, by contrast, the latter is closed.

The echoed clause ‘the light is on’ in epistemic conditional (10), repeated here for convenience, seems to be closed; it fills a slot in the conditional ‘If ____ John must be home’, though it may not serve as a singular term:

(10) If the light is on, John must be home.
Namely we may say that the protasis clause is quoted, as in:

(22) If ‘the light is on’, John must be home.

To make it clear how the quoter is related to the quoted clause in (22), consider the example Noh (2000: 19) gives as a mixed quotation:

(23) The teacher said, “I will use ‘the rod of love’ to make you learn better.”

In the direct speech (23), the speaker reports what the teacher, say Mary, uttered, i.e., “I will use … you learn better.” In that quoted utterance, she used the words the rod of love and, at the same time, may have quoted them. Thus the phrase the rod of love is doubly quoted, that is, by Mary and then by the speaker of (23). Next consider:

(24) a. I said, “I will use ‘the rod of love’ to make you learn better.”

b. Honestly (I say), “I will use ‘the rod of love’ to make you learn better.”

In (24a), Mary herself reports her past utterance, in which she quoted the phrase the rod of love. In (24b), in uttering the reporting sentence Honestly (I say)… she utters the reported sentence I will use the rod of love to …, where she quotes that phrase. Notice here that in (24b), Mary does not just report the utterance “I will use …,” but performs a genuine speech act of, say, warning.

Further consider:

(25) Honestly (I say), “ ‘What is essential is invisible to the eye.’ ”

In (25), the utterance “ ‘What is essential is …’ ” is doubly quoted as a whole; in uttering the sentence Honestly (I say)…, the speaker, say, the prince, reports and echoes that utterance simultaneously. In (10), I claim, the same thing happens to the conditional and its protasis.

(26) If “ ‘the light is on’ ”, John must be home.

In uttering the conditional ‘If ____ , John must be home,’ the speaker quotes the utterance ‘the light is on,’ which fills the slot, and, at the same time, echoes some other utterance. Furthermore, I claim that the apodosis in (26) is quoted in the sense that the utterance modified by the speech act adverb honestly in (27a) is interpreted as a reporting speech of a sort, as in (27b):

(27) a. Honestly, what is essential is invisible to the eye.

b. Honestly I say, “What is essential is invisible to the eye.”

Namely, the main clause of (10) is used and, at the same time, quoted to stand for the type which its utterance instantiates. If I am right, conditional (10) is constructed by filling the two slots of ‘If ____ , then ____ ’ and interpreted as:

(28) If “ ‘the light is on’ ”, “ ‘John must be home’ ”.

More precisely, following Recanati (2001), the slots are filled by the occurrences of ‘Dem (enonstraction)’, an iconic symbol; and those occurrences refer to the quoted materials or the utterance types, which are not semantically parts of the conditional in which they are presented. This is illustrated, as in:

(29) If [Dem] , then [Dem].

\[ \downarrow \]

\[ \downarrow \]

‘the light is on’ ‘John must be home’

My claim is indirectly supported by the peculiar behaviors of epistemic conditionals concerning pronominalization and modality, which are mentioned in section 1. In the case of an epistemic conditional, an antecedent noun phrase in the apodosis clause does not bind a pronoun in the protasis clause; and the modal operator in the apodosis does not have scope over the whole conditional. This means that the utterance of the apodosis, rather than that of the whole conditional, is committed to the truth of its own propositional content.

To sum up, in uttering an epistemic conditional, the speaker expresses her attitude toward the truth of the three propositional contents, i.e., that of the ij-clause, the main clause and the whole conditional. First she assumes the protasis as true and then, under that assumption, infers the truth of the apodosis; and finally she asserts the truth of an inferential relationship between them4.

4. Speaker’s Epistemic Situations in Epistemic Conditionals

A sentence has two meanings: propositional and attitudinal. The propositional meaning of a sentence is an objective description of a situation that the speaker is supposed to focus on in uttering it; and the attitudinal meaning is her attitude toward the truth of that propositional meaning. Consider:

(30) John is smart.

The propositional meaning of this sentence is a type of
situation whose instance situation supports a state of affairs in which John is smart. The type is represented as:

\[ \text{e}_0 \rightarrow \text{e}_1 \rightarrow \text{e}_2 \]  

When the speaker, say, Mary, utters sentence (30), the state of affairs, \( \langle \text{true}, \langle \text{smart}, \text{j} \rangle \rangle \), is realized in her epistemic situation at that utterance, i.e., \( \varepsilon_0 \). This is shown as in:

\[ \text{e}_0 = \langle \text{true}, \langle \text{smart}, \text{j} \rangle \rangle \]

The attitudinal meaning of (30), which reflects a modal aspect of its meaning, is a type of epistemic situation whose instance situation supports the speaker’s belief attitude, as in:

\[ \text{e}_1 = \langle \text{true}, \langle \text{smart}, \text{j} \rangle \rangle \]

This relationship is actualized by a channel situation \( \text{c} \), as shown in:

\[ \text{c} = \langle \text{smart}, \text{j} \rangle \]

According to situation semantics, a conditional represents a general relationship between the two situation types respectively represented by its protasis and apodosis. Consider:

(35) If Mary goes, John will go.

This content conditional represents the relationship between the Mary-going type and the John-going type, as in:

\[ \text{e}_2 = \langle \text{true}, \langle \text{smart}, \text{j} \rangle \rangle \]

The channel \( \text{c} \) defines the relation \( R \), that connects Mary-going situations to John-going situations and so (37) can be rephrased as:

\[ \forall \text{s}, s \in \langle \text{going, m} \rangle \land R(s, t) \]

Since conditional (35) is a indicative sentence, its attitudinal meaning is like this:

(39) \[ \langle \text{true}, \langle \text{c} = \text{T} \Rightarrow \text{T} \rangle \rangle \]

When some speaker, say Joan, utters (35), her epistemic situation \( \text{e} \) instantiates this epistemic situation type, as in:

(40) \[ \langle \text{true}, \langle \text{c} = \text{T} \Rightarrow \text{T} \rangle \rangle \]

Next consider epistemic conditional (10), repeated here for convenience:

(10) If the lights are on, John is home.

As we saw in the previous section, the utterances of the protasis and apodosis are demonstrations and they are doubly quoted, as in:

(41) “‘the lights are on’, “‘John is home’.”

In uttering (41), the speaker does not only mention the protasis and apodosis, but also use them to express her belief attitudes toward their truth. Thus her attitudes are realized in epistemic situations \( \text{e}_0 \) and \( \text{e}_1 \), as in:

(42) a. \[ \langle \text{true}, \langle \text{s} = \langle \text{on}, \text{lgt} \rangle \rangle \rangle \]

b. \[ \langle \text{true}, \langle \text{s} = \langle \text{home}, \text{j} \rangle \rangle \rangle \]

Conditional (10) represents, as a whole, the relationship between the two epistemic situation types referred to by the demonstrations of the protasis and apodosis, which means that the two types which the epistemic situations \( \text{e}_0 \) and \( \text{e}_1 \) instantiate constitutes that type relationship, as in:

(43) \[ \langle \text{true}, \langle \text{p} \rangle \rangle \Rightarrow \langle \text{true}, \langle \text{q} \rangle \rangle \]

In the utterance of (41), this propositional meaning of (10) is instantiated by channel situation \( \text{c} \), as shown in:

(44) \[ \text{c} = \langle \text{true}, \langle \text{p} \rangle \rangle \Rightarrow \langle \text{true}, \langle \text{q} \rangle \rangle \]

Furthermore, the speaker expresses her attitude toward the truth of the propositional meaning, as in:

(45) \[ \langle \text{true}, \langle \text{c} = \text{T} \Rightarrow \text{T} \rangle \rangle \]

(46) \[ \langle \text{true}, \langle \text{c} = \text{T} \Rightarrow \text{T} \rangle \rangle \]

So the attitudinal meaning of (10) is the type of epistemic situation \( \text{e}_2 \):
in e₁, she concludes that q is also true; and at the same time, she is committed to the truth about the inferential relationship between p and q or of the claim that q follows p.

Before leaving this section, a few words are in order about modality in epistemic conditionals. Their apodoses often contain modal auxiliaries or modal adverbs:

(48) a. Herb: Frank tells me you’re a singer.
Rachel: Yeah, that’s right.
Herb: Yeah, well, uh, we’re are kinda out of things up her. I’m sorry.
Rachel: Well, that’s okay.
Herb: You must be very successful if you need someone like Frank.

From the movie The Bodyguard
b. “But the door was locked—yes. But there is nothing to show if it were locked from the inside or the outside. You see, the key was missing.”
“But then—if it is missing…” She took a minute or two. “Then it must have been locked from the outside. Otherwise it would be somewhere in the room.”

A. Christie Murder in the Mews
c. Frank: She’s out to kill you.
Andrew: My dear Hunter, if that was indeed her purpose, you should know by now that she fulfilled it long ago.

T. Rattigan The Browning Version

(49) If he’s in with the Caymans he probably saw my letter about the Evans business.

A. Christie Why Didn’t They Ask Evans?

They also contain the semi-modal seem or propositional-attitude expressions:

(50) a. Alex Pritchard, or Alan Carstairs, must have been murdered. If he wasn’t there seems no point in the attack upon Jones.

A. Christie Why Didn’t They Ask Evans?
b. In fact, Bobby reflected, if she had not recognized her own photograph, it seemed doubtful if anyone else would have done so.
[−If she did not recognize her own photograph, it seems doubtful if anyone else will have done so.]

A. Christie Why Didn’t They Ask Evans?

(51) a. ‘If Dr Nicholson is so fond of children I suppose he came to your children’s party?’ said Frankie carelessly.

‘Unfortunately he was away for a day or two just then. I think he had to go to London for some conference.’

A. Christie Why Didn’t They Ask Evans?
b. If in fact McDeere met with the Fibbies up there and failed to report it, then I’m sure Lazarov will instruct me to move quickly.

J. Grisham The Firm

In some cases, a protasis contains a modal expression (See Declerck and Reed (2001: 88–89):

(52) If he [is probably / may perhaps be] a paedophile, we’d better keep the children away from him.

The modal parts in these examples can be made explicit by the following paraphrases:

(53) a. It must be true that you are very successful.

b. It must be true that it was locked from the inside.

c. It should be true that you know by now that she fulfilled it long ago.

d. It is probably true that he saw my letter about the Evans business.

e. It seems that there is no point in the attack upon Jones.

f. It seems doubtful if anyone else did so. [−It seems that no one else did so.]

g. I suppose that he had to go to London for some conference.

h. I am sure that Lazarov will instruct me to move quickly.

i. It is probably / may perhaps be true that he is a paedophile.

These epistemic expressions are used performatively; and the situations in which epistemic judgments are performed by them are represented as ‘e₁="True, p\)" , just as the judgment performed by the phrase it is true (that) is. The differences in epistemic value between the modal parts may be expressed by some other situations, say ‘s₁="Must, e\)" or ‘s₂="Probable, e\)’.

5. Inferential Processes

Copi (1972: 5) says, “Inference is a process by which one proposition is reached and affirmed on the basis of
Thus they continued: “In the epistemic domain, *if-then* conjunction expresses the idea that knowledge of the truth of the hypothetical premise expressed in the protasis would be a sufficient condition for concluding the truth of the proposition expressed in the apodosis.” Declerck and Reed (2001: 42) also make a similar remark: “These [Epistemic conditionals] are conditionals that represent a process of reasoning of the type ‘If P is true, Q is true’ in which the P-clause is ‘premise-expressing’ and the Q-clause asserts the conclusion which the speaker draws from P.”

Whitehead and Russell (1910: 7) remarked that in common usage, the process of inference is often confused with ‘implication’ expressed in an epistemic conditional and explained it as follows:

> The process of inference is as follows: a proposition “P” is asserted, and a proposition “P implies Q” is asserted, and then as a sequel the proposition “Q” is asserted. The trust in inference is the belief that if they two former assertions are not in error, the final assertion is not in error. Accordingly whenever, in symbols, where P and Q have of course special determinations,
> 
> “P” and “P ⊃ Q” have occurred, the “P” will occur if it is desired to put it on record. The process of the inference cannot be reduced to symbols. Its sole record is the occurrence of “Q.”

Whitehead and Russell (1910: 8–9)

Namely the inferential process consists of the three stages: “P”, “P ⊃ Q” and “Q”. We often express an inferential relation like this by connecting two sentences with the conjunctive word *therefore* or so, as in: (54) These are his footprints, therefore, so he’s been here recently.

Thus they continued:

It is of course convenient, even at the risk of repetition, to write “P” and “P ⊃ Q” in close juxtaposition before proceeding to “Q” as the result of an inference. When this is to be done, for the sake of drawing attention to the inference which is being made, we shall write instead “P ⊃ Q” which is to be considered as a mere abbreviation of the threefold statement

> “P” and “P ⊃ Q” and “Q.”

Thus “P ⊃ Q” may be read “P, therefore Q,” being in fact the same abbreviation, essentially, as this is; for “P, therefore Q” does not explicitly state, what is part of its meaning, that P implies Q. An inference is the dropping of a true premiss; it is the dissolution of an implication.

_îbid._

Is an epistemic conditional an abbreviation of the three-stage inferential relationship? The answer is no. It may be similar to “P ⊃ Q”, but it is not an abbreviated form like “P, therefore Q.” To utter “P, therefore Q” is just to assert an inferential relationship between the two propositions P and Q.

By contrast, to utter an epistemic conditional (If “P”, then “Q”) is to perform an inferential act—reasoning from premise P to conclusion Q”. This means that the utterance includes the three assertions “P” and “P ⊃ Q” and “Q”; that is, the utterance “P” makes an assertion “P” and at the same time demonstrates its type; the utterance “Q” also asserts “P” and demonstrates its type; and the utterance of the whole clause “If . . . then . . .” asserts an implication “P implies Q”—“P ⊃ Q.”

6. Conclusion

An epistemic conditional contains the two doubly quoted clauses—the protasis and apodosis, and expresses a relationship between the two epistemic situation types respectively represented by the clauses. In uttering the conditional, the speaker actually performs an act of reasoning—drawing a conclusion from a premise. More specifically, she asserts the protasis as a premise and the inferential relationship and, under this assumption, also asserts the apodosis as a conclusion; and she performs these three acts simultaneously.

Notes

1) Declerck (1984: 286) remarks that in an epistemic conditional, the meaning of the *if*-clause comes very close to that of an *as*- or *since*-clause.

2) Declerck (1984: 285–286) points out that in (i) and (ii), where the protases are echoed, ‘the meaning of *if*
comes very close to that as as or since:
i. If he won’t arrive before nine, there’s no point in ordering dinner for him.
ii. If the lava will come down as far as this, we must evacuate these houses immediately.
3) For details of a hybrid use, see Recanati (2000: 139–140) and (2001).
4) As Declerck and Reed (2001: 285) point out, if-clauses ‘express the most relevant rather than the only premise underlying the inferential reasoning process.’
Barwise (1989, Ch. 5) discussed formal treatment of implicit premises that are pragmatically presupposed and so not considered to be worth mentioning in the ordinary use of conditionals.
5) For details about epistemic judgment and its situations, see Nakashima (2007).
6) For the treatment of conditionals in situation semantics, see Nakashima (2006).
7) Epistemic conditional (10) can be paraphrased with the predicate true, as in:
i. If it is true that the lights are on, it is true that John is home.
In a case like this, the phrase it is true (that) is used performatively, rather than descriptively.
8) As Dancygier (1998: 88) points out, the link between the if-clause and the main clause is sometimes expressed by the phrase (then) it means that, as in:
i. If he is the villain of the piece, as we decided he must be, it means that we’re going to show him our hand.
A. Christie Why Didn’t They Ask Evans?
My guess is that even in cases like this, the clause is doubly quoted, as in:
If he is . . . , it means that “we’re going to show him our hand”.
9) Dancygier and Sweetser (2005: 117) also claim that what the speaker is involved in is ‘neither a prediction about a conclusion to be drawn nor a description of a general relation between premise and conclusion, but a performative act of reasoning aloud.’ However they do not explain how she performs such a reasoning act in uttering an epistemic conditional.

References