Openness requirements and conditional 'iffiness': evidence from Bangla *jodi*-conditionals

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Abstract

Restrictor analyses of indicative conditionals usually assume that the conditional connective makes no independent semantic contribution, merely marking the antecedent clause as a restrictor of the embedded modal. However, observing differences from syntactically similar adverbial clauses has led authors to question this, e.g. Von Fintel and Iatridou (2002)'s proposal that the conditional connective is 'iffy': it adds some meaning akin to requiring uncertainty in the antecedent. A near-exclusive focus on *if* makes it difficult to distinguish this purported iffiness from broader pragmatic constraints on modal assertion (Diversity; Condoravdi (2002)). Using data from the connective *jodi* in Bangla, I propose that conditionals can impose modal uncertainty requirements in the antecedent independently of the modality in the consequent, adding to growing evidence that conditional connectives make lexically-specific semantic contributions: conditionals are semantically 'iffy'. Specifically, *jodi* presupposes that its antecedent is future-dependent at utterance time, corresponding to an attitude of 'unknowability'—a stronger form of uncertainty than that imposed by *if*.

Keywords: indicative conditional, tense-aspect, historical modality, Bangla

1 Introduction: antecedent uncertainty in indicative conditionals

In the philosophical literature, conditionals have been modeled as two-place connectives relating sentences. For example, *if he was sick, he left* is rendered as *sick*→*left*, with → encoding the contribution of *if*. In contrast, following Kratzer (1986), linguistic analyses typically treat conditional connectives as markers of restriction: the antecedent narrows the domain of evaluation for a modal whose prejacent is the consequent. On this view, *If Ali was sick, he left* corresponds to $\Box_{epis \cap sick} left$, where a covert epistemic modal $\Box_{epis}$ is restricted to worlds in which Ali was sick, and *if* merely signals this restriction. The connective itself contributes no additional meaning.

However, authors have noted over the years that conditionals differ from syntactically similar adverbial clauses such as *when X, Y*, motivating proposals that *if* contributes meaning beyond marking a restriction. This view is articulated in Von Fintel and Iatridou (2002)'s proposal that *if* is 'iffy': it adds some meaning akin to requiring uncertainty in the antecedent. The authors point to examples such as (1), noting that *if*, but not *when*, seems to suggest that at each point in the domain, there is a question of whether the antecedent holds.

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(1) (??if)/when Peter wakes up, he usually makes coffee

Given our world knowledge that waking up each day is not usually open to question, the *if*-antecedent is odd. But is this a contribution of the connective per se? A near-exclusive focus on the word *if* makes it difficult to distinguish the purported iffiness of the conditional connective from broader pragmatic constraints on modal assertion (e.g. Diversity; Condoravdi (2002)). Using data from the connective *jodi* in Bangla, I propose that conditionals can impose modal uncertainty requirements in the antecedent independently of the modality in the consequent, adding to growing evidence that conditional connectives make lexically-specific semantic contributions: conditionals are semantically 'iffy'.

jodi is a subordinating connective expressing conditional meaning, with a more restricted distribution than *if*. Specifically, the clauses that can appear in the antecedent of *jodi* are a subset of those that can appear under *if*. I ask two questions:

1. **The empirical question:** How to characterize the distributional restriction?
2. **The formal question:** Where/how is this restriction specified?

I will argue that as an answer to the first, that *jodi* is acceptable iff the truth of an eventive antecedent is future-dependent at the utterance time (UT). This corresponds to a known modal property of historical/ontic[1] openness (Condoravdi, 2002) and intuitively expresses an attitude of 'unknowability' towards the antecedent proposition (Kaufmann, 2005); and in answer to the formal question, that this cannot derive from pragmatics and instead must be lexically specified by *jodi*. Thus, *jodi* shows that iffiness should be a lexical property of conditional connectives.

2 Data

I focus on indicative conditionals with eventive antecedents, and without further clausal embedding. I put statives aside here because (i) their temporal behavior in conditional antecedents is less well-understood in general, and (ii) in Bangla, stative antecedents require the presence of the copulas *hO* and *thak* from a multi-copula system, which contribute their own aspectual meaning, significantly increasing the complexity of the data. I further limit my focus to 'one-case' conditionals (Rumberg and Lauer, 2023), ignoring multi-case conditionals that express a meaning akin to 'whenever X, Y', e.g. *If she wakes up early, she goes for a run*. In all cases, the consequent is unrestricted.

2.1 Verbal system of Bangla

Since existing analyses of conditionals have largely focused on English, certain assumptions about tense-aspect in the conditional are tied to contrasts that are/aren't expressed in English. Given the differences in the verbal systems, some details about the tense-aspect system of Bangla are necessary. Verbal clauses in Bangla have the following sequence of morphemes:

[1] *historical* and *ontic* are used interchangeably throughout; some authors have used *metaphysical* for the same modality.

[verb-aspect-tense-agreement], e.g. *kor-ch-il-am*: do-PROG-PAST-1 'I was doing'. I will omit agreement in the schematic representations that follow. Present tense (PRES) is morphologically null (ϕ), and there are two past-markers: perfective *-l-* and imperfective *-t-*. The imperfective past is obligatory in the antecedents of counterfactual conditionals, and conversely, an antecedent clause with *-t-* can only be interpreted as counterfactual. I therefore don't consider it here, and formalize the perfective past *-l-* as the tense operator PAST. Viewpoint aspect is marked by an inflectional system comprising of the progressive marker (PROG: *-ch-*), perfect marker (PERF: *ech*), and imperfective (IMPF: morphologically null with present tense). In addition to inflectional aspect markers, Bangla patterns with other South Asian languages in having a set of copular auxiliaries that enable further distinctions of aspectual meaning. A fuller exploration of the multi-copula system and its associated aspectual contrasts is beyond the scope of this work. For present purposes, what I formalize as the aspect operators IMPF, PROG, PERF, are the inflectional markers. This decision reflects the fact that these are the exponents that express the corresponding meaning in unembedded clauses. I assume that these occupy the Aspect Phrase (AspP) in the structure.

Bangla has an inflectional future-marker (*-b-*), which has limited acceptability under *jodi*. Since the oddness of future-markers in conditional antecedents is a cross-linguistically common phenomenon and its cause an open question, I will treat it as an independent fact and not attempt to account for it here (for discussions see Cariani and Santorio (2018); Kaufmann (2005) and references therein).

2.2 Constraints on *jodi* antecedents

jodi antecedents are restricted in (i) tense-aspect marking; (ii) interpretation of ambiguous aspect morphology; and (iii) type of future-eventuality: in simple present antecedents. I present these in turn.

(i) To set intuitions, consider the following conditionals with *if*, all of which are acceptable:

(2) a. If he submits his paper to a journal, we will not publish it
b. If he submitted/is submitting/has submitted his paper to a journal, we will not publish it

With *jodi*, the antecedent clauses like (b) with inflectional past, progressive, and perfect marking are unacceptable:

(3) a. jodi o aj oshudh khaye, kal khabe na
if she today medicine eat-PRS-3, tomorrow eat.FUT.3 NEG
If she takes the medicine today, she will not take it tomorrow
b. ?? jodi o oshudh kha-ch-ϕ-e /khe-ech-ϕ-e /khe-l-o, kal
?? if she medicine eat.PROG-PRS-3 /eat-PRF-PRS-3 /eat-PST-3, tomorrow
khabe na
eat.FUT.3 NEG
Intended: If she is taking/ has taken/ took the medicine, she will not take it tomorrow

(ii) Whereas simple present antecedents under *if* are ambiguous between a future-referring and a habitual-generic reading, simple present clauses under *jodi* can be interpreted as future-referring (4a) but not habitual-generic (4b):

(4) a. jodi pOrer bochhor khub brishti pORe, rasta-gulo kharap hoye jabe
if next year much rain fall.PRS.3, road-COP bad happen go.FUT.3
If it rains a lot next year, the roads will wear out

b. ?? jodi ekhane khub brishti pORe, tahole (nishchoi) jol-er somosshya nei
?? if here much rain fall.PRS.3, then (likely) water-GEN problem NEG
Intended: If it rains a lot here (in general), then (I bet) there is no water shortage

(iii) In simple present antecedents, future-reference is necessary but not sufficient—only genuinely open future possibilities are acceptable:

(5) a. Context: we are testing the efficiency of a new stove by seeing how quickly the water boils.

jodi jol-ta [paanch minute-e] phot-ϕ-e, baccha-ta baba-ke Dak-b-e
if water-CLF [five minute-LOC] boil-PRS-3, child-CLF father-ACC call-FUT-3

If the water boils within five minutes, the child will call her dad

b. Context: a vessel of water is heating on a stove-top; a child is in charge of watching it.

?? jodi jol-ta phot-ϕ-e, baccha-Ta baba-ke Dak-b-e
?? if water-CLF boil-PRS-3, child-CLF father-ACC call-FUT-3

Intended: if (when) the water boils, the child will call her dad

Given the natural laws of our world, the antecedent above describes a necessary event (assuming ordinary conditions, it is certain that the water will boil at some point). Though describing a future event, it is still unacceptable under *jodi*. With a slight variation of the context in (b), when a temporal adverbial modifies the antecedent, making the future event a genuinely open possibility, it is acceptable under *jodi*.

(i-ii) have been noted previously (Bagchi, 2005; Dasgupta, 1982; Bhattacharya, 1998; Simpson and Syed, 2014). (iii) is shared by *if*, showing that *jodi* appears in a subset of the environments where *if* is acceptable.

3 Proposal

3.1 Empirical question: what property is invoked by the restriction?

The data above shows at least three types of restriction: (i) on the appearance of certain tense-aspect markers: inflectional progressive, perfect, and perfective past clauses are disallowed; (ii) on the possible interpretation of ambiguous aspect marking. Specifically, the simple present can only be interpreted as future-referring; a generic interpretation is disallowed; (iii) on the status of future-referring clauses with respect to our knowledge: a clause denoting a necessary future fact is disallowed. What is common to these? I suggest that the relevant semantic property is the following: for all the disallowed clauses, their truth at UT does not depend on future times in the evaluation world.

Under any available analysis of the perfective past and the perfect, it is uncontroversial to claim that in order to be true at t, a sentence A of the form PAST(p) or PRES(PERF(p)) requires p to hold at some time prior to t. Thus, no future facts are involved.

What about the progressive and habitual-generic reading of the imperfective aspect? The right semantics for PROG and IMPF has generated a substantial body of research (Deo, 2020). Accounts differ on whether or not times after t are involved in computing the truth value of a present-tensed progressive/imperfective clause at t. In spite of these differences in the involvement of future *times*, most modern accounts converge in ascribing the modal property of future textitindependence to these aspect categories. The insight follows from the so-called 'imperfective paradox' (and corresponding 'progressive paradox'), which has been a departure point for many of the currently available analyses. The crux of the puzzle is that although the eventuality denoted by uninflected accomplishment predicates (e.g. *cross-the-road*; Vendler (1957)) appears to include its culmination (*#She crossed the road but did not reach the other side*), the use of progressive/imperfective aspect with accomplishment predicates is felicitous even when future developments preclude the culmination, e.g. *She was crossing the road at 5pm when she got hit by a bus.* Thus, 'she is crossing the road' seems to remain true of 5 pm, regardless of what happens at 5:01. Whereas early extensional accounts wrongly predicted that 5:01 facts about the evaluation world should matter, it is simultaneously clear that to count as an ongoing 'road-crossing', the eventuality being described must bear *some* relation to the expected state of culmination in the evaluation world. Most current accounts have emerged from an attempt to reconcile these facts. One approach is to propose intensional semantics for PROG and IMPF, requiring culmination at a future time on only those intensional alternatives that are related to the UT in a predictable way (e.g. inertial/normal futures) (Dowty, 1979; Deo, 2009; Asher, 1992; Landman, 1992; Bonomi, 1997; Zucchi, 1999). These differ on the nature of this set of alternatives, but share the intuition that facts about the evaluation time should be enough to determine it. An alternative set of analyses retain an extensional semantics for PROG/IMPF, but make different assumptions about what is required for an accomplishment predicate to be true at t, so that these do not involve future facts (e.g. Nadathur and Siegal (2022); Parsons (1990); Szabó (2008). Abstracting away from how this is implemented, under all of these accounts, the truth of IMPF(p) and PROG(p) at a time t world w do not involve facts about w that are after t.

Thus, future-independence is a promising candidate for unifying restrictions (i) and (ii) above. Finally, (iii) reinforces this, showing that the status of the antecedent-proposition with respect to necessity is directly relevant to its acceptability under *jodi*.

This intuitive idea of future-(in)dependence is reflected in a well-studied sub-type of circumstantial modality called historical modality. Just as epistemic modality models the possible ways the world could be given what we know now, historical modality (Thomason, 1970) models (our perception of) the possible ways the world could be given what is objectively the case now. It relies on the idea that given the way the world is now, it cannot *now* have been otherwise. This encodes a past-future asymmetry such that non-future facts are objectively fixed, even if unknown, whereas future facts can be genuinely open. Facts about the future thus admit a stronger form of uncertainty than epistemic uncertainty (p being unknown at evaluation time)– that of p being objectively 'unknowable' at the evaluation time (Kaufmann, 2005). Necessity/open-ness in the historical modal base is encoded in many known contrasts in natural language modal expressions, including conditionals (Condoravdi, 2002; Funk, 1985; Kaufmann, 2005; Khoo, 2015; Bhadra, 2022; Iatridou, 1990; Klecha, 2016). I propose that this contrast is at play in the antecedent of *jodi*-conditionals: *jodi*(A)(B) is acceptable iff A is *open* in the historical modal base at the evaluation time, where *open* means that neither A nor ¬A is necessary. Adopting standard assumptions about temporal operators, the distributional facts above derive from known interactions of historical modality with time.

3.2 Formal question: what is the nature of the constraint?

How might a requirement for historical openness in the antecedent come about? Below, I consider an alternative hypothesis H' that retains a pure-restrictor view of conditionals and attempts to derive the patterns above from a broader pragmatic principle. Ultimately, I argue that this is not compatible with the empirical facts about *jodi*.

A well-known pragmatic principle that has been shown to govern a variety of modal assertions is that modal restrictions should be non-trivial, to prevent truth-conditional equivalence with the corresponding non-modal claim. A clear articulation of this idea is found in the 'diversity condition' of Condoravdi (2002). This is purported to explain contrasts such as the following:

(6) He might win tomorrow/*yesterday

The idea is that the modal auxiliary *might* here embeds an ontic modal that is keyed to the utterance time. When we evaluate the past prejacent *win yesterday* in this modal base, its truth/falsity is already settled. The assertion is therefore equivalent to the structurally simpler non-modal assertion *He won yesterday*. This violates diversity, explaining the unacceptability of the construction. The result is that an auxiliary that is specified to embed ontic modals will only be acceptable in a construction where the prejacent is future-referring. Or conversely: an auxiliary that is only acceptable with future-referring prejacents must be restricted to embed ontic modals.

If we assume (i) conditionals simply restrict the domain of a modal; (ii) a general pragmatic principle of diversity (ban against vacuous restriction), this leads naturally to the

following hypothesis H': the embedded modal under *jodi* is always ontic. Since epistemic possibilities are a superset of ontic possibilities, openness in the former does not guarantee openness in the latter. This would force ontic openness.

This relates to a tradition of classifying conditionals as enabling two distinct types of reasoning: ontic (if x happen(s/ed), y will/would happen); vs epistemic: (*if I learn that x, I will/would conclude y*) (Schulz, 2007). If *jodi* only embeds ontic (as opposed to, e.g., epistemic) modals, the antecedent restrictions would simply follow from diversity. H' would amount to the claim that *jodi*, unlike *if*, is restricted to ontic reasoning.

However, this is unlikely given the acceptability of conditionals like (7):

(7) jodi o jete, (tahole nishchoi/ tar mane) o goto du mash onek
if she win.PRS.3, (then surely/ that means) she last two month much
practice korechhe
practice do.PRF.PRS.3
If she wins, she must have practiced hard these last two months

Here, the consequent is in the past. If the consequent modal base was ontic, (7) would be trivially true given the settledness of the past (contra observation). Moreover, the consequent is paraphrasable as: 'I will conclude/believe that she has practiced hard', and can contain *taar maane/nishchoi*, which mark epistemic modality. Thus, *jodi* does not disallow reasoning over epistemic possibilities. Rather, it restricts what kinds of hypothetical scenarios can be used for the reasoning— the speaker must bear an attitude of un-knowability towards the corresponding proposition. Formally: the restriction specifically targets the status of the antecedent clause in an ontic modal base no matter the modal flavor of the consequent, which cannot be derived from a pragmatic diversity condition. I implement this as a lexically-specified presupposition of *jodi*, given standard projection behavior.

4 Analysis

4.1 Assumptions about conditional antecedent

I will assume that the antecedent and consequent of the conditional are both finite clauses with tense and aspect, and that the conditional connective does not by itself make additional temporal contributions. Following recent and independently-motivated proposals along these lines, I will assume that the conditional antecedent licenses a future-shifting operator F that is (i) lower than tense, and (ii) responsible for future reference in the antecedent. This is contra accounts that build future-shift into the semantics of the conditional or the non-past-ness of the present tense (e.g. Kaufmann (2005); Rumberg and Lauer (2023); Schulz (2008)).

This choice is motivated by the observation that the *pattern* of future-reference seen in condirtionals is shared by a wider range of constructions: future-shift in dependent clause, no independent shift in the main clause, and temporal donkey anaphora (Williamson, 2021). This make sit unlikely that it is contributed by the conditional semantics. Mendes (2024) further shows that this pattern extends to non-modal construction, and such future-shifts always co-occur with subjunctive marking in languages with richer mood morphology. Gitksan has an overt marker that appears in exactly this set of constructions and is obligatory for

future reference (Matthewson, 2012), making a strong argument for the linguistic 'reality' of a future-shifting aspectual operator.

Finally, an aspectual account is better suited for Bangla because accounts based on non-past Present tense rely on a close connection between future reference in conditional antecedents and scheduled, futurate uses of the present tense in unembedded contexts: *She leaves at 5 tomorrow.* However, Bangla does not allow futurate uses of the simple present, showing that the purported semantic overlap is not operative. Moreover, if the semantics of the conditional provided future reference, it should be unaffected by aspectual properties of the embedded clauses. As described above, however, the possibility for future reference in the antecedent is modulated by aspect in Bangla. This is better captured by a structure where the source of future reference can interact with aspect, such as the LF I have assumed here.

I assume that F is aspectual, and for concreteness, take it to be akin to prospective aspect (Kratzer, 2011; Matthewson, 2012; Matthewson et al., 2022). F simply requires the constituent embedded under it to be evaluated at some future time. Since the data here only concerns temporal reference in the antecedent, I remain neutral about the LF for the consequent clause, only assuming that it comes with its own tense and aspect.

I assume the following LF for a simple present antecedent:

(8) LF: [$_{\text{TP}}$ PRES [$_{\text{AspP}}$ F [$_{\text{vP}}$ *she win*]]]

4.2 System (semantic setup)

I use a propositional language with variables ranging over indices and sentences, constants denoting the relations in the model, and the usual logical connectives. The smallest units of analysis are sentence radicals (correspond to vPs, assuming vP-internal subjects), represented as the set of atomic sentences (At). W is a non-empty set of worlds, and T is a non-empty set of time intervals related by containment $\subseteq$ and precedence $\leq$, such that t$\leq$t' iff no part of t extends beyond t'. Let I = W$\times$T be the set of indices in the model. Truth is evaluated at indices (world-time pairs) and relativized to a context, which provides a unique index $\langle w_c, t_c \rangle$. t_c corresponds to the utterance time UT. Unembedded sentences are evaluated at $\langle w_c, t_c \rangle$ by default. The valuation V is a relation on At such that for any p $\in$ At, V(p,$\langle$w,t$\rangle$) $\in$ {1,0,#}.For any p of arbitrary complexity:

(9) if p $\in$ At, p(w,t) = 1 iff V(p,$\langle$w,t$\rangle$) = 1

(10) $[\![p(w,t)]\!]^c = 1$ iff $p(w_c, t_c) = 1$

Accessibility relations and modal bases Following Kaufmann (2005), assume an accessibility relation R on I$\times$ I is *modal* if $\langle$w,t$\rangle$R$\langle$w',t'$\rangle$ implies that t = t', and *temporal* if $\langle$w,t$\rangle$R$\langle$w',t'$\rangle$ implies that w = w'. We will be concerned with the historical accessibility relation $\approx$, which has the following properties:

(11) Properties of the historical accessibility relation $\approx$

a. It is modal: $\langle$w,t$\rangle\approx\langle$w',t'$\rangle$ implies that t = t'

b. It is an equivalence relation

c. **Backward-connectedness:** if $\langle w,t\rangle \approx \langle w',t\rangle$ and $t'<t$, then $\langle w,t'\rangle \approx \langle w',t'\rangle$
If two worlds are historical alternatives of each other at a given time, they are historical alternatives of each other at all prior times

d. **Historicity:** if $\langle w,t\rangle \approx \langle w',t\rangle$, then for all $p \in At$, $V(p,\langle w,t\rangle) = V(p,\langle w',t\rangle)$
Historical alternatives agree on the truth values of all atomic sentences

(11c) and (11d) together capture the intuition that historical alternatives at t are completely identical up until t, and may diverge after t. Sentences are thought to be uttered against sets of background information/assumptions (*modal bases*; Kratzer (1981)). A modal base is a modal accessibility relation such that the following holds:

(12) **Consistency of modal bases**: if iRj and $i \approx k$, then kRj

That is, a modal base generated in w at any given time t remains consistent across historical alternatives at t. Necessity is defined in the usual way:

(13) **Necessity:** For any accessibility relation R, $(\Box_R\ p)\ (w,t) = 1$ iff for all $\langle w',t'\rangle$ s.t. $\langle w,t\rangle R \langle w',t'\rangle$, $p(w',t')$.

Aspect operators are modifiers of sentence radicals. Assuming standard semantics with minimal theoretical commitments:

(14) a. $PERF(p)\ (w,t) = 1$ iff $\exists t'\ [t \subseteq_{fin} t'\ \&\ p(w,t') = 1]$; $\subseteq_{fin}$ gives a final subinterval of t'

b. $F(p)\ (w,t) = 1$ iff $\exists t'$: $t < t'\ \&\ p(w,t') = 1$

c. $PROG(p)\ (w,t) = 1$ iff $\forall \langle w',t\rangle \in R_{mod}(w,t)$, $\forall \langle w',t'\rangle \in R_{temp}(w',t)$, $p(w',t') = 1$

d. $IMPF(p)\ (w,t) = 1$ iff $\forall \langle w',t\rangle \in R_{mod}(w,t)$, $\forall \langle w',t'\rangle \in R_{temp'}(w',t)$, $p(w',t') = 1$

R_{mod} and R_{temp} are accessibility relations representing the modal and temporal contributions respectively of IMPF and PROG. R_{mod} gives the relevant set of intensional worlds (e.g. inertia worlds; Dowty (1977)); capturing expected continuity/non-accidental generalization. R_{temp} gives the relevant subintervals at which the embedded vP is instantiated, capturing iteration over some contextually-salient time interval (Deo, 2020). The progressive and imperfective have near-identical semantics (Deo, 2009; Ferreira, 2016), varying only in the nature of the temporal accessibility relation. The important feature for our purposes is that they require the embedded p to be instantiated at the appropriate time interval in each world *in the modal base generated at t*, and set is consistent across the historical alternatives at t. Thus, the truth of a progressive or imperfective sentence at t does not depend on facts after t, capturing the desired intuition.

Tenses modify sentence radicals (optionally modified by aspect). Present tense is vacuous, past tense is existential.[2]

(15) $PRES(p)\ (w,t) = 1$ iff $p(w,t) = 1$

[2]Since I am only concerned with conditionals in unembedded contexts and assuming that the context supplies the utterance time UT as the evaluation time for the antecedent, this semantics for PRES makes the same predictions as one where PRES is deictic on UT.

(16) PAST(p) (w,t) = 1 iff ∃t' s.t. t'<t and p(w,t') = 1

Since the empirical facts here don't concern the relation between the antecedent and consequent, the exact semantics for the conditional is irrelevant as long as the antecedent is a tensed clause. I treat *jodi* as a two-place predicate of propositions and assume a strict conditional analysis: the conditional is true at an index if the corresponding material conditional is true at all indices accessed by the appropriate accessibility relation R. The selectional restriction of *jodi* is treated as a presupposition about the modal status of the antecedent argument in the historical modal base:

(17) *jodi*(A)(B) (w,t) = undefined, if $(\Box_{\approx}A \vee \Box_{\approx}\neg A)(w,t) = 1$. If defined,
jodi(A)(B) (w,t) = 1 iff $\Box_R(A \rightarrow B)$ (w,t) = 1, where R is a modal base

Conditional devices such as English *if* simply lack this presupposition (or require the antecedent to be open in the epistemic modal base, depending on our desired theory for *if*).

Let us consider an antecedent (A) of the form 'Mini works/is working/has worked/...'; the vP translated as *mw*. Simple present antecedents are expected to be acceptable under *jodi* with future reference:

(18) Antecedent LF: [$_{TP}$ PRES [$_{AspP}$ F [$_{vP}$ mw]]]

a. $[\![PRES(F(mw))]\!]^c = 1$
b. iff PRES(F(mw)) (w_c,t_c) = 1
c. iff (F(mw)) (w_c,t_c) = 1
d. iff ∃t' [t_c < t' & mw(w_c,t') = 1]
e. Suppose the antecedent is true in c:
f. ⟹∃t' [t_c < t' & mw(w_c,t') = 1]. Let t' = t1.
g. Consider an arbitrary w' s.t. $\langle w_c,t_c\rangle \approx \langle w',t_c\rangle$
h. Since t_c < t', there is a counter-model where mw(w',t') = 0
i. ¬ ∀$\langle$w',t'$\rangle$ s.t. $\langle w_c,t_c\rangle \approx \langle w',t'\rangle$, PRES(F(mw)) (w',t') = 1
j. $\Box_{\approx}$ PRES(F(mw)) (w_c,t_c) = 0 (1)
k. Similarly, if PRES(PERF(mw))(w_c,t_c) = 0, then ¬ ∀$\langle$w',t'$\rangle$ s.t. $\langle w_c,t_c\rangle \approx \langle w',t'\rangle$, PRES(PERF(mw)) (w',t') = 0
l. ⟹($\Box_{\approx}$¬ PRES(PERF(mw)) (w_c,t_c)) = 0 (2)
m. from (1) and (2), $(\Box_{\approx}A \vee \Box_{\approx}\neg A)(w_c,t_c) = 0$
n. therefore, *jodi*(A)(B) ≠ undefined; A is acceptable in the antecedent

In contrast, inflectional present perfect is correctly predicted to be unacceptable:

(19) Antecedent LF: [$_{TP}$ PRES [$_{AspP}$ PERF [$_{vP}$ mw]]]

a. $[\![PRES(PERF(mw))]\!]^c = 1$
b. iff ∃t' [$t_c \subseteq_{fin}$t' & mw(w_c,t') = 1]
c. Suppose the antecedent is true in c:
d. ⟹∃t' [$t_c \subseteq_{fin}$t' & mw(w_c,t') = 1]

e. since $t_c$is a *final* subinterval of t', there is no part of t' that extends beyond t_c. Therefore, t' $\leq t_c$.
f. Consider an arbitrary w' s.t. $\langle w_c,t_c\rangle \approx \langle w',t_c\rangle$
g. by **backward-connectedness**: $\langle w_c,t_c\rangle \approx \langle w',t_c\rangle$ and t' $\leq t_c \implies \langle w_c,t'\rangle \approx \langle w',t'\rangle$
h. by **historicity**: $\langle w_c,t'\rangle \approx \langle w',t'\rangle$ and $mw(w_c,t') \implies mw(w',t')$
i. Since we know that $t_c \subseteq_{fin} t'$, $\implies \exists t'$ [$t_c \subseteq_{fin} t'$ & $mw(w',t') = 1$]
j. $\implies$ PERF(mw) $(w',t_c) = 1$
k. $\implies$ PRES(PERF(mw)) $(w',t_c) = 1$
l. Since $\langle w',t_c\rangle$ was arbitrary,
m. $\implies \forall\langle w',t'\rangle$ s.t. $\langle w_c,t_c\rangle \approx \langle w',t'\rangle$, PRES(PERF(mw)) $(w',t') = 1$
n. $\implies \Box_{\approx}$ PRES(PERF(mw)) (w_c,t_c) (1)
o. Similarly, if PRES(PERF(mw))$(w_c,t_c) = 0$, then $\forall\langle w',t'\rangle$ s.t.$\langle w_c,\ t_c\rangle \approx \langle w',t'\rangle$, PRES(PERF(mw)) $(w',t') = 0$
p. $\implies \Box_{\approx} \neg$PRES(PERF(mw)) $(w_c,t_c) = 1$ (2)
q. from (1) and (2), $(\Box_{\approx}A \vee \Box_{\approx}\neg A)(w_c,t_c) = 1$
r. $\implies$ *jodi*(A)(B) = undefined; A is unacceptable in the antecedent

This shows that any clause whose evaluation at UT depends on the embedded VP being instantiated at an earlier time will violate the presuppositional requirement of *jodi*. Given how $<$ is defined, the same obtains when the truth of the clause only depends on UT, and no interval after it. Considering a present progressive antecedent demonstrates this:

(20) LF: [$_{TP}$ PRES [$_{AspP}$ PROG [$_{vP}$ mw]]]
a. $[\![PRES(PROG(mw))]\!]^c = 1$ iff
b. iff $\forall\langle w',t_c\rangle \in R_{mod}(w_c,t_c)$, $\forall\langle w',t'\rangle \in R_{temp}(w',t_c)$, $mw(w',t') = 1$
c. Suppose the antecedent is true in c:
d. $\implies \forall\langle w',t_c\rangle \in R_{mod}(w_c,t_c)$, $\forall\langle w',t'\rangle \in R_{temp}(w',t_c)$, $mw(w',t') = 1$ (1)
e. Consider an arbitrary $\langle w'',t_c\rangle$ s.t. $\langle w_c,t_c\rangle \approx \langle w'',t_c\rangle$
f. By **consistency of modal bases**, $R_{mod}(w_c,t_c) = R_{mod}(w'',t_c)$
g. $\implies$ from (1): $\forall\langle w'',t'\rangle \in R_{temp}(w'',t_c)$, $mw(w'',t') = 1$
h. $\implies$ PROG(mw) $(w'',t_c) = 1$
i. $\implies$ PRES(PROG(mw)) $(w'',t_c) = 1$ (2)
j. since $\langle w'',t_c\rangle$ was arbitrary, $\implies \forall\langle w',t'\rangle$ s.t. $\langle w_c,t_c\rangle \approx \langle w',t'\rangle$, PRES(PROG(mw)) $(w',t') = 1$
k. $\implies \Box_{\approx}$ PRES(PROG(mw)) (w_c,t_c) (3)
l. Similarly, if PRES(PROG(mw))$(w_c,t_c) = 0$, then $\forall\langle w',t'\rangle$ s.t. $\langle w_c,t_c\rangle \approx \langle w',t'\rangle$, PRES(PROG(mw)) $(w',t') = 0$
m. $\implies \Box_{\approx} \neg$ PRES(PROG(mw)) $(w_c,t_c) = 1$ (4)
n. from (3) and (4), $(\Box_{\approx}A \vee \Box_{\approx}\neg A)(w_c,t_c) = 1$
o. $\implies$ *jodi*(A)(B) = undefined; A is unacceptable in the antecedent

Since the lexical entry for IMPF differs from PROG only in the nature of its temporal accessibility relation R_{temp}, a generic antecedent of the form PRES(IMPF(p)) is similarly settled in the historical modal base at $\langle w_c,t_c\rangle$, and predicted to be unacceptable. Finally, the perfective past is expected to be unacceptable under one construal:

(21) Antecedent LF: [$_{TP}$ PAST [$_{AspP}$ F [$_{vP}$ mw]]]. Since nothing occupies AspP in a simple past clause, I assume that past tense can co-occur with F.

a. $[\![PAST(F(mw))]\!]^c = 1$
b. iff PAST(F(mw)) $(w_c,t_c) = 1$
c. iff $\exists$t' s.t. t'<t_c and F(mw) $(w_c,t') = 1$
d. iff $\exists$t' s.t. t'<t_c and $\exists$t" s.t. t'<t", and mw(w_c,t") (1)
e. Assume that the antecedent is true in c. Let t' in (1) be instantiated by a time t_{ref}, and t" by a time t_{ev}. Checking the modal status of PAST(F(mw)) at $\langle w_c,t_c\rangle$
f. from (1): $t_{ref} < t_c$ and $t_{ref} < t_{ev}$, and mw(w_c,t_{ev}) = 1.
g. Two possibilities:
   i. $t_{ref} < \mathbf{t_{ev}} < \mathbf{t_c}$
   ii. $t_{ref} < \mathbf{t_c} < \mathbf{t_{ev}}$

The complete derivation is not shown here. To summarize: when $t_{ev} < t_c$, the derivation parallels that of the present perfect LF above, and correctly predicts that past tense is disallowed under *jodi* when the event time if before UT (i.e. with a past reading). When $t_c < t_{ev}$, the derivation parallels that of simple present antecedents, and predicts that past tense should be acceptable under *jodi* in configurations where the event time is after the time of evaluation (i.e., future-referring readings). This is indeed possible in Bangla— in the rare cases where perfective past marking is acceptable in the antecedent, the clause has a future reference with additional inferences about performativity:

(22) jodi kaaj-ta mini-i korlo, tumi acho ki korte?
if work-CLF mini- do–PST-3, you COP-3 what do.INF?
If it is Mini who does the work, what are you here for?

Given its limited availability, however, we would likely require additional constraints on the interaction of PAST and F to explain why this is not the default reading. One possibility is that the availability of a simpler structure [$_{TP}$ PRES [$_{AspP}$ F [$_{vP}$ mw]]] blocks this.

5 Discussion and implications

It has been a longstanding observation that conditional antecedents are constrained in ways not shared by parallel adverbial constructions, questioning 'pure-restrictor' views. While not formalized, Von Fintel and Iatridou (2002) attribute this to an additional meaning-contribution of *if*: antecedent uncertainty. This broad uncertainty requirement for *if* is difficult to disentangle from a more general diversity condition on modal assertions. Being a (stronger) uncertainty requirement, the restriction on *jodi* antecedents is a variety of 'iffiness',

but being independent of the modal flavor of the consequent, it is hard to explain through pragmatics of modal assertion. I have suggested based on Bangla *jodi* that historical openness can be one concrete realization of iffiness. I made two claims that are not predicted by a 'restrictor-only' account of conditionals:

1. The antecedent can invoke modality that is independent of the consequent
2. Conditional connective can select for properties of this modality (or its associated attitudinal state)

Both of these have been independently proposed. Based on English *if*, (Van Fraassen, 1981) presents conditionals such as the following:

(23) If my wife deceives me, I won't believe it

Here, the consequent modality is presumably epistemic. However, if the antecedent modality were to be epistemic, the antecedent proposition would be equivalent to the negation of the consequent, and conditional would express the agent to believe a contradiction. However, the conditional is perfectly acceptable. This suggests, as noted by Kaufmann (2005), that the antecedent must carry some independent modality here. This has also been assumed by Copley (2008) on independent grounds.

Bearing on 2., recent research on other conditional connectives across languages suggests that many connectives encode lexically specific openness requirements of various 'flavors'. A recent analysis of German *falls* by (Kaufmann et al., 2024), for example, proposes that *falls*(A)(B) is acceptable only in contexts where there is some salient agent who actively entertains the question of 'whether A'. That is, *falls* presupposes that its antecedent proposition is an active open question in some agent's attitudinal state. This is again a more specific form of uncertainty than the uncertainty invoked by *if*.

A constraint very similar to that proposed above has been proposed by Arita (2009) as a basis for the contrast encoded in the system of conditional connectives in Japanese. Japanese has four main conditional expressions: *-eba, -tara, -nara, -n(o)nara*. Based on acceptability across a range of conditional interpretations, the author proposes that the choice of conditional in a given construction reflects the speaker's stance towards the antecedent: *-eba / -tara* are specified for ontically unsettled antecedents, *-nara and n(o)nara* for ontically settled antecedents, with *-n(o)nara* additionally marking epistemic ignorance. This shows that the constraint proposed here is encoded in the grammar of an unrelated language. Moreover, this might hold tendentially for the connective *in the event* in English.[3]

Examining the Turkish conditional *-se* with aorist-marked antecedents, Soykan (2021) reports restrictions on the possible interpretations of the antecedent that are very similar to the semantics of *jodi*-conditionals. The marker *-(a/i)r-*, termed 'aorist' in Turkish linguistics, has a semantics similar to the simple present in many Germanic languages– in unembedded clauses, it can have a characterizing interpretation, or a future-referring interpretation. In the antecedent of single-case conditionals, however, the aorist-marked clauses can only be interpreted as future-referring. Although the analysis focuses on the aorist rather than the

[3]Author's observation. A sample of 100 randomly selected occurrences of *in the event*-conditionals in the Corpus of Contemporary American English shows only four instances of ontically-settled antecedents.

conditional connective, Soykan further points out that the conditional in Turkish is more restricted than *if* in the kinds of temporal relations that are allowed between the antecedent and consequent.

In the present work as well as the studies discussed above, a working assumption is that openness is specified in some way in indicative conditional connectives, contrasting with syntactically similar adverbials like *when* in English, *wenn* in German, etc, which are underspecified in this respect. The other logical possibility is that the latter set of connectives are specified for the opposite of openness. That is, certain connectives lexically specify that their antecedent clause is settled in some sense, and the openness of the conditional connective is a strengthened implicature. This is the approach taken by Yeom (2004) in analyzing the semantics of two conditional markers in Korean: *-(u)myeon* and *-ta/la-myeon*. Based on restricted distribution and interpretation across indicative and counterfactual uses, the author proposes that the latter presupposes that the antecedent is ontically settled at the evaluation time, whereas the former is underspecified in this respect. It is possible that one of these approaches is more empirically adequate, or that conditional connectives can in theory specify either antecedent openness or settledness against various modal bases. The relevant fact is that they uniformly show antecedent openness to be a viable dimension of contrast in the semantics of indicative conditionals. Moreover, note that even if we take these openness requirements to come about through strengthened implicatures rather than lexically specified, this differs crucially from the kind of pragmatic explanation that was considered and rejected here. A general diversity condition is indifferent to the semantics of the connective. A strengthened implicature as proposed by Yeom (2004), on the other hand, results from the interaction of the connective's lexical semantics with that of an adverbial counterpart.

This brief survey of connectives across languages shows an emerging typological picture: antecedent openness as a linguistically-relevant dimension of contrast in indicative conditional meaning across connectives. This provides a promising direction of future work, as a point of departure in understanding the 'moving parts' of conditional meaning. A particularly exciting prospect is that many of the connectives discussed above (including *jodi*) also have counterfactual uses. This opens up a possibility to examine how the restrictions on antecedent openness might translate to constraints in the corresponding counterfactual construction. A uniform formal account for indicative and counterfactuals has been a long-standing open question in the field, and this line of inquiry promises to provide valuable empirical leverage for constraining and testing formal choices.

Abbreviations

3	third person
ACC	accusative
CLF	classifier
COP	copula
FUT	future
GEN	genitive

INF	infinitive
LOC	locative
NEG	negative
PRF	perfect
PROG	progressive
PRS	present
PST	past

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