

Counterfactual Morphology and the Licensing of Modal Subordination in Hindi

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1 Introduction

The goals of the presentation are as follows:

- to compare modal subordination in English and Hindi,
- to relate the differences in the two languages to the morpho-syntactic resources available in each for the expression of counterfactuality and the ability in each language to license an implicit restrictor.

2 Modal Subordination in English

2.1 Environments for Modal Subordination

Indefinite NPs appearing within the scope of a semantic operator introduce objects that are generally not available for coreference with subsequent anaphoric expressions, cf. (1, 2a) and (3, 4a). However, when the subsequent sentence itself includes an operator of a certain kind, coreference is possible (1, 2b) and (3, 4b). This phenomenon is known as *modal subordination* (Roberts, 1989; Landman, 1986).

The assertion of the second sentence is interpreted with respect to the hypothetical context introduced in the previous discourse.

Modals:

- (1) A wolf might come in. (Roberts, 1989)
- (2) a. # It is fierce and gray.
b. It would eat you first.
- (3) A thief might break into the house.
- (4) a. # He is wanted in five states.
b. He would take the silver.

(3) can also be followed by a conditional such as (5a) or (5b). The subordinating context in these cases is made explicit by an *if*-clause (5a) or added to the antecedent of a subsequent conditional: e.g., (5b) is paraphrasable as *If a thief broke in and the cabinet were unlocked, he would steal the silver*.

- (5) a. If he broke in, he would take the microwave.
b. If the cabinet were unlocked, he would steal the silver.

Conditionals: Conditionals can also introduce hypothetical contexts with respect to which subsequent sentences are interpreted.

- (6) a. If Agatha had gone to Bavaria, she would have bought a cuckoo clock.
b. She would have put it in her study.
c. \approx [If Agatha had gone to Bavaria and bought a clock] she would have put it in her study.

Negation: negation favors counterfactual and causal relationships.

- (7) a. Mary didn't buy a microwave. (Frank, 1997)
b. She would (#will) never use it.
c. \approx Mary didn't buy a microwave *because* [if she had bought a microwave] she would never have used it.
- (8) a. Fred didn't draw a picture. (Frank, 1997)
b. He would (#will) have made a mess of it.
c. \approx Fred didn't draw a picture *because* [if he had drawn a picture] he would have made a mess of it.

Habituals: Habitual sentences can also license something like modal subordination.

- (9) a. John used to read a book every day.
b. He would start it as he drank his coffee and finish it on the bus ride home.

2.2 Previous Approaches

We briefly present two DRT (Kamp and Reyle, 1993) based approaches to modal subordination. Some DRT basics are given below.

Rudimentary DRT

A DRS $K = \langle U_K, C_K \rangle$ consists of...

- a set of **discourse referents** U_K and
- a set of **conditions** C_K , which can have any of the following forms:
 - $P(x_1, \dots, x_n)$ for n -ary predicate P .
 - $x_i = x_j$, for arbitrary discourse referents x_i and x_j .
 - $\neg K_i$, $K_i \Rightarrow K_j$, $K_i \Diamond K_j$ and $K_i \Box K_j$ for arbitrary DRSs K_i and K_j .

Conditions of the form $K_i \Diamond K_j$, $K_i \Box K_j$ represent generalized quantification over possible worlds. The restrictor K_i adds a (hypothetical) premise to the modal base in a Kratzer (1991) style modal semantics. The modal statements $\Diamond K_j$ and $\Box K_j$ are evaluated wrt this hypothetical modal base.

Anaphoric Accessibility

The discourse referents in U_{K_i} are available for anaphoric reference from a DRS condition $\gamma \in C_{K_j}$ iff K_j is **subordinate to** K_i . Subordination is a transitive relation between DRSs that holds just in case...

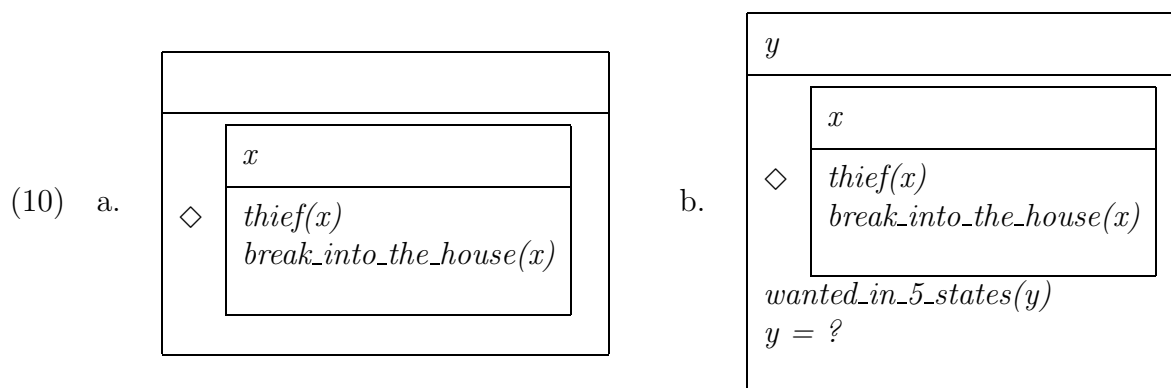
- $i = j$
- K_i is a DRS that contains K_j as part of a complex condition γ in C_{K_i} .
- K_i and K_j form a complex condition of any of the following types: $K_i \Rightarrow K_j$, $K_i \Diamond K_j$ or $K_i \Box K_j$.

In other words: you can look “left and up” for an available antecedent, but not “right and in”.

2.2.1 Roberts (1989)

- Roberts assumes modal statements come with a (possibly implicit) domain restrictor (Lewis, 1975; Kratzer, 1981).
- If this restrictor is left unspecified, appropriate nonfactual material from the preceding discourse context is *accommodated* (Lewis, 1979).

Example: processing the (3) results in the DRS shown in (10a).¹

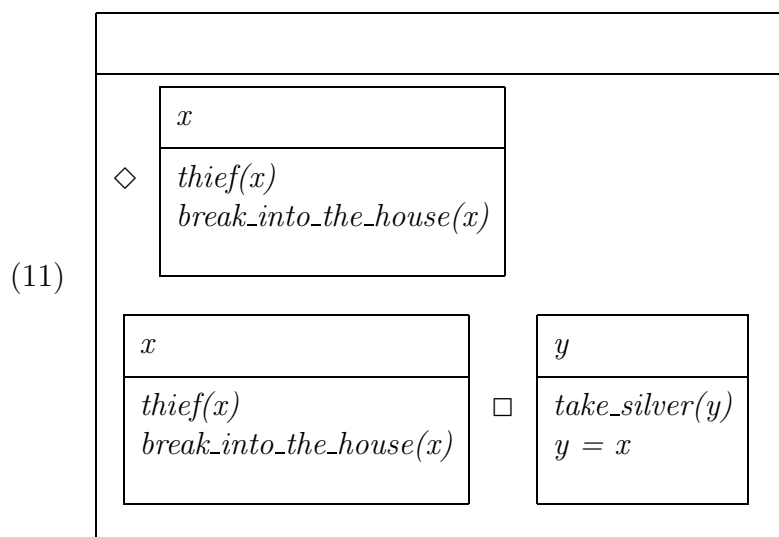


The main DRS of (10a) contains a sub-DRS corresponding to the material in the scope of the modal *might*. Continuing the discourse in (3) with the factual (4a) results in the DRS (10b).

Problem:

- The pronoun *he* introduces a discourse referent *y* which must be linked to a prior accessible discourse referent.
- In (10b), the only available discourse referent is *x* which is inaccessible given the DRT accessibility conditions.
- Thus, the discourse represented by (10b) is infelicitous, as the anaphora remains unresolved.

If we continue the discourse begun in (3) with (4b), the material in the scope of the initial modal verb *might* is accommodated as the restrictor argument of *would*, as shown in (11).



¹For simplicity we suppress the modal's restrictor in (10).

- Now the discourse referent introduced by the indefinite NP *a thief* in the initial sentence is available to serve as the antecedent for the pronoun in the second sentence.
- Without accommodating the implicit restrictor the discourse referent for *a thief* would remain inaccessible to the pronoun.

2.2.2 Geurts (1999)

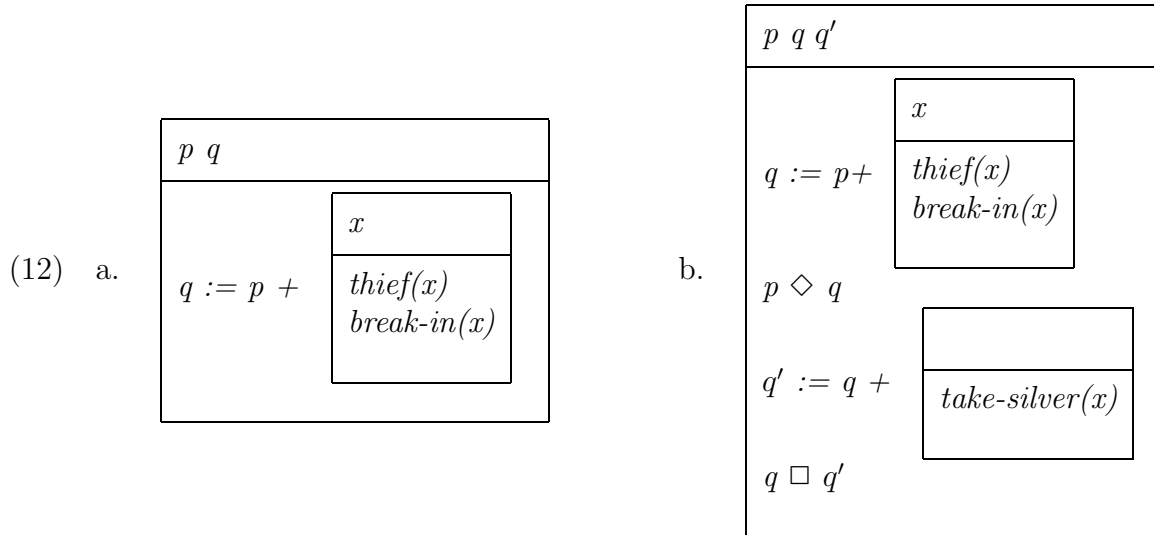
Comments on the Roberts account:

- This generalized accommodation mechanism is powerful, and requires additional constraints on its use (Roberts, 1989).
 - Both sentences must be in non-factual mood.
 - A plausible restrictor must immediately precede the subordinate DRS.
 - An explicit antecedent must already be present in the DRS.
- Since the information in the domain restrictor of the second sentence is already present in the DRS, it seems counterintuitive to accommodate it.

Geurts proposes an alternative to Roberts' account. Both assume that the restrictor of the modal is presupposed, but in the Geurts account the presupposition is anaphorically bound rather than accommodated.

- Uses *binding theory of presupposition* of van der Sandt (1992). Presuppositions are taken to search out antecedents as pronominals do. In DRT this means that they go 'left and up' in the DRS along a path defined by the DRT accessibility relation.
- Modal case: Modals presuppose their restrictors and introduce propositional referents which label subDRSs (an approach also taken by Frank (1997)). Conditions of the form $p = p' + K_\varphi$, K_φ a DRS, are used to model update of a context p' with the content of K_φ .

This framework gives the representation in (12a) for (3). Updating with (4b) produces (12b), after binding the presuppositions of the modals to suitable antecedents.



3 Modal Subordination in Hindi

Recall that in English a modal in the second sentence is sufficient to license modal subordination. This appears not to be the case in Hindi.

Modals: The Hindi equivalent of the English discourse (1, 2b) is infelicitous, cf. (13, 14a). The domain restriction must be explicitly introduced by an *if*-clause, as in (14b).

- (13) shaayad koi bheRiyaa kamre-mẽ ghus aa-e
 maybe some wolf room-in enter COME-Sbjv
 ‘A wolf might come in.’

- (14) a. # vo tum-ko sab-se pahle khaa-e-gaa
 it you-ACC all-than before eat-Fut
 ‘It will eat you first.’
 b. [agar vo kamre-mẽ ghus aa-yaa] to vo tum-ko sab-se pahle
 [if he room-in enter COME-Pfv] then he you-ACC all-than before
 khaa-e-gaa
 eat-Fut
 ‘If it comes in, it will eat you first.’

Negation: Similar observations hold for the cases involving negation.

- (15) Mary ke-paas microwave nahii hai
 Mary near microwave Neg is
 ‘Mary doesn’t own a microwave.’

- (16) a. # vo us-kaa kabhii bhii prayog nahii kartii
 she its never ever use Neg do-Fut
 ‘She will never use it.’
- b. [agar us-ke paas microwave hotii] to vo us-kaa kabhii prayog naa
 [if her near microwave be-Hab] then she its ever use Neg
 kartii
 do-Hab.f
 ‘If she had a microwave, she would never have used it.’

Conditionals: There are instances where modal subordination in Hindi resembles the English case. The initial sentence of these discourses is a full conditional.

- An indicative conditional (17) can be followed by sentences containing a futurate modal and an explicit discourse marker, i.e., one advancing a narrative sequence: (18a) and (18a’).

- (17) agar koi bheRiyaa kamre-mẽ ghus aa-yaa, to vo tum-ko sab-se pahle
 if some wolf room-in enter COME-Sbjv, then it you-ACC all-than before
 khaa le-gaa
 eat TAKE-Fut
 ‘If some wolf comes in, it will eat you first.’

- (18) a. vo tumhari behen ko bhii khaa le-gaa
 it your sister ACC also eat TAKE-Fut
 ‘It will also eat your sister.’
- a’. ?? (phir/uske-baad) vo tumhari behen ko khaa le-gaa
 (then/after-that) it your sister ACC eat TAKE-Fut
 ‘??(Then/After that) it will eat your sister.’

- Counterfactual conditionals (19) can be followed by a series of sentences containing a tenseless habitual participle ($V_{hab} + \phi_{tns}$), as in (20). These sequences do not require explicit discourse markers, unlike the indicative case.

- (19) agar Mary-ke paas microwave hotii, to vo us-kaa kabhii prayog naa kartii.
 if Mary near microwave be-Hab, then she its ever use Neg do-Hab.f.
 ‘If Mary had a microwave, she would never have used it.’
- (20) vo us-ko drawing room me rakh detii. us-ke paRosii microwave-ko
 she it-ACC drawing room in keep give-Hab.f. she-GEN neighbors microwave-ACC
 nihaarte.
 admire-Hab.M.
 ‘She would have kept it in the drawing room. Her neighbors would have admired it.’

4 Background

4.1 Past-Habitual in Hindi

We indicate the habitual participle, i.e., the verbal element marked with *-taa* by V_{hab} .

The basic distribution of the habitual morpheme is as follows:

- V_{hab} requires an overt tense specification. (21) in isolation is unacceptable without some tense bearing element.

- (21) Ram ghar jaa-taa *(hai/thaa)
Ram home go-Hab PRS/PST
'Ram goes/used to go home.'

Exceptions: tenseless V_{hab} is possible with proper licensing.

- $V_{hab} + \phi_{tns}$ is acceptable in (i) a counterfactual conditional (22), (ii) as part of a sequence of sentences where the first sentence is a past habitual with an overt tense morpheme (23) or (iii) in a past habitual sentence containing an overt adverb of quantification (24), cf. Bhatt (1998).

- (22) agar Billu parhaii kar-taa to vo paas ho jaa-taa
if Billu study do-Hab then he pass be GO-Hab
'If Billu would have studied, he would have passed.'

- (23) [fursat-ke samay ve dāṇḍe-ko haath mẽ jhulaa-yaa kar-te the]. [kabhi
[leisure-GEN time he stick-ACC hand in swing-Pfv do-Hab PST] [sometimes
use naak ke-paas rakh-te]. [us-kii sugandh-kaa majaa le-te]
it-ACC nose near keep-Hab] [it-GEN perfume-GEN pleasure take-Hab]
'In times of leisure, he would swing the stick in his hand. Sometimes, he would keep it near his nose. He would take pleasure in its smell.'

- (24) kai-baar apnii hatheli-ko mantrii-ji anjaane-mẽ jakhmii kar le-te
oftentimes selfGEN palm-ACC minister-Hon unknowingly wound do TAKE-Hab
'Oftentimes, the minister would unknowingly wound his palm.'
NOT 'Oftentimes, the minister unknowingly wounds his palm.'

- $Neg + V_{hab} + \phi_{tns}$ is interpreted as a present habitual.

- (25) Billu parhaii nahii kartaa
Billu study Neg do-Hab
'Billu doesn't study.'
'*Billu didn't used to study.'

4.2 English *would*

Three uses of the English modal *would*:

1. In the consequent of a counterfactual conditional.

- (26) If France hadn't been knocked out in the first round, they would have advanced to the quarterfinals.

will vs. *would*: *will* pragmatically presupposes that the assertion in the *if*-clause is compatible with the context of utterance; *would* suspends this presupposition (Stalnaker, 1976), cf. (7) and (8).

2. Implicit conditionals.

Examples such as (27a) and (28a) can be treated as counterfactual conditionals whose implicit antecedent provides the necessary preconditions for the truth or falsity of the sentence (Kasper, 1992).

- (27) a. John failed the exam. Peter would have passed.
b. \approx [If Peter had undergone the exam], he would have passed.
- (28) a. John would like Mary to listen to this symphony. (Pesetsky, 1991)
b. \approx If Mary were to listen to this symphony, John would like *it*.

These first two uses are related: both express **conditional meanings**.

3. Past habitual.

- (29) a. John used to participate in the community theater. He would always get the lead.
b. * If John participated in the community theater, he would get the lead.
b.' When John participated in the community theater, he would always get the lead.

This use does *not* involve quantification over possible worlds, instead it quantifies over past times or eventualities, cf. (29b').

5 Comparisons

Table 1 summarizes the data introduced so far.

- **Contexts** are characterizations of initial sentences in the above discourses.
- **Licensers** are those elements in subsequent sentences that we take to license modal subordination.

Context	English Licenser	Hindi Licenser
Negation	would	counterfactual cond.
Modal	would/will	indicative cond.
Indicative cond.	would/will and disc. adv.	will and disc. adv.
Counterfactual cond.	would	hab. part.
Habitual	(PST hab) would	hab. part.

Table 1: **Licensing of Modal Subordination**

Three generalizations emerge from an examination of Table 1 in light of the background presented in the previous section:

1. Negated and counterfactual contexts require subordinated sentences to contain “counterfactual” morphology, i.e., *would* in English or the tenseless habitual participle in Hindi. The licensing of this morphology in Hindi is more strict than in English. This accounts for the differences between the two languages in these cases.
2. A habitual context requires habitual morphology. In both languages, this morphology is the same as that used in counterfactual conditionals (Iatridou, 2000).
3. In Hindi, modal subordination is licensed in a modal context by an overt *if*-clause, i.e. a full indicative conditional. Subsequent sentences, however, need only a discourse adverbial, as in English.

5.1 Licensing through Counterfactual Morphology

5.1.1 Counterfactuality

English *would* and the Hindi habitual participle both mark counterfactual environments.

However, *would* doesn’t require overt morpho-syntactic licensing, whereas the Hindi habitual participle does. In a context in which the English (30a) is acceptable, the Hindi (30b) is not.

- (30) a. I would have come.

- b. * mĒ aa-taa
I come-Hab

In Hindi the counterfactual context must be explicitly introduced for the morphology to be licensed (30b').

- (30b') mĒ aa-taa lekin kuchh log aa gaye the
I come-Hab but some people come GO-Pfv Pst
'I would have come but some people came over.'
≈ I would have come [if some people hadn't come over]

Since the negated habitual participle in (16a) can only receive a present habitual interpretation, modal subordination cannot occur. However, in (16b), because the *if*-clause makes a counterfactual interpretation available, subordination is licensed.

- (15) Mary ke-paas microwave nahii hai
Mary near microwave Neg is
'Mary doesn't own a microwave.'

- (16) a. # vo us-kaa kabhii prayog nahii kartii
she its never use Neg do-Hab.f
'She never uses it.'
- b. [agar us-ke paas microwave hotii] to vo us-kaa kabhii prayog naa
[if her near microwave be-Hab] then she its ever use Neg
kartii
do-Hab.f
'If she had a microwave, she would never have used it.'

- (7) a. Mary didn't buy a microwave.
b. She would never use it.

In cases like (19, 20), repeated below, a counterfactual conditional is followed by a sequence of tenseless habitual sentences.

The continuations are apparently interpreted within the scope of the *if*-clause in (19), since the tenseless V_{Hab} morphology in (20) is licensed. That is, the *if*-clause takes scope over the entire discourse.

- (19) agar Mary-ke paas microwave hotii, to vo us-kaa kabhii prayog naa kartii.
if Mary near microwave be-Hab, then she its ever use Neg do-Hab.f.
'If Mary had a microwave, she would never have used it.'

- (20) vo us-ko drawing room me rakh detii. us-ke paRosii microwave-ko
 she it-ACC drawing room in keep give-Hab.f. she-GEN neighbors microwave-ACC
 nihaarte.
 admire-Hab.M.
 She would have kept it in the drawing room. Her neighbors would have admired it.'

5.1.2 Past Habituals.

However, a conditional interpretation is not a *necessary* prerequisite for subordination like behavior, as the following two examples suggest.

- (9) a. John used to read a book every day.
 b. He would start it as he drank his coffee and finish it on the bus ride home.
- (23') [fursat-ke samay ve koi-na-koi kitaab paRhate the]. [kabhi use
 [leisure-GEN time he some-or-other book read-Hab PST] [sometimes it-ACC
 naak ke-paas rakh-te]. [us-kii sugandh Raa majaa le-te]
 nose near keep-Hab] [it-GEN smell GEN enjoyment take-Hab]
 'In times of leisure, he would read some book or other. Sometimes, he would keep it
 near his nose. He would take pleasure in its smell.'

Whereas in standard cases of modal subordination we quantify over possible worlds, these cases quantify over past eventualities, and therefore the entities referred to actually exist. Yet anaphora in cases such as (31) is still infelicitous, suggesting that a kind of subordination is at work.

- (31) # John used to read a book everyday. He keeps it on his shelf.

5.2 Modals & Indicative conditionals

Modal and indicative conditional contexts are much like the counterfactual cases above (with a few twists):

- In English the modal verbs *would* and *will* are sufficient to license subordinate sentences in modal contexts.
 In Hindi, however, a sentence (immediately) subordinate to a modal context must be a full indicative conditional, cf. (13, 14a).
- In both English and Hindi, a simple sentence containing a futurate can be subordinate to an indicative conditional context, provided the sentence contains a presuppositional element, i.e., *too*, *also* or a discourse adverbial, i.e., *then*, *after that*, cf. (17, 18a/18a') repeated below.

So once again, in Hindi an *if*-clause is able to take scope over an extended chunk of discourse, licensing the continuation of a hypothetical context with sentences containing a futurate verb and no explicit restrictor.

- (17) agar koi bheRiyaa kamre-mẽ ghus aa-yaa, to vo tum-ko sab-se pahle
 if some wolf room-in enter COME-Sbjv, then it you-ACC all-than before
 khaa le-gaa
 eat TAKE-Fut
 ‘If some wolf comes in, it will eat you first.’
- (18) a. vo tumhari behen ko bhii khaa le-gaa
 it your sister ACC also eat TAKE-Fut
 ‘It will also eat your sister.’
- a’. ?? (phir/uske-baad) vo tumhari behen ko khaa le-gaa
 (then/after-that) it your sister ACC eat TAKE-Fut
 ‘??(Then/After that) it will eat your sister.’

As noted above, these discourses are strange without a presuppositional item (18a) or discourse adverbial (18a’). This suggests that by themselves, futurate modals like *will* cannot license modal subordination.

The following argument provides a possible explanation:

- Discourse adverbials relate the proposition in their scope to an antecedent proposition or in the case of *too*, *also* presuppose a proposition of a certain form (Webber et al., 2001).
- The most plausible antecedents in the above discourses occur in an indicative conditional context.
- Picking up one of these nonfactual antecedents causes the proposition in the scope of the adverbial to also be interpreted nonfactually. Otherwise the discourse would be incoherent (Poesio and Zucchi, 1992).

6 Summary

We conclude that...

- semantically, modal subordination in English and Hindi appear to be very similar,
- in the cases which involve “counterfactuality,” the differences can be traced to the licensing conditions of counterfactual morphology in each language; in particular, the Hindi habitual participle has much stricter licensing conditions than English *would*.

Several issues remain open:

- the precise reason Hindi requires an overt conditional clause in modal contexts,
- the mechanism by which an *if*-clause is able to take scope over a sequence of sentence, as in both indicative and counterfactual cases,
- the role of the discourse adverbial in licensing subordination in both languages considered.

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