Disambiguating two conditional construals: Evidence from the optionality of *if*[1]

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Abstract. In Kratzer's restrictor analysis, conditionals without overt modals are assumed to contain a covert epistemic necessity modal (Kratzer 1986, 1991a). Although this assumption has gained empirical support from a number of conditional phenomena (Frank 1996; Zvolenszky 2002; von Fintel and Iatridou 2002 among others), it still remains unclear whether the covert epistemic necessity modal is *always* present. I argue that conditional construals with and without the covert epistemic necessity modal are both needed, evidenced by the distribution of Mandarin *ruguo* in deontic conditionals.

Keywords: Deontic conditionals, epistemic modals, restrictor analysis of conditionals, Mandarin Chinese.

1. Introduction

Kratzer's restrictor analysis of conditionals treats conditionals as quantificational constructions, with a modal operator in the consequent restricted by the antecedent (Kratzer 1986, 1991a, 2012). For conditionals without overt modals, she assumes a covert epistemic necessity modal, restricted by the antecedent. In this paper, I discuss the consequence of this assumption, specifically, whether the covert epistemic necessity modal is needed in general.

From English, there is converging evidence that argues convincingly in favor of the conditional construal in which the covert epistemic necessity modal is present. The observation that plays a particularly important role is the fact that some conditionals whose consequents contain overt non-epistemic modals are interpreted as epistemic conditionals nevertheless (Frank 1996; Zvolenszky 2002; von Fintel and Iatridou 2002, 2005; Geurts 2004; Schwager 2006; Kaufmann and Schwager 2009; Condoravdi and Lauer 2016; Kaufmann and Kaufmann 2015). Focusing on deontic conditionals, Frank (1996) goes one step further and argues that the covert epistemic necessity modal is *always* present—so, overt deontic modals in conditional consequents are always outscoped by a covert epistemic necessity modal, and there are thus in fact no truly deontic conditionals.

In this paper, I challenge Frank (1996)'s view and argue that conditional construals with and without the covert epistemic necessity modal are both needed. The key evidence for this proposal comes from the interaction between Mandarin deontic conditionals and *ruguo*, a marker that appears at the beginning of conditional antecedents. Although *ruguo* appears to be optional at first glance, on closer inspection, I show that its distribution correlates with whether the conditionals are interpreted as epistemic, a correlation that English *if*-conditionals do not display. In order to account for the distribution of *ruguo*, I argue that the conditional construals

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with and without the covert epistemic necessity modal should both be available in our theory of conditionals.

This paper is structured as follows. Sec 2 introduces the basic ingredients of Kratzer's restrictor analysis of conditionals. Sec 3 reviews the two construals of deontic conditionals and considers what type of data would constitute evidence for the construal without the covert epistemic necessity modal. Sec 4 presents data concerning Mandarin *ruguo* in deontic conditional, which I take to indicate that both conditional construals are needed. Sec 5 spells out an analysis and shows that it makes correct predictions in other non-epistemic conditionals. Sec 6 discusses some open issues concerning (overtly modalized) epistemic conditionals. Sec 7 concludes the paper.

2. The restrictor analysis in a nutshell

The standard Kratzerian framework analyzes conditionals as quantificational constructions, with modal operators restricted by conditional antecedents (Kratzer 1986, 1991a). To introduce Kratzer's analysis of conditionals thus requires us to revisit her analysis of modality first.

In Kratzer's analysis of modality (1977; 1981; 1991b; 2012), modal expressions like *must* and *may* are interpreted with respect to two contextual parameters: a modal base, represented as f, and an ordering source, represented as g. Formally, both the modal base and the ordering source are conversational backgrounds, i.e. they are functions from worlds to sets of propositions.

The division of labor between the modal base and the ordering source in the interpretation of modality is the following. The modal base maps a world to a set of inviolable propositions, such as what is known (epistemic), what the relevant facts are (circumstantial). On the other hand, the ordering source supplies violable and possibly inconsistent information, such as laws (deontic), wishes (bouletic) and normal courses of events (stereotypical). At a given world, the worlds in the intersection of the propositions provided by the modal base (that is, $\bigcap f(w)$) are ranked by the ordering source. Specifically, for any world i and any ordering source g, $g(i)$ induces a preorder $\leq_{g(i)}$ on W as defined in (1), where $w \leq_{g(i)} w'$ means that w is at least as optimal as w' in view of the information supplied by g at i.

(1) $w \leq_{g(i)} w'$ iff $\{p : p \in g(i) \ \& \ w' \in p\} \subseteq \{p : p \in g(i) \ \& \ w \in p\}$

For simplification, I assume the Limit Assumption (Lewis 1973, 1981,Kaufmann 2017), that is, all non-empty lower subsets of $\bigcap f(w)$ contain worlds that are minimal in the order induced by $g(w)$. I follow Kaufmann and Kaufmann (2015) and represent a set of minimal worlds with O, defined as in (2).

(2) $O(f,g,w) := \{u \in \cap f(w) | \forall v \in \cap f(w)[v \leq_{g(w)} u \rightarrow u \leq_{g(w)} v]\}$

With these ingredients in place, the interpretation of modal expressions like *must* and *may* can be spelled out with their corresponding quantificational force, as in (3a) and (3b), respectively.

(3)   a.   '*must p*' is true at w w.r.t. f and g iff for all $v \in O(f,g,w)$, p is true at v.
        b.   '*may p*' is true at w w.r.t. f and g iff for some $v \in O(f,g,w)$, p is true at v.

These ingredients carry over to the restrictor analysis of conditionals. Under this analysis, a conditional contains a modal operator, whose restrictor is constituted by the antecedent proposition. The restriction is achieved by updating the modal base with the antecedent proposition,

as shown in (4).

(4)   'if p, MOD q' is true at w w.r.t. f, g iff 'MOD q' is true at w w.r.t. f^+, g, where $f^+ = \lambda u.f(u) \cup \{[\![p]\!]\}$

Take (5) as example for a simple conditional. Its construal under the restrictor analysis is schematized in (6).

(5)   If the shelves are empty, bread flour must be out of stock again.

(6) $\square^{epi}$ [the shelves are empty] [bread flour is out of stock again]
       $\underbrace{\qquad\qquad\qquad}_{\text{restrictor}}$ $\underbrace{\qquad\qquad\qquad\qquad}_{\text{nuclear scope}}$

For conditionals without overt modal operators, the restrictor analysis assumes that they contain a covert epistemic necessity modal. Hence, (7) also has the construal illustrated in (6), similarly to its counterpart where an overt epistemic necessity modal *must* is present, cf. (5).

(7)   If the shelves are empty, bread flour is out of stock again.

One of the major contributions of Kratzer's analysis of modality is that, by utilizing contextually-supplied modal bases and ordering sources, it successfully captures the contextual variability of modal expressions. In the following, the modal operators that will be central to our concerns are deontic modals and epistemic modals. For concreteness, I will follow the standard treatment and assume that a deontic modal operator is interpreted with respect to a circumstantial modal base and a deontic ordering source, and an epistemic modal operator is interpreted with respect to an epistemic modal base and a stereotypical ordering source. It will become clear that these choices together play a crucial role in interpreting deontic conditionals under the two distinct construals that we will consider in the next section.

3. Two construals for deontic conditionals

Introducing a covert epistemic necessity modal into the theory of conditionals puts forward (at least) two analyses for conditionals with overtly modalized consequents.[2] Consider (8).

(8)   If Max buys a car, he will have to pay car taxes.
                    (Kaufmann and Kaufmann 2015: 260 (31), modified from Frank 1996)

Under one analysis, the antecedent restricts the deontic modal *have to* directly, thus dubbed the **Overt Conditional Operator (OCO) construal**.[3] Alternatively, one could assume that there is a covert epistemic necessity modal scoping over the deontic modal, with the antecedent restricting the covert epistemic necessity modal; this construal is thus dubbed the **Covert Conditional Operator (CCO) construal**.[4] See (9a) and (9b) for the illustrations of the OCO and

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[2] 'At least', because the two analyses to be discussed in the following are not the only options. One could also construe an overtly modalized conditional with *a sequence of* covert epistemic necessity modals outscoping the overt one. However, due to the nature of the epistemic accessibility relation, stacking (one or more) epistemic necessity modals over epistemic modals does give rise to distinct interpretations. Hence, I will not discuss the possibility of stacking epistemic necessity modals; see Kaufmann and Kaufmann (2015) for more detailed discussions.

[3] I will leave aside the possibility that the antecedent restricts the tense auxiliary *will*, although *will* is sometimes analyzed as a modal operator, e.g. Condoravdi (2002); Kaufmann (2005). As a preliminary remark, native speakers' judgments regarding *will* in (8) are subtle: some suggest that (8) without *will* gets slightly worse, some do not find such contrast. Thanks to Frank Sode (p.c.) for raising this issue to my attention.

[4] The terminology of the OCO and the CCO construals are from Kaufmann and Schwager (2009).

the CCO construals, respectively.

(9) a. **Overt Conditional Operator construal (OCO):**
   $\Box^{deo}$ [if Max buys a car] [he pays car taxes]
 b. **Covert Conditional Operator construal (CCO):**
   $\Box^{epi}$ [if Max buys a car] [$\Box^{deo}$ he pays car taxes]

In the following, I will focus on the two distinct interpretations of deontic conditionals that have been discussed in the literature and examine how the OCO and the CCO construals fare with each reading. The upshot is that the existing evidence confirms the availability of the CCO construal of deontic conditionals, although whether the OCO construal is also available remains an open question. For more evidence from conditional phenomena that argue in favor of the CCO construal, see Frank (1996); Zvolenszky (2002); Geurts (2004); von Fintel and Iatridou (2002, 2005); Schwager (2006); Kaufmann and Schwager (2009); Condoravdi and Lauer (2016).

3.1. The non-shifty reading

Let us consider the tax-paying example first, repeated in (10).

(10) If Max buys a car, he will **have to** pay car taxes.   (=(8))

Intuitively, under the most natural reading, (10) is true just in case the actual regulations holding at the current world require car-owners to pay car taxes; in particular, the regulations at the hypothetical worlds where Max buys a car are irrelevant. I call this reading the **non-shifty reading**, since it requires the deontic modal to be interpreted with respect to the world of evaluation, rather than the antecedent worlds. I leave aside the less natural reading of (10) that Max's obligation of tax-paying is conditioned by his purchase of a car (see Sec 3.2 for discussions about this reading).

Is the non-shifty reading predicted by the OCO and the CCO construals? Let us start with the OCO construal, repeated in (11a). (11b) shows the truth conditions of (10) using the basic set-up of the restrictor analysis introduced in Sec 2 ('*cir*' stands for circumstantial).

(11) a. **OCO:** $\Box^{deo}$ [if Max buys a car] [he pays car taxes]
 b. (10) is true in w w.r.t. f_{cir} and g_{deo} iff for all $w' \in O(f_{cir}, g_{deo}, w)$ where Max buys a car, he pays car taxes at w'.

Suppose the world of evaluation w is such that Max is 50 years old, and the laws require any car-owner under the age of 70 to pay car taxes. Intuitively, (10) is true at w. According to (11b), we first collect all worlds that are compatible with the relevant facts (e.g. Max's age) and eliminate those where Max does not buy a car; the remaining worlds are then ordered based on the actual laws. Given the provision of the laws at w, all worlds in $O(f_{cir}, g_{deo}, w)$ are worlds where Max pays car taxes. Therefore, OCO correctly predicts (10) to be true.

Now, consider the CCO construal, repeated in (12a). Its truth conditions are given in (12b) ('*st*' stands for stereotypical).

(12) a. **CCO:** $\Box^{epi}$ [if Max buys a car] [$\Box^{deo}$ he pays car taxes]

b. (10) is true in w w.r.t. f_{cir}, f_{epi}, g_{st} and g_{deo} iff for all $w' \in O(f_{epi}, g_{st}, w)$ where Max buys a car, for all $w'' \in O(f_{cir}, g_{deo}, w')$, he pays car taxes at w''.

Suppose the same world of evaluation w as before: Max is 50 years old, car-owners under the age of 70 must pay car taxes. According to (12b), we first collect the worlds compatible with the speaker's knowledge at w (including e.g. Max's age), and eliminate those where Max doesn't buy a car. The remaining worlds are then ranked based on the normal courses of events at w; for instance, that the tax laws do not change. The worlds that rank the highest, i.e. $O(f_{epi}, g_{st}, w)$, constitute the quantificational domain of the deontic modal. Next, from each world w' in $O(f_{epi}, g_{st}, w)$, we collect the worlds compatible with the relevant facts at w', including that Max is 50 years old, and that he has a car. We then rank those worlds with respect to the laws at w' and single out the highest-ranked ones, i.e. $O(f_{cir}, g_{deo}, w')$; crucially, the laws about car taxes at w' are guaranteed to remain identical with those at w, thanks to the stereotypical ordering source of the epistemic modal. This ensures that in all worlds in $O(f_{cir}, g_{deo}, w')$, Max pays car taxes. Therefore, CCO also predicts (10) to be true, which is in line with our intuitions. See Figure 1 for a simplified visualization of the interpretation of deontic conditionals under the CCO construal; the shaded areas represent the domains where the necessity of the proposition '*Max pays car taxes*' gets evaluated.
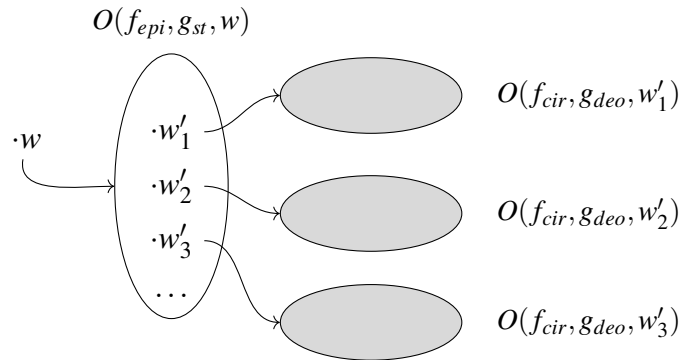

Figure 1: Pointwise evaluation of the deontic modal in CCO-construed deontic conditionals

Let us briefly take stock. We have seen that the OCO construal predicts the non-shifty reading easily, since OCO specifically requires the ordering source of the deontic modal to anchor to the evaluation world. Under the CCO construal, the deontic modal operator is evaluated pointwise at each antecedent world with respect to the hypothetical laws; it can still predict the non-shifty reading, once appropriate assumptions about the modal operators are in place. Most importantly, we have assumed a stereotypical ordering source for the epistemic modal, which allows certain information holding at the actual world to enter the quantificational domain of the deontic modal (e.g. that the content of the actual laws does not change). In addition, the circumstantial modal base of the deontic modal guarantees that the restriction to antecedent-worlds gets inherited to the deontic modal (e.g. Max owns a car). Overall, for both the OCO and the CCO construals, the non-shifty reading of deontic conditionals does not provide a decisive argument for or against them.

3.2. The shifty reading

Deontic conditionals have another reading, which I call the **shifty reading**. This reading becomes prominent in certain sentences and contexts. Consider (13).

(13)   If jaywalking is illegal in this town, that guy over there has to be punished.

(von Fintel and Iatridou 2005: 9 (17))

Intuitively, under the more salient reading of (13), the sentence is true just in case the guy over there jaywalked. Importantly, the current regulations at the actual world are irrelevant to the interpretation of (13). Since the deontic modal is evaluated with respect to the regulations holding at the antecedent worlds where jaywalking is illegal (by virtue of the content of the antecedent proposition), I call this reading the shifty reading. (13) also has a less natural non-shifty reading that the punishment of the guy over is conditioned on the legal status of jaywalking in the actual world (regardless of whether he jaywalked), but I will put aside this reading in the following discussions.

The OCO construal of (13) and the corresponding truth conditions are given in (14a) and (14b).

(14)   a.   **OCO:** $\square^{deo}$ [if jaywalking is illegal] [that guy over there gets punished]
         b.   (13) is true in w w.r.t. f_{cir} and g_{deo} iff for all $w' \in O(f_{cir}, g_{deo}, w)$ where jaywalking is illegal, that guy over there gets punished at w'.

Suppose at the world of evaluation w, jaywalking is legal and the guy over there just jaywalked. Intuitively, (13) is true at w, but the OCO construal predicts the opposite. According to (14b), the deontic modal is evaluated at w with respect to the actual laws. Then, the deontically best worlds are all such that the guy over there does not get punished, since he did not violate any regulations (and, presumably, it would be deontically more optimal to not punish someone who didn't violate any regulations than to punish them). Consequently, (13) is predicted to be false, contrary to our intuitions.

On the other hand, the CCO construal makes a different prediction for (13). See (15a) and (15b) for the construal and the corresponding truth conditions.

(15)   a.   **CCO:** $\square^{epi}$ [if jaywalking is illegal] [$\square^{deo}$ that guy over there gets punished]
         b.   (13) is true in w w.r.t. f_{cir}, f_{epi}, g_{st} and g_{deo} iff for all $w' \in O(f_{epi}, g_{st}, w)$ where jaywalking is illegal, for all $w'' \in O(f_{cir}, g_{deo}, w')$, that guy over there gets punished at w''.

Suppose the same scenario as above. According to (15b), the deontic modal is evaluated pointwise at each antecedent world (again, see Figure 1 for a visualized illustration). First, we collect the set of worlds that are compatible with the speaker's knowledge, e.g. the guy over there jaywalked. We then eliminate those where jaywalking is not illegal, and order the remaining worlds according to the normal courses of events at w; for instance, that the guy over there is not exempt from the local laws. Next, at each world w' in $O(f_{epi}, g_{st}, w)$, we evaluate the deontic modal by first collecting the worlds that are compatible with the relevant facts at w' (e.g. the guy jaywalked, the guy is subject to local laws), and then ranking them according to the laws at w', which provide that jaywalking is illegal. Hence, at all worlds in $O(f_{cir}, g_{deo}, w')$, the guy over there gets punished; subsequently, the CCO construal renders (13) true in w, which is in line with our intuitions.

3.3. Interim summary

To sum up, we have seen that the CCO construal captures both the non-shifty and the shifty readings of deontic conditionals, whereas the OCO construal is only able to capture the non-shifty reading. The findings are summarized in Table 1.

Reading	Predicted by OCO?	Predicted by CCO?
Non-shifty	✓	✓
Shifty	×	✓

Table 1: Predictions made by OCO and CCO for deontic conditionals

Arguments along these lines have led authors like Frank to conclude that overt deontic modals in conditional consequents are always outscoped by an epistemic modal operator, and 'there are in fact no truly *deontically modalized if*-clauses' (Frank 1996: 50, italics original). In the rest of the paper, I would like to show that such views have dismissed the OCO construal from the theory of deontic conditionals too quickly. After all, in view of the data from English *if*-conditionals examined above, we still have the choice between (i) a CCO-only theory and (ii) a theory that keeps both construals. Specifically, with theory (i), one could attribute both the non-shifty and the shifty readings to the CCO construal (*à la* Frank 1996). On the other hand, with theory (ii), one could argue that English *if*-conditionals are constantly ambiguous between an OCO and a CCO construal: specifically, the two construals can both generate the non-shifty reading; as for the shifty reading, although it cannot be rendered by OCO, its availability is ensured by CCO.

Is it possible to tease apart theory (i) and theory (ii)? In other word, is there any way to argue for or against the OCO construal? Since OCO captures only a subset of the interpretations that the CCO construal does, I suggest that one way of arguing for the necessity of having OCO in addition to CCO would be to find a form of conditionals that has the non-shifty reading, but lacks the shifty reading. Only OCO, but not CCO, would be able to account for such data. In the next section, I will show that such conditionals are attested in Mandarin Chinese.

4. Data

In Mandarin Chinese, conditional antecedents do not need to be morphologically marked (Li and Thompson 1989) . Instead, an adverb *jiu* in the main clause ensures the sentence's status as conditionals, rather than two propositions that the speaker commits to (see Liu 2017 for a formal analysis of the semantics of *jiu*). (16) exemplifies a simple conditional sentence: the first clause describes a hypothetical scenario where s/he goes, and the second clause expresses the consequence that follows, in this case, that I won't go.

(16) *ta   qu, wo jiu bu   qu le.*
      s/he go I   JIU NEG go PERF
      'If s/he goes, I won't go.'

In addition, Mandarin conditional antecedents can also co-occur with a clause-initial marker *ruguo*, as shown in (17). In regular hypothetical conditionals, *ruguo* does not appear to make much semantic contribution; so, the meaning of (17) is roughly equivalent with that of (16).

(17) *ruguo   ta   qu, wo jiu bu   qu le.* ≈ (16)
      RUGUO s/he go I   JIU NEG go PERF
      'If s/he goes, I won't go.'

The central observation of this paper is that the occurrence of *ruguo* makes a difference in the felicity of deontic conditionals.[5] Consider first the tax-paying case, which is most naturally interpreted with the non-shifty reading, as discussed in Sec 3.1. As shown in (18), *ruguo* is optional for this reading.

(18) There're lots of things for Ming to do when he moves to the US...
    a. *ruguo   zai meiguo mai che, jiu bixu shang baoxian.*
       RUGUO at US   buy car JIU must get   insurance
    b. *zai meiguo mai che, jiu bixu shang baoxian.*
       at US   buy car JIU must get   insurance
       'If he buys a car in the US, he must get car insurance.'

However, *ruguo* appears to be obligatory for the shifty reading. This is shown by the jaywalking case; see the contrast between (19a) and (19b).

(19) I'm new to this town and haven't learned about the traffic rules, but...
    a. *ruguo zai zheli hengchuanmalu weifa, ta jiu bixu jiao fakuan le.*
       IF   at here jaywalk   illegal he JIU must pay fine   PERF
    b. ??*zai zheli hengchuanmalu weifa, ta jiu bixu jiao fakuan le.*
       at here jaywalk   illegal he JIU must pay fine   PERF
       'If jaywalking is illegal here, he has to pay fines.'

Table 2 compares the predictions made by the OCO and the CCO construals and the distribution of conditionals with and without *ruguo*.

	Theoretical prediction		Speakers' intuitions	
Intended reading	Predicted by OCO?	Predicted by CCO?	without *ruguo*	with *ruguo*
Non-shifty	✓	✓	felicitous	felicitous
Shifty	✗	✓	??	felicitous

Table 2: Predictions made by OCO and CCO and facts from Mandarin conditionals

I take the the contrast between (18) and (19) as an indication that conditionals without *ruguo* are unambiguously OCO-construed. As Table 2 shows, assuming a CCO-construal for *ruguo*-less conditionals (either unambiguously or not) would wrongly predict them to also have the shifty reading, contrary to the fact. Importantly, as discussed in Sec 3.3, English *if*-conditionals do not provide us with decisive evidence that would support or refute the OCO construal. Now, Mandarin conditionals without *ruguo* constitute exactly the type of evidence that we would need in order to argue for OCO. As for conditionals with *ruguo*, I suggest that they are unambiguously CCO-construed; hence, overt deontic modals in conditionals with *ruguo* are always outscoped by an epistemic necessity modal.

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[5] Apart from *ruguo*, conditional antecedents can also be accompanied by clause-initial *jiaru*, *yaoshi*, and clause-final *dehua*, to name just a few. I leave it to future research to compare these elements and how they interact with deontic conditionals. See Li and Thompson (1989): Ch. 23 for a description of these elements in conditionals.

5. Analysis for *ruguo* and predictions

I propose that *ruguo* is an epistemic necessity modal that must occur with an overt restrictor before combining with the consequent. This means that conditionals with *ruguo* instantiate the CCO construal with the epistemic necessity modal surfacing as *ruguo* overtly. As assumed previously for the covert epistemic necessity modal, I assume that *ruguo* comes with a stereotypical ordering source. The semantics of *ruguo* can then be given as in (20), in a run-of-the-mill Kratzer-style.[6]

(20) $[\![ruguo]\!] = \lambda f.\lambda g.\lambda p.\lambda w.\forall v \in O(f,g,w)[v \in p]$

Hence, in deontic conditionals with *ruguo*, the deontic modal in the consequent is evaluated point-wise at antecedent-worlds. With the assumption that the restriction to antecedent-worlds is inherited by the deontic modal via a circumstantial modal base as discussed previously, the non-shifty and the shifty readings fall out naturally depending on whether the antecedent proposition feeds into the content of the deontic ordering source. Specifically, when the antecedent proposition and the ordering source of the deontic modal are independent, we predict the non-shifty reading, as in the tax-paying case in (18a). On the other hand, if the content of the deontic ordering source depends on the state of affairs described by the antecedent proposition, we derive the shifty reading, as in the jaywalking case in (19a). The construals and the interpretations of the non-shifty and the shifty readings of *ruguo*-conditionals are illustrated in (21) and (22), using (18a) and (19a) as examples, reseptcively. See Sec 3.1 and Sec 3.2 for the details regarding how the truth conditions are derived from their construal, which I omit here.

(21)   **Non-shifty:**   (18a)
     a. $\text{RUGUO}^{g_{st}}_{f_{epi}}$ [Ming buys a car] [$\text{BIXU}^{g_{deo}}_{f_{cir}}$ he gets car insurance]
     b.   (18a) is true in w iff for all $w' \in O(f_{epi}, g_{st}, w)$ such that Ming buys a car, for all $w'' \in O(f_{cir}, g_{deo}, w')$, he gets car insurance at w''.

(22)   **Shifty:**   (19a)
     a. $\text{RUGUO}^{g_{st}}_{f_{epi}}$ [jaywalking is illegal] [$\text{BIXU}^{g_{deo}}_{f_{cir}}$ the guy over there gets punished]
     b.   (19a) is true in w iff for all $w' \in O(f_{epi}, g_{st}, w)$ such that jaywalking is illegal, for all $w'' \in O(f_{cir}, g_{deo}, w')$, the guy over there gets punished at w''.

This proposal leads us to an important prediction, namely that *ruguo* enforces the epistemic reading of conditionals. In particular, in case there are quantificational elements in the consequent, we expect *ruguo* to block the antecedent from restricting them. In the rest of this section, I will show that this prediction is borne out by discussing three types of conditionals—generic conditionals, conditionals whose antecedents restrict adverbs of quantification, and conditionals embedded under nominal quantifiers.

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[6] An anonymous review raises the concern as to how the proposal in (20) connects with the lexical semantics of *ruguo*: *ru* can mean 'compare', 'raise an example' etc., and *guo* means 'results'; taken together, *ruguo* roughly amounts to 'if it is the case such that'. I think these lexical meanings in fact offer a good illustration of the intuition about *ruguo* that I am trying to explore here, that is, *ruguo* sets up a non-actual context for the evaluation of subsequent clauses (put differently, *ruguo* enables modal subordination, cf. Roberts 1989). Since many constructions that are known to be able to establish hypothetical contexts involve epistemic modals (e.g. *might*-sentences and antecedents of epistemic conditionals, cf. Kaufmann 2000), the proposal in (20) strikes me as perfectly compatible with the lexical meanings of *ruguo*.

5.1. Prediction #1: Generic conditionals

Generic conditionals are often analyzed as having a covert generic operator restricted by the antecedent (see e.g. Farkas and Sugioka 1983; Kratzer 1986). We thus predict conditionals with *ruguo* to lack the generic reading, since the antecedent would be forced to restrict *ruguo* instead of the generic operator. This prediction is borne out. Consider (23), a conditional that conveys a description of natural laws, where *ruguo* appears to be odd. (24) shows the construal that would give rise to the desired generic reading, which would not be possible in the presence of *ruguo*.[7]

(23)   The geography textbook says...
     a. ??*ruguo   haibai shangsheng 100 mi,   wendu   jiu xiajiang 0.6 du.*
           RUGUO altitude increase   100 meter temperature JIU drop   0.6 degree
     b. *haibai shangsheng 100 mi,   wendu   jiu xiajiang 0.6 du.*
           altitude increase   100 meter temperature JIU drop   0.6 degree
           'When altitude increases by 100 meter, temperature decreases by 0.6 degrees.'

(24) GEN_s [altitude increases by 100 meters in s] [temperature drops by 0.6 degrees in s]

One might wonder whether (23a) has an epistemic reading instead. Before turning to the data, notice a diagnostic that distinguishes between the epistemic and the generic readings introduced by Farkas and Sugioka (1983). They observe that only epistemic conditionals are compatible with antecedent propositions that describe specific events, such as those describing events modified by temporal adverbials.[8] To see that this diagnostic holds, consider English *when*-clauses. Unlike *if*-clauses, *when*-clauses cannot restrict epistemic modals, as shown in (25); they can, however, restrict a generic operator, as in (26).

(25)   a. *When the library has this book, it must be on the second floor.
     b.   If the library has this book, it must be on the second floor.

<div align="right">(Kratzer 1995: 129 (16))</div>

(26)   Small fish are widespread when big fish are rare. (Farkas and Sugioka 1983: 225 (1e))

Adding a temporal adverbial to the antecedent of (26), however, leads to unacceptability, as in (27). This shows that the addition of adverbials along the lines of (27) provides a useful test for epistemic conditionals, as argued by Farkas and Sugioka (1983).

(27)   *Small fish are widespread when big fish are rare tomorrow at 5.

<div align="right">(Modified from Farkas and Sugioka 1983: 228 (7e))</div>

Now, applying Farkas and Sugioka (1983)'s diagnostic to Mandarin conditionals, we expect *ruguo* to be felicitous in conditionals whose antecedents describe specific events. This prediction is borne out, as shown in (28a), an example that differs minimally from the one intended as

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[7] Following the standard treatment of generic operators (Lewis 1975; Farkas and Sugioka 1983; Kratzer 1986), I assume that the generic operator unselectively binds a free variable in the antecedent and the consequent; the same will be assumed for quantificational adverbs in Sec 5.2. The nature of the variable (situation, time, their tuples, or the like) is orthogonal to our concerns here.

[8] This test is used also in Frank (1996), Ch. 2.3.1 to disambiguate the generic (in her words, the 'frequency' reading) and the epistemic readings of conditionals with adverbs of quantification. See 5.2 for the relevant data.

a generic conditional in (23). A time adverbial is present in the antecedent of (28a), indicating that the sentence is interpreted as an epistemic conditional.[9]

(28)   Standing at the summit of a dormant volcano, the father says to the kids...
   a. *ruguo   sanqian nian hou zheli-de haibai   shangsheng 100 mi,*
       RUGUO 3000   years after here-GEN altitude increase   100 meter

       wendu   jiu hui xiajiang 0.6 du.
       temperature JIU will drop   0.6 degree
   b. ??*sanqian nian hou zheli-de haibai   shangsheng 100 mi,   wendu jiu hui*
        3000   years after here-GEN altitude increase   100 meter temp. JIU will
       xiajiang 0.6 du.
       drop   0.6 degree
       'If the altitude here increases by 100 meters in 3000 years, the temperature will decrease by 0.6 degrees.'

Meanwhile, (28b) shows that the variant without *ruguo* becomes unacceptable under the epistemic reading. This falls out naturally from our analysis that *ruguo*-less conditionals are OCO-construed: in (28b), there is simply no operator for the antecedent to restrict; in particular, the generic operator is not allowed since it would be incompatible with the time adverb in the antecedent. I will turn to the interaction between *ruguo*-less conditionals and the epistemic reading in more details in Sec 6.

5.2. Prediction #2: Adverbs of quantification

Lewis (1975) famously discusses conditionals with adverbs of quantification. In such conditionals, their antecedents can directly restrict the adverbs of quantification, giving rise to an interpretation that expresses quantification over instances of the state of affairs described by the antecedent. For instance, (29a) and (29b) can both be paraphrased as in (29c). See (30) for the schematization of this interpretation, using *usually* as an example.

(29)   a. Always / Usually / Sometimes, if it rains, my roof leaks.
        b. My roof always / usually / sometimes leaks if it rains.
        c. ≈ For all / most / some instances of raining, my roof leaks.

(30) $MOST_s$ [it rains in s] [my roof leaks in s]

Similarly to generic conditionals, we predict *ruguo* to block the restriction of quantificational adverbs, since the antecedent would be forced to restrict *ruguo* instead. Before constructing examples to check whether this prediction is correct, let us inspect the behaviors of quantificational adverbs in Mandarin first. In English, conditional antecedents can restrict quantificational adverbs that scope over the whole conditional and appear inside the consequent, as shown in

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[9] (28a) differs from (23a) also in that the future marker *hui* 'will' is added to the consequent of (28a). My intuition is that without *hui*, (28a) is still degraded. I do not have a concrete explanation for this contrast, but I suspect that it has to do with the temporal reference of the antecedent proposition (cf. the distinction between the predictive and the non-predictive readings of conditionals, Kaufmann 2005). I reserve a discussion of this issue for future work. Note also that the *ruguo*-less variant, namely (28b), is unacceptable regardless of whether *hui* is present in the consequent.

(29a) and (29b) already.[10] In Mandarin, however, the placement of quantificational adverbs seems to put a restriction on how they get restricted. Below, I illustrate this point using sentences with temporal adverbial clauses, namely those in the form of *φ-de-shihou* (lit. 'the moment of *φ*'), which can be translated as 'when-*φ*'. Consider (31), where the adverb *jingchang* 'usually' outscopes the whole sentence; as indicated below the translation, *jingchang* can be restricted by the antecedent, but not by the temporal intervals of a raining-situation.

(31) *wo jia-de   jiu fangzi, jingchang xiayu-de shihou, chufang loushui.*
      my home-GEN old house often   rain-GEN moment kitchen leak
      'Speaking of my old house, often, when it rains, it leaks in the kitchen.'
      Only: 'For most instances of raining, it leaks in the kitchen.'
      Not: 'When it rains, in most intervals of that situation, it leaks in the kitchen.'

Now, compare (31) with (32), where *jingchang* 'usually' appears inside the matrix clause. Here, the pattern gets reversed: *jingchang* is only allowed to quantify over temporal intervals of a raining-situation.

(32) *wo jia-de   jiu fangzi, xiayu-de shihou, jingchang chufang loushui.*
      my home-GEN old house rain-GEN moment often   kitchen leak
      'Speaking of my old house, when it rains, it often leaks in the kitchen.'
      Only: 'When it rains, in most intervals of that situation, it leaks in the kitchen.'
      Not: 'For most instances of raining, it leaks in the kitchen.'

Assuming that quantificational adverbs in conditionals are subject to the same restrictions, we are now ready to formulate our predictions. That is, we expect *ruguo* to be incompatible with quantificational adverbs that scope over the whole conditional, since the antecedent would be forced to restrict *ruguo* instead. On the other hand, we predict consequent-internal quantificational adverbs to be compatible with *ruguo*, since in that case, the antecedent need not (in fact, cannot) restrict the quantificational adverbs and could thus restrict *ruguo*.

These predictions are indeed borne out. Consider (33), where the adverb *jingchang* 'often' scopes over the whole conditionals. The variant with *ruguo* is infelicitous, as in (33a), whereas the variant without *ruguo* is perfectly acceptable, as in (33b).

(33) a. *#wo jia-de   jiu fangzi, jingchang ruguo   xiayu, jiu lou shui.*
         my home-GEN old house often   RUGUO rain   JIU leak water
      b. *wo jia-de   jiu fangzi, jingchang xiayu, jiu lou shui.*
         my home-GEN old house often   rain   JIU leak water
         'Speaking of our old house, often, if it rains, it leaks.'

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[10] Even for English, Geurts (2004) remarks that different placement of quantificational adverbs results in different interpretations of conditionals. He notes that (i) antecedent-initial quantificational adverbs like those in (29a) are unambiguously restricted by the antecedent (so, no epistemic reading), (ii) consequent-internal adverbs like those in (29b) are ambiguous between the epistemic reading and the reading expressing quantification over antecedent-instances, (iii) moreover, conditionals with adverbs occurring at the end of the consequent are unambiguously epistemic, as in (i).
(i)   If Beryl is in Paris, she visits the Louvre often.   (Geurts 2004: 4 (6b))
See also Frank (1996), Sec 2.3.1 for discussions concerning the placement of quantificational adverbs and the ambiguity of conditionals in German.

Next, consider the conditionals with consequent-internal quantificational adverbs shown in (34). The presence of the time adverb *mingnian xiatian* 'next summer' further ensures that the sentences are intended as epistemic conditionals (as discussed previously in Sec 5.1). Intuitively, the variant with *ruguo* is felicitous, as in (34a), which is in line with our predictions formulated above. Absent *ruguo*, the sentence becomes unacceptable, as in (34b); this is again also expected, since (34b), a OCO-construed conditional under our analysis, does not provide an operator for the antecedent to restrict (the oddness of (34b) is thus similar to that of (28b)).

(34) A couple is planning to reform their old house...
    a. *ruguo mingnian xiatian yushui duo, jiu hui jingchang lou shui.*
       RUGUO next.year summer rain   many JIU will <u>often</u>   leak water
    b. ??*mingnian xiatian yushui duo, jiu hui jingchang lou shui.*
       next.year summer rain   many JIU will <u>often</u>   leak water
       'If it rains a lot next year, it will leak very often.'

5.3. Prediction #3: Nominal quantifiers

von Fintel and Iatridou (2002) observes that conditional antecedents can also restrict nominal quantifiers that occur in matrix clauses (see also Geurts 2004). Consider (35a), where the quantifier over individuals *no* occurs in the consequent. The interpretation where *no* gets restricted by the antecedent is paraphrased as in (35b), and schematized as in (36).[11]

(35) a. No student will succeed if he goofs off.
     b. ≈ No student who goofs off will succeed.
         (von Fintel and Iatridou 2002: 2 (2), originally due to Higginbotham 1986)

(36) *No$_x$* [x is a student & x goofs off] [x succeeds]

Our proposal for *ruguo* predicts the reading along the lines of (35b) to be unavailable in the presence of *ruguo*: again, the antecedent would be forced to restrict *ruguo*, rather than the quantifier over individuals (or whatever operator that licenses the binding of the individual variable, see footnote 11). This prediction is indeed borne out. Consider the minimal pair in (37a) and (37b). Under the intended reading, the antecedent constitutes the restrictor of the quantifier, as shown by the paraphrase; this reading is available in (37b), but not in (37a).

(37) Teacher speaking to students on the first day of the school...
    a. ??*ruguo bu nuli,   jiu meiyou ren   hui chenggong.*
       RUGUO NEG make.effort JIU no   people will succeed
    b. *bu nuli,   jiu meiyou ren   hui chenggong.*
       NEG make.effort JIU no   people will succeed
       lit. 'If they don't work hard, no one will succeed.'
       Intended: 'No one who doesn't work hard will succeed.'

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[11] I do not mean to suggest that (36) offers a precise *analysis* of nominal quantifiers restricted by conditional antecedents. After all, (36) only shows the binding of an individual variable, although such binding may be subject to further constraints. In particular, von Fintel and Iatridou (2002) shows that the relevant reading of (35a) is possible in a generic context only; if their claim is on the right track, the binding of the individual variable shown in (36) would need to be further licensed by a generic operator, which is a world/situation quantifier itself. See von Fintel and Iatridou (2002) for more details; I will discuss some relevant issues in Sec 6 as well. For now, it suffices to note that an epistemic construal would conflict with the relevant reading of (35a).

However, (37a) does have an epistemic reading. For instance, we can imagine a context where (37a) is uttered by the manager of a project team: the team is about to start a new project; this time, the technological base is crucial for the success of the project, so the project manager says (37a) to the members in charge of technology. The interpretation of (37a) in this context can be paraphrased as 'if you (= the members of the tech team) do not work hard, no one (involved in this project) will succeed'. Hence, this is a reading where *meiyou* 'no' quantifies over a contextually salient set of individuals (i.e. those involved in this project), and the antecedent proposition constitutes the restriction of *ruguo*. This interpretation falls out naturally from our analysis that *ruguo* is an epistemic necessity modal. Meanwhile, the *ruguo*-less variant in (37b) is infelicitous in this context, which follows from our analysis that *ruguo*-less conditionals are OCO-construed. That is, the only quantificational operator for the antecedent to restrict in (37b) is the negative quantifier, but that would automatically yield a non-epistemic interpretation.

6. More on conditionals without *ruguo* and the epistemic reading

What we have seen in Sec 5 is the following. Conditionals with *ruguo* are obligatorily epistemic, and thus block the antecedent from restricting a non-epistemic operator (generic operator, quantificational adverbs or nominal quantifiers), whereas conditionals without *ruguo* allow their antecedents to restrict these non-epistemic operators. Now, it may be tempting to ask whether Kratzer's covert epistemic necessity modal is ever available in Mandarin, in particular, in conditionals without *ruguo*. Our observations in Sec 5.1–5.3 seems to suggest immediately that the answer is negative, since otherwise, the *ruguo*-less conditionals without overt quantificational operators would be able to have epistemic readings, contrary to the facts (i.e. (28b), (34b), and (37b)). Below, I will show that the antecedents of conditionals without *ruguo* cannot restrict epistemic modals at all, be it overt or covert. Hence, Kratzer's covert epistemic necessity modal is at least not available in Mandarin conditionals without *ruguo*, although I will not be able to answer the question whether its unavailability extends to Mandarin in general.

First, let us look at epistemic conditionals without overt epistemic modals. As shown by the contrast between (38a) and (38b), the variant without *ruguo* is degraded. This is consistent with our findings in Sec 5: a conditional without *ruguo* must provide an operator for its antecedent to restrict; since such an operator is missing in (38a), the sentence is odd.

(38)   Ming went home by train yesterday, but I forgot which train he took...
  a. ??*ta zuo le   manche, xianzai jiu yijing dao jia le.*
     he take PERF slow.train now   JIU already arrive home PERF
  b. *ruguo   ta zuo le   manche, xianzai jiu yijing dao jia le.*
     RUGUO he take PERF slow.train now   JIU already arrive home PERF
     'If he took the normal train, he has arrived by now.'

Next, consider (39), where the consequent contains an overt epistemic modal operator *yinggai* 'should'. Here, the variant without *ruguo* is still degraded, as shown by (39a) vs. (39b).

(39)   a. ??*ta zuo le   manche, jiu yinggai kuai   dao   le.*
          he take PERF slow.train JIU should almost arrive PERF
       b. *ruguo   ta zuo le   manche, jiu yinggai kuai   dao   le.*
          RUGUO he take PERF slow.train JIU should almost arrive PERF
          'If he took the normal train, he should be arriving soon.'

Note that the felicity of (39b) is expected given our semantics proposed for *ruguo*. Specifically, under our analysis, (39b) is construed with an epistemic necessity modal restricted by the antecedent (that is, *ruguo*) scoping over an epistemic weak necessity modal (that is, *yinggai* 'should'). This construal yields an interpretation that is equivalent to the interpretation of a construal with *yinggai* 'should' being restricted directly by the antecedent, since stacking epistemic necessity modals over other epistemic modals do not yield additional semantic effect (see footnote 4).

Based on (38) and (39), I conclude that Mandarin conditionals without *ruguo* do not allow epistemic readings at all, and their antecedents can only restrict non-epistemic modals such as deontic modals, generic modals, adverbs of quantification and nominal quantifiers.[12] I will have to leave open the question as to what mechanism is responsible for this restriction, but would like to speculate that it could be explained by resorting to the general principle regarding the selection between overt and covert semantic operators (cf. 'Don't do covertly what you can do overtly', Chierchia 1998: 360). Roughly, one may reason that the epistemic readings of conditionals without *ruguo* are not blocked at the semantic level; rather, the usage of *ruguo*-less conditionals for expressing epistemic conditionals is blocked by the availability of conditionals with *ruguo*, an overt, lexical realization of (unambiguously) epistemic conditionals. To fully explore such an approach would of course require us to take into account the conditional forms in Mandarin other than the ones that we have explored in this paper, which I will leave for future research.

7. Conclusion

I have shown that the view that all deontic conditionals are in fact epistemic conditionals (Frank 1996) proves incorrect once we include Mandarin in our language sample. Drawing on the distribution of *ruguo*, I have argued that the OCO and the CCO construals are both needed in Kratzer's restrictor analysis of conditionals. By analyzing *ruguo* as an epistemic necessity modal, this proposal also allows us to account for the distribution of *ruguo* in other types of non-epistemic conditionals.

There are a number of open issues left for future research. For instance, how does our analysis of *ruguo* as an epistemic modal fare with other theories of conditionals, such as the conditional operator analysis (Gillies 2010)? Also, it remains to be tested how the split between epistemic vs. non-epistemic conditionals in Mandarin interact with other conditional phenomena, such as genericity (Sec 6), speech act conditionals, the stacking of conditional antecedents and counterfactuals.

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[12] Another way to make sense of the data would be to make a stronger argument that antecedents of *ruguo*-less conditionals must always restrict a (covert or overt) generic operator. Such an argument immediately captures the facts observed in Sec 5.1-5.3, since generic operators, adverbs of quantification and nominal quantifiers all give rise to generic-flavored conditionals when restricted by conditional antecedents (in particular, for the interaction between nominal quantifiers and genericity, see von Fintel and Iatridou 2002). However, it remains unclear how genericity fares with deontic conditionals; that is, it raises the question as to whether an overtly modalized deontic conditional without *ruguo* (e.g. (18b)) is genuinely OCO-construed as we have argued so far (with the overt deontic modal itself carrying certain generic features), or has a covert generic operator outscoping the overt deontic modal. For now, I will stick to the weaker claim that antecedents of *ruguo*-less conditionals restrict non-epistemic operators.

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