

## Causal networks in discourse: A case of Mandarin negative conditionals

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Mandarin has negative conditionals (NCs) which are headed by the complementizer *yaobushi* ‘if not’. The negative meaning is contributed by *bu* ‘not’. Henderson (2010; 2011) analyzes the semantics of NCs in English (e.g. *if-not-for*-conditionals) in a modification of Schulz’s (2007) causal model. Ippolito & Su (2014) discuss crosslinguistic data including Mandarin and offer a syntax-semantic analysis based on the assumption that a type-mismatch drives movement of negation into the complementizer. We stand with Henderson in that NCs encode causal reasoning, but we address both the semantics and the pragmatics of the construction. We argue that NCs instantiate a linguistic form of causal reasoning to the best explanation in discourse: *yaobushi*-conditionals provide a causally maximal answer to a contextually salient *Why*-question. We show that this account captures the new observation that NCs cannot be contrastive topics.

**Basic properties** Like NCs in other languages, Mandarin NCs show three basic properties (cf. Henderson; I&S). (i) Unlike its positive counterpart *yaoshi*, *yaobushi* only allows counterfactual (CF) interpretations.

- (1) Context: Whenever the road is under construction, the apartments nearby experience water suspension. As a result, the residents can’t cook at home and have to order food delivery.

**yaoshi** waimian xiulu, John jiu xuyao dian waimai (1e)  
IF outside road.construction John then need order delivery PERF

✓ **Indicative**: ‘If there’s road construction outside, John needs to order food delivery.’

✓ **CF**: ‘If there were road construction outside, John would need to order food delivery.’

- (2) **yaobushi** waimian xiulu, John jiu neng ziji zuofan (1e)  
IF-NOT outside road.construction John then can self cook PERF

#**Indicative**: ‘If there’s no road construction outside, John can cook himself.’

✓ **CF**: ‘If there were no road construction outside, John would be able to cook himself.’

(ii) CFs have a less common interpretation called backtracking that expresses reasoning from effect to cause (cf. Lewis 1979). Only *yaoshi* allows backtracking.

- (3) **yaoshi** jiali tingshui, waimian jiu zhengzai xiulu (1e)  
IF at.home water.suspension outside then now road.construction LE

‘If there were water suspension at home, there would be road construction outside now.’

- (4) # **yaobushi** jiali tingshui, waimian jiu meiyou xiulu (1e)  
IF-NOT at.home water.suspension outside then NEG.PERF road.construction PERF

Intended: ‘If there weren’t water suspension, the road wouldn’t be under construction now.’

(iii) The preadjacent of *yaobushi* is factive, e.g. (2) implies that the road is truly under construction. It is important that in NCs the negation appears within the complementizer, because *yaoshi*-antecedents with overt sentential negation pattern with (1)/(3), e.g. *yaoshi jiali bu/mei tingshui...* (lit. ‘if there isn’t/hasn’t been water suspension’).

**New observation** We observe a novel contrast between *yaoshi* and *yaobushi* diagnosed by *ne*, a contrastive topic marker according to Constant (2014). Constant observes that *ne* can mark *if*-clauses, and indeed *yaoshi*-antecedents in (1) and (3) are felicitous with *ne* under both indicative and CF readings, e.g. *yaoshi waimian xiulu ne...* (lit. ‘if instead the road is/were under construction outside’). In contrast, we find that *yaobushi*-conditionals reject such marking. Besides, Constant shows that *if*-clauses marked by *ne* can form fragment questions, translated into ‘what if...?’, as in (5). Note that it is possible to contrast a *ne*-marked fragment question with another *if*-clause explicitly, e.g. (5) can be uttered either alone or as a continuation of (1). We find that *yaobushi* cannot form fragment questions.

- (5) **yaoshi** waimian tinggong ne? (6) # **yaobushi** waimian tinggong ne?  
IF outside stop.work NE IF-NOT outside stop.work NE

‘What if there is/were no construction?’

‘What if it weren’t the case that constr. stopped?’

To this, we add that *yaobushi*-conditionals require all interlocutors to know the counterfactuality of the consequent (e.g. the hearer of (2) knows that John currently can’t cook himself).

**Analysis** We argue that NCs express causal reasoning as follows. In search of the explanation of a fact  $x$  (which is the negation of the consequent of NCs), the speaker first infers upwards from  $x$  to its cause along the causal flow (cf. Pearl 2000). A causal intervention raised by the negation in *yaobushi* forces her to cut the established causal link into  $x$ 's cause. Finally, she reasons once more in the opposite direction, i.e. from the cause to the effect, about the non-factual situation. We add that the reasoning is subject to a maximality condition in terms of causal dependency, which requires the speaker to reach the most remote causal ancestor in explaining  $x$ . These are ensured by mapping NCs onto the semantics in (7). For this, I assume that a context is a quadruple in the form of  $c = \langle w, \mathcal{C}, QUD, f \rangle$ .  $w$  is the world of  $c$ .  $\mathcal{C}$  represents the salient causal structure which is a pair  $\langle U, < \rangle$ , where  $U$  is a set of finite partitions on  $W$ , and  $<$  is a directed acyclic graph over  $U$ , e.g.  $P_1 < P_2$  indicates that  $P_1$  directly affects  $P_2$  (Kaufmann 2013).  $QUD$  is the stack of question under discussion in  $c$  (Roberts 2012).  $f$  constitutes the salient causal modal base, a function from worlds to sets of causally relevant truths (i.e. sets of all cells of all partitions in  $U_c$  true at that world);  $f$  is thus realistic, and for the current purpose I assume that all propositions in the set assigned by  $f$  are causally relevant. Building on the Kratzer-style premise semantics, I also assume that an antecedent  $\phi$  updates  $f_c$  in a way defined as follows:  $f_c[\phi](w) := f'_c(w) \cup \{\phi\}$  where  $f'_c(w)$  is the maximal subset of  $f_c(w)$  that is (i) logically consistent with  $\phi$  (cf. Schulz 2011; I assume for simplicity that there is a unique maximal subset consistent with  $\phi$ , see Kaufmann for the case when there is none), and (ii) closed under causal ancestors (i.e. whenever  $x$  is in the set,  $x$ 's causal descendants are also in the set, but not vice versa, cf. Kaufmann).

- (7) a. '*yaobushi p, q*' is defined in  $c$  only if (i)  $\exists P \in U_c. \exists Q \in U_c. p \in P \wedge q \in Q \wedge P < Q$ ; and (ii) the question on top of  $QUD_c$  is in the form of "Why  $\neg q$ ?", and (iii)  $p$  provides a causally maximal answer to  $QUD_c$ . This holds iff  $\forall r. \forall R : r \in R \in U_c. R < Q \rightarrow r \notin f_c[\neg p](w)$  (i.e. manipulating the value of  $P$  removes all variables that affect  $Q$  from  $f_c(w)$ ).

b. If defined, '*yaobushi p, q*' is true in  $c$  iff  $q$  is a consequence of  $f_c[\neg p]$  together with causal laws. Assuming that *why*-questions presuppose their the prejacent (Lawler 1971, Tomioka 2009 a.o.), the requirement of a suitable  $QUD_c$  in (7a-ii) accounts for our observation that the consequent is presupposed to be false. Together with the truth condition that  $q$  is true in the modal base updated with  $\neg p$ , it also explains the factivity of antecedents. In combination with the negation in *yaobushi*, it further makes the conditional counterfactual. The rest of the observed facts all follow from (7a-iii). It naturally blocks backtracking readings because the condition rules out the possibility of any cause of the fact farther than the one conveyed in the antecedent (we leave it as a non-linguistic issue how remote in a causal structure one shall trace back, cf. Lipton's 2004 notion of 'why-regress'). It also accounts for the distribution of *ne* in marking *if*-clauses. For this, we adopt Constant's argument that *ne* is rejected by semantically maximal phrases that cannot be contrasted with some other possibilities, cf. *{most/#all} students ne, they work hard*. Therefore, our account captures the oddness of *ne*-marked *yaobushi*-antecedents, since the antecedents are maximally informative.

**More predictions** First, for causal chains with more than two variables, e.g. *Construction*  $\Rightarrow$  *Water*  $\Rightarrow$  *Delivery* as in (1–4), speakers find it unacceptable if *yaobushi*-antecedents indicate intermediate causes. This is predicted by the completeness condition. Second, in the case of a fact resulting from multiple causes, the completeness condition requires the prejacent of *yaobushi* to be the conjunction of the causes. This is also consistent with speakers' intuition. Third, we find that NCs in many languages require phrases meaning 'reasons' such as English *If not for...*, and Spanish *Si no fuera porque...* (lit. 'if not were because'). This seeming coincidence follows from the idea that NCs instantiate causal reasoning to the best explanation.

**The disjunctive use** There is another disjunctive use of *yaobushi*, i.e. *yaobushi A, jiushi B* (lit. 'if-not A, then B'). We leave this use out of the discussion of NCs because its interpretation doesn't involve causal reasoning. It also requires the presence of *jiushi* in the second clause (a focus-sensitive exclusive similar to English *only* cf. Liu 2017), which doesn't appear in NCs and other regular conditionals in Mandarin.

**Selected Refs** Constant 2014 *Contrastive Topic*. UMass. Henderson 2010 "If not for" Counterfactuals'. *WCCFL*. Ippolito&Su 2014 'Counterfactuals, negation, and polarity'. *MITWPL*. Kaufmann 2013 'Causal premise semantics'. *CogSci*. Schulz 2011 "If you'd wiggled A, then B would've changed". *Synthese*.