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ORIGINAL RESEARCH

Coordinated *if*s and theories of conditionals

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Abstract
This paper concerns the semantics of coordinated *if*-clauses, as in (1)-(2).

(1) context: You forgot the umbrella.
  a. If it is snowing, or if it is raining, we'll get wet.
  b. If it was snowing, or if it was raining, we'd get wet.

(2) context: You want to get a tan.
  a. If it is sunny, and if it is warm, I'll go to the beach.
  b. If it was sunny, and if it was warm, I'd go to the beach.

It is argued that the meanings of such sentences are explained straightforwardly on theories of conditionals that tie their non- monotonic behaviour to the *if*-clause itself (e.g. Schlenker 2004, but not theories that tie it to a (covert) modal operator (e.g. Kratzer 1981; 1991). Coordinated *if*-clauses are revealing of the fine-grained compositional semantics of conditionals.

Keywords Conditionals · Coordination

1 Introduction

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  b. If it was snowing, or if it was raining, we'd get wet.

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2 Data

As a first pass the conditionals in (1) and (2) appear to be equivalent to their counterparts in (3) and (4).

(3) a. If it is snowing or raining, we'll get wet. ≈ (1)a
b. If it was snowing, or if it was raining, we'd get wet. ≈ (1)b

(4) a. If it is sunny and warm, I'll go to the beach. ≈ (2)a
b. If it was sunny and warm, I'd go to the beach. ≈ (2)b

That is, coordinated *if*-clauses seem to COLLAPSE to a single *if*-clause containing the coordination of the two antecedent clauses: :

if- COLLAPSE if p or if q, r ⇔ If p or q, r
if p and if q, r ⇔ If p and q, r

A few further examples:

(5) context: We forget our keys.
If there's a key under the mat, or if John is still home, we'll get in. ≈
If there's a key under the mat or John is still home, we'll get in.

(6) If I had a dollar, and if you had 50 cents, we'd have \$1.50 ≈
If I had a dollar and you had 50 cents, we'd have \$1.50.

Given these apparent equivalences the lesson from coordinated if-clauses could be a simple syntactic one. The following hypothesis for example could suffice: a covert expression (L) marks the left edge of a conditional antecedent and plays the semantic role we thought *if* did. The complementizer itself is semantically vacuous.[1]

However, Khoo (2021) observes that the equivalence fails for *or*. Conditionals with disjoined *if*-clauses and their collapsed counterparts with disjunctive antecedents both lead to SIMPLIFICATION INFERENCES. (a) and (b) seem to follow from both of the conditionals in (7):

(7) If it is snowing, or if it is raining, we'll get wet.
If it is snowing or raining, we'll get wet.
a. If it is snowing, we'll get wet.
b. If it is raining, we'll get wet.

[1] Given the LF [L [if p and/or if q]], and that ⟦if p⟧=⟦p⟧, it would follow that ⟦L [if p and/or if q]⟧ = ⟦L [if p and/or q]⟧.

The same holds for the counterfactual pair in (8).

(8) If it was snowing, or if it was raining, we'd get wet.
If it was snowing or raining, we'd get wet.

a. If it were snowing, we'd get wet.
b. If it were raining, we'd get wet.

But Khoo argues that simplification inferences are only *obligatory* for disjoined antecedent conditionals. This is shown by the fact that (9-b) is a contradiction while (9-a) is not. The latter says something true if it's below freezing.

(9) a. If it is snowing or raining, it is snowing.
b. #If it is snowing, or if it is raining, it is snowing.

One simplification, *If it is raining, it is snowing* is a contradiction, and thus (9-a) should be too if simplification inferences were entailments. (Khoo calls conditionals as in (9) SPECIFICATIONAL: the consequent specifies which antecedent proposition is true given the antecedent(s).) A parallel contrast and argument obtain for the counterfactual variant, (10):

(10) a. If it were snowing or raining, it would be snowing.
b. #If it were snowing, or if it were raining, it would be snowing.

To Khoo's observation we add that *if*- COLLAPSE also fails for conjunction. The failure concerns a property of (non-coordinated) *if*-clauses that has played a central role in theorising, non-monotonicity. An example is the failure of the inference pattern STRENGTHENING OF THE ANTECEDENT (SA): (11-b) and (12-b) do not follow from (11-a) and (12-a) respectively. Correspondingly, (11-a) and (12-a) are consistent with (11-c) and (12-c).

(11) a. If it is raining, we'll get wet.
b. $\nRightarrow$ If it's raining and we stay home, we'll get wet.
c. But if it's raining and we stay home, we will not get wet

(12) a. If the US didn't have nukes, Russia would invade.
b. $\nRightarrow$ If the US and Russia didn't have nukes, Russia would invade.
c. But if the US and Russia didn't have nukes, Russia would not invade.

We will call the variety of antecedent strengthening that fails in the preceding, SAC ("Strengthening of the Antecedent, Conjunctive"):

SAC If $p, r \;\Rightarrow\;$ If p and q, r

The invalidity SAC would entail the invalidity of the following principle given *if*- COLLAPSE, their right hand sides being equivalent:

SCA If $p, r \;\Rightarrow\;$ If p and if q, r ("Strengthening to Conjoined Antecedents")

Thus if *if*- COLLAPSE were valid a pattern of judgments parallel to (11) and (12) would be expected for variants with the *if*-clause "uncollapsed" into a coordination of *if*-

clauses. But his prediction appears to be incorrect. For example, it does not seem possible to follow up (13-a) with (13-c), in the way one can (12-a) with (12-c).

(13) a. If the US didn't have nukes, Russia would invade.
b. $\not\Rightarrow$ If the US didn't have nukes, and if Russia didn't have nukes, Russia would invade.
c. #But if the US didn't have nukes, and if Russia didn't have nukes, Russia would not invade.

In addition to showing that *if*- COLLAPSE is invalid for *and* as well as *or*, these observations might be taken to show that SCA *is* valid. For, (13-a) and (13-c) are contradictory given SCA. And yet, the direct SCA inference from (13-a) to (13-b) does *not* seem to go through, as indicated. We argue in the following section that this (paradoxical) pattern, as well as Khoo's observation about disjunction, is explained by one class of approaches to the compositional semantics of conditionals. But not another.[2]

3 Two loci for non-monotonicity

A prominent approach to explaining the non-monotonic behaviour of conditionals is the appeal to comparative similarity, due to Stalnaker and Lewis. The following is a generalised/compromise version of their proposed truth-conditions, which collapses two much discussed differences, the validity of Conditional Excluded Middle and the Limit Assumption (see e.g. Lewis, 1981):

(14) *if* ϕ, χ is true at world w iff χ is true at all ϕ-worlds w' most like w

More formally in (15-a), where the worlds "most like" w are those selected by the function $\mathbf{f}_w$ applied to the antecedent proposition, meeting the conditions in (15-b):

(15) a. $[\![\text{if } \phi, \chi]\!]^w = 1 \text{ iff } [\![\chi]\!]^{w'} = 1, \quad \underbrace{\forall w' : w' \in \mathrm{f}_w([\![\phi]\!])}_{\text{every most similar } \phi\text{-world to } w}$

b. $\mathrm{f}_w(\alpha) = \left\{ u : \begin{array}{l} \text{(i) } \alpha(u) = 1 \\ \text{(ii) } u \leq_w v, \forall v \text{ s.t. } \alpha(v) = 1 \end{array} \right\}$
$\leq_w$ a total preorder on W (transitive, reflexive, $(u \leq_w v) \vee (v \leq_w u)$)

Note: we write $[\![\phi]\!]$ for $\lambda w.[\![\phi]\!]^w$.

[2] Khoo (2021) proposes there are "secondary", or less accessible, readings of (ostensibly) coordinated *if*-clause conditionals, on which they are equivalent to coordinations of conditionals.

(i) If it was snowing or if it was raining, John would stay in (I don't remember which).
= If it was snowing, John would stay in or if it was raining, John would stay in.

(ii) If it is snowing and if it is not snowing, John stays in.
= If it is snowing John stays in and if it is not snowing John stays in.
(obv. $\neq$ If it is snowing and not snowing, John stays)

These readings could be explained in various possible ways—e.g. ellipsis, type shifting, ATB movement, under either approach to the semantics of conditionals considered in the following section. We therefore do not discuss them further.

In this section we consider monotonicity and coordinated *if*-clauses, and two implementations of the comparative similarity approach, reflecting the relevant central assumptions of two theories—Schlenker 2004, and Kratzer 1979, 1981 (a.o.). These implementations are shown make different predictions for the data in §2. This will bring out a general point from coordinated *if*-clauses regarding the compositional semantics of conditionals.

Like Stalnaker and Lewis's own proposals, (15-a) is stated syncategorematically: the truth-conditions for *if p, q* are given only/directly in terms *p* and *q*. A further question arises within type-driven, compositional approaches to semantics, of how the total truth-condition is divided among (the meanings of) the other syntactic constituents of a conditional. This is a question about syntactic Logical Form and semantic composition. In addition to the antecedent clause and consequent clauses, the syntactic constituents of a conditional include (at least) the *if*-clause in which the antecedent is embedded, and of course *if* itself. Semantically, there are two key components of (15-a): quantification and selection (of maximally similar worlds).

With this in mind consider the following LFs for a conditional *if* ϕ, χ, and corresponding semantic (de)compositions of (15-a), which we will call S and K for reasons discussed below:[3]

S [if ϕ], $\Box\chi$

a. $[\![\text{if } \phi]\!]^w = f_w([\![\phi]\!])$
b. $[\![\Box\chi]\!]^w = \lambda p_{st}.\forall w'\big([R_w \sqcap p](w')=1 \rightarrow [\![\chi]\!](w')=1\big)$

where: $_w(\alpha)$ is the characteristic function of $\mathrm{f}(w)(\alpha)$ as defined in (15-b); R_w is the characteristic function of the set of worlds accessible to w; $\sqcap$ is generalised conjunction/intersection (cf. fn. 5).

K [if ϕ], $\Box\chi$

a. $[\![\text{if } \phi]\!]^w = [\![\phi]\!]$
b. $[\![\Box\chi]\!]^w = \lambda p_{st}.\forall w'\big([f_w(R_w \sqcap p)](w') \rightarrow [\![\chi]\!](w')=1\big)$

(For readability in we suppress relativization of $[\![\cdot]\!]$ to R and f and talk of sets in lieu of characteristic functions thereof, e.g. referring to $[\![\phi]\!]$ as the set of ϕ-worlds.)

On S, selection is tied to *if*, with an *if*-clause denoting the closest antecedent worlds. In this respect S reflects most directly the theory of Schlenker (2004), who treats *if*-clauses as referential devices picking out the closest antecedent worlds. Tying selection to *if* may be implicit already in Stalnaker-Lewis's way of stating truth-conditions, in spite of being syncategorematic, in which case read 'S' as invoking Stalnaker-Lewis instead of/in addition to Schlenker. Quantification comes from a modal operator ($\Box$) in the consequent clause, ranging over the (accessible) worlds denoted by the *if*-clause. (In this second respect it departs from its namesakes, a point we return to in §4.)

On K, *both* selection and quantification are tied to a modal operator ($\Box$) in the consequent clause. The *if*-clause simply denotes the antecedent worlds and the modal both selects and then quantifies over the most similar (accessible) ones. In this respect K reflects the proposal of Kratzer (1979), Kratzer (1981). We elaborate on K and Kratzer's theory in §4, but a few notes are in order: (i) the accessibility relation R

3 We leave to the reader to generalise from $[\![\text{if } \phi]\!]^w$ as defined to $[\![\text{if}]\!]^w$.

here plays the role of Kratzerian modal base, f that of ordering source. (ii) similarity is based on an ordering on worlds, as in Lewis/Stalknaker rather than premise sets of propositions, as in Kratzer's formulation. This accords with the general equivalence proven by Lewis (1981) between ordering and premise semantics (Chemla, 2011, see also).

Though S and K differ regarding the locus of selection in Logical Form and semantic composition they are equivalent, modulo accessibility, for conditionals without coordinated antecedents. More precisely, for a conditional *if* ϕ, χ and R_w such that $[\![\phi]\!] \subseteq R_w$ (e.g. R_w = the set of worlds W, all worlds accessible), S and K both yield the truth-condition (15-a). While (further) assumptions about accessibility can make the bare formal frameworks S and K diverge, this is immaterial to the main point of this section, which follows.[4]

For conditionals with coordinated *if*-clauses, the predictions of S and K come apart. On both approaches, it is expected that *if*-clauses can be combined by *and* and *or*, qua generalized Boolean connectives $\sqcap$ and $\sqcup$:[5] However, on K we have selection first then coordination, and on S coordination then selection.

S	$[\![\text{if } \phi \text{ and if } \psi]\!]^w$	$= [\![\text{if } \phi]\!]^w \sqcap [\![\text{if } \psi]\!]^w$	$= f_w([\![\phi]\!]) \sqcap f_w([\![\psi]\!])$
	$[\![\text{if } \phi \text{ or if } \psi]\!]^w$	$= [\![\text{if } \phi]\!]^w \sqcup [\![\text{if } \psi]\!]^w$	$= f_w([\![\phi]\!]) \sqcup f_w([\![\psi]\!])$
K	$[\![\text{if } \phi \text{ and if } \psi]\!]^w$	$= [\![\text{if } \phi]\!]^w \sqcap [\![\text{if } \psi]\!]^w$	$= [\![\phi]\!] \sqcap [\![\psi]\!]$
	$[\![\text{if } \phi \text{ or if } \psi]\!]^w$	$= [\![\text{if } \phi]\!]^w \sqcup [\![\text{if } \psi]\!]^w$	$= [\![\phi]\!] \sqcup [\![\psi]\!]$

On S, the consequent of a coordinated *if*-clause conditional must be true in all the worlds in the right column (the intersection/union of the closest ϕ-worlds with the closest ψ-worlds). On K, the consequent must be true in all worlds in: f_w applied to the right column (the intersection/union of the proposition ϕ with ψ). This difference results in the following pattern of (in)validities:

		K	S
or-collapse	If ϕ or if ψ, χ $\Leftrightarrow$ If ϕ or ψ, χ	valid	invalid
and-collapse	If ϕ and if ψ, χ $\Leftrightarrow$ If ϕ and ψ, χ	valid	invalid
simplification	If ϕ or if ψ, χ $\Leftrightarrow$ If ϕ, χ and If ψ, χ	invalid	valid

Comparing the theories for disjunction, it is immediate that S but not K captures Khoo's observation that simplification is obligatory for disjunctions of *if*-clauses, but not disjunctive ones (§2). Only the former validates the principle SAD, though both invalidate simplification for disjunctive antecedents,

[4] For example, On Kratzer's theory, counterfactual conditionals are distinguished from indicatives in terms of accessibility—total for the former ($R_w = W$) not not the latter.

[5]

(i) $[\![A \text{ and } B]\!]^w = [\![A]\!]^w \sqcap [\![B]\!]^w$, where $\alpha \sqcap \beta =$
$\alpha \wedge \beta$ if α, β of type t,
$\lambda x.[\alpha(x) \sqcap \beta(x)]$ if α, β are of type $\langle a, b\rangle$, and b ends in t

(ii) $[\![A \textit{ or } B]\!]^w = [\![A]\!]^w \sqcup [\![B]\!]^w$, where $\alpha \sqcup \beta =$
$\alpha \vee \beta$ if α, β of type t,
$\lambda x.[\alpha(x) \sqcup \beta(x)]$ if α, β are of type $\langle a, b\rangle$, and b ends in t

SDA If ϕ or ψ, χ $\Leftrightarrow$ If ϕ, χ and If ψ, χ.

SDA is valid on neither since for simplex antecedent conditionals we have equivalence to Lewis/Stalnaker, on which the principle fails for well-known reasons (Nute, 1975). (That simplification inferences are nonetheless robust/default for disjunctive antecedents, has been argued to have a pragmatic explanation; e.g. Bar-Lev & Fox 2020).

For conjunction, the situation is more subtle. On the one hand K (but not S) validates and-collapse, and thus captures the apparent equivalence between conjoined and conjunctive *if*-clauses noted at the outset of §2. On the other hand, because of this K fails to fully explain their contrasting antecedent(s) strengthening behaviour noted in §2. K (like S) invalidates strengthening of the antecedent, and the specific case of SAC, by design: (11-b) does not follow from (11-a), and correspondingly, (11-c) is consistent with (11-a), since the closest worlds where the US doesn't have nukes may be ones where Russia doesn't. Because it validates and-collapse K does correctly predict that (13-b) does not necessarily follow from (13-a). But for the same reason it incorrectly predicts that (13-c) should be consistent with (13-a), just as (11-c) is with (11-a).

(13) a. If the US didn't have nukes, Russia would invade.
b. $\not\Rightarrow$ If the US didn't have nukes, and if Russia didn't have nukes, Russia would invade.
c. #But if the US didn't have nukes, and if Russia didn't have nukes, Russia would not invade.

S, we will argue, can make sense of this pattern, with the help of a further observation and assumption. With these in place it can also explain the perceived equivalence between conjoined and conjunctive *if*-clauses in spite of not validating and-collapse.

First we note that, given the truth of (13-a), (13-c) can only be true *vacuously* on S – in contrast to its conjunctive antecedent counterpart (12-c). For it follows from (13-a) that if there are any worlds in $[\![$if the US didn't have nukes and if Russia didn't have nukes$]\!]^w$ they are worlds in which Russia *does* invade. It seems plausible to assume a pragmatic constraint against asserting a sentence that could only be vacuously true. It would then follow that (13-c) can never be truly asserted along with (13-a). Such a constraint could for example be realised by a presupposition on $\Box$ that its domain of quantification be non-empty:

(16) $$[\![\Box\chi\ ]\!]^w = \lambda p_{st} : \exists w([R_w \sqcap p](w) = 1) \,.\, \forall w'\big([R_w \sqcap p](w')=1 \rightarrow [\![\chi]\!](w')=1\big)$$

This presupposition makes (13-c) undefined whenever (13-a) is true.[6] In turn, the strengthening (SCA) inference from (13-a) to (13-b) can fail on pragmatic grounds. While the truth of (13-a) guarantees that any worlds in $[\![$if the US didn't have nukes and if Russia didn't have nukes$]\!]^w$ are Russia-invades-worlds, it does not guarantee that there are any such worlds. Thus, it does doesn't guarantee that (13-b) is non-vacuously true and therefore assertible. Given (16), SCA becomes (merely) Strawson

[6] $\lambda\alpha_a : P \,.\, \beta_b$ is a partial function defined only for α of type a such that P.

valid; the premise (merely) Strawson entails the conclusion (cf. (17) below). We now have an explanation for the puzzle from the end of §2: while SCA is not (fully) valid, still (13-c) can never be asserted along with (13-a). (We return below to when SCA inferences are predicted to go through.)

(17) where p and q are possibly partial functions from worlds to truth values, p Strawson entails q iff $\forall w$: (($p(w)$=True and $q(w)$ is defined) $\rightarrow q(w)$=True)

With this in hand we return to and-collapse. With the pragmatic assumption encoded In (16), and-collapse fails in case $[\![\text{if } \phi \text{ and if } \psi]\!]^w$ is empty. In that case $\Box$ has an empty domain and $[\![[\text{if } \phi \text{ and if } \psi], \Box\chi]\!]$ is the tautology, while $[\![[\text{if } \phi \text{ and } \psi], \Box\chi]\!]$ may be false. On the other hand, where $[\![\text{if } \phi \text{ and if } \psi]\!]^w = f_w([\![\phi]\!]) \cap f_w([\![\psi]\!])$ is not empty, *and*-collapse does go through. For then,

1. there is a (ϕ and ψ)-world, u in $f_w([\![\phi]\!])$ and in $f_w([\![\psi]\!])$
2. by 1, $u \leq_w v$ for every ϕ-world, and thus every (ϕ and ψ)-world, v.
3. by 2 $f_w([\![\phi \text{ and } \psi]\!]) \subseteq f_w([\![\phi]\!])$ and $f_w([\![\phi \text{ and } \psi]\!]) \subseteq f_w([\![\psi]\!])$

and so $f_w([\![\phi]\!]) \cap f_w([\![\psi]\!]) = f_w([\![\phi \text{ and } \psi]\!])$.[7]

It should be apparent that *with* our non-vacuity assumption (16) in place, and-collapse like SCA is (merely) Strawson valid. The left to right direction is valid, but the right to left is (merely) Strawson valid: whenever *If p and if q, r* is true, *If p and q, r* is true and whenever the latter is true and the former defined, the former is true. Thus whenever an utterance of one is felicitously asserted/accepted, the other must be, accounting for the intuition of equivalence noted in §1. Perceived equivalence is predicted to break only in case $[\![\text{if p and if q}]\!]^w$ is empty, a presupposition failure. For example, a contrast is expected between (a) and (b) as continuations of (18):

(18) If it was Saturday, I wouldn't be at the office.
a.??If it was Saturday, and if I was at the office, I'd be unhappy.
b. If it was Saturday and I was at the office, I'd be unhappy.

for (a) will be undefined and therefore not assertible given the truth of (18).

Finally, let us reconsider SCA in light of the Strawson validity of and-collapse. A final prediction is that an instance of SCA should go through—the conclusion should be assertible and true in light of the premise, only if the corresponding instance of SAC goes through. This seems correct. For example, in a situation in which someone *does* conclude (13-b) from (13-a), it seems clear they must accept (12-b).

[7] 1. follows from the def. of f_w (Centering), 2. from 1. and the def. of $\leq_w$ ((15-b)), and 3. from 2. and the def. of f_w. While 2. makes use of $\leq_w$ being total, this is not essential. The same result could be obtained with a selection function based on ordering that is not total, as long as the selection function is "downward persistent": where ϕ entails ψ, the most similar ϕ-worlds are just those ϕ-worlds, if there are any, that are among the most similar ψ-worlds:

(i) $[\![\phi]\!] \subseteq [\![\psi]\!] \Rightarrow f_w([\![\phi]\!]) = [\![\phi]\!] \cap f_w([\![\psi]\!])$ if $f_w([\![\psi]\!]) \cap [\![\phi]\!] \neq \emptyset$

4 Discussion

In the above we argued that the behaviour of coordinated *if*-clauses favours S over K. The crucial difference between the two frameworks which lead to differing predictions is the scope of selection vs. coordination. The takeway, which extends beyond these specific implementations of the comparative similarity approach, is that selection in conditionals should scope below or "precede" coordination in coordinated *if*-clauses (which in turn scopes below quantification).[8] While S and K depart in some ways from the proposals of Schlenker (2004) and Kratzer (1981), respectively, they are true to them with respect to the the locus for selection. For both Kratzer and Schlenker the locus of selection is a design feature that ties into further features and explanatory aims of their analyses. We conclude by discussing the implications of this squib in light of their specific proposals.

For Kratzer, the non-monotonic behavior of conditionals is the realisation of a more general semantic feature of modals. Modals as a class do not simply quantify over accessible worlds, but have an additional parameter that selects a "best" subset of these worlds. In terms of our rendering K, all modals come with a (context dependent) R and f, varying by type of modality. In conditionals, quantification comes from a modal in the consequent. This may be an overtly expressed one where present, or a covert one. For example, modal quantification in a *would*-counterfactual comes from *would* directly, which would correspond to $\Box$ in our rendering K. Thus conditionals are normal, albeit doubly relative, modal statements. They also come with a modifier: the *if*-clause, which functions to restrict the accessible worlds from which the modal selects its domain of quantification.

On K the modal in consequent takes the *if*-clause as argument, restricting the modal base/accessible worlds, R. (In the spirit of Kratzer one could assume that a modal takes an implicit argument, in non-conditional modal statements). This is commensurate with how Kratzer's theory is sometimes presented/implemented in the literature. In Kratzer's original formulation, however, the *if*-clause is treated as the higher type expression, an operator that shifts the modal base (accessible worlds), restricting it to antecedent worlds. While there are likely other reasons to prefer this implementation, it does not yield the desired results for coordinated *if*-clauses, since coordination scopes over quantification (the result is a wide scope coordination of conditionals).[9]

[8] The first proposal to discuss and treat coordinated *if*-clauses specifically is Khoo (2021). It is is implemented with a strict semantics which validates and-collapse, and SAD, by way of several innovations. Khoo uses a covert modal that is strict but proposes (fn.13) that a Kratzerian one (cf. K) could be adopted instead to handle non-monotonicity in general. As far as we can tell, with this move and-collapse would still be valid. We do not discuss his proposal in detail for reasons of space, and since our aim is to make a broad point about comparative similarity approaches.

[9] Here is an implementation, by modification of K. Abstraction is needed over the R parameter (now explicit), which we introduce in the syntax with an abstractor r.

K' [if ϕ], r $\Box\chi$

a. $[\![\text{if } \phi]\!]^{R,f,w} = \lambda\mathcal{R}_{<s,st>,t} \,.\, \mathcal{R}(\lambda w.[R_w \sqcap \lambda w.[\![\phi]\!]^{R,f,w}])$

b. $[\![\Box\chi]\!]^{R,f,w} = \text{T iff } \forall w'\big(R_w(w') \rightarrow [\![\chi]\!]^{R,f,w'} = \text{True}\big)$

c. $[\![\text{r } \phi]\!]^{R,f,w} = \lambda r_{s,st} \,.\, [\![\phi]\!]^{r,f,w}$

Kratzer motivated her theory from puzzles about deontic modals, graded uses of (nominalised) modals, and—most directly—the fact that *if*-clauses do appear to restrict overt modals in some cases. To put the latter more neutrally, Kratzer noted that extant theories of conditionals could not capture the meaning of certain conditionals with overt modals in their consequents. Recent work has questioned some of these motivations—e.g. Lassiter (2011) on graded uses, Mandelkern (2023) on *if*-clauses as restrictors, pointing to different explanations. Since the conclusions of this squib are at odds with the core assumptions of Kratzer's view they can be taken to support alternative perspectives on her motivating data.

Schlenker's theory, by contrast, localises selection to *if*-clauses, in aiming to capture observed parallels between *if*-clauses and definite descriptions. For example, following Lewis, Schlenker observes that definite descriptions exhibit similar failures of monotonicity (e.g. *The dog(s) is (are) barking* does not entail *The neighbors dog(s) is (are) barking*). *if*-clauses are assimilated to definite descriptions of worlds, and selection in a generalised sense ('most accessible') is taken to apply to the restrictor of definites. Thus in a conditional *if p, q*, *if p* denotes the most accessible p-world(s), analogously to 'the dog(s)', which denotes the most accessible dog(s).

In Schlenker's official formal system, unlike our S, there is not a separate device ($\Box$) for quantification in conditionals. This is because *if*-clauses are formalised as *singular* definites: a là Stalnaker, selection gives a unique closest antecedent world. Compositionally the *if*-clause is in effect a direct argument of the proposition expressed by the consequent: *if p, q* is true at w iff $[\![\mathrm{q}]\!](F_w([\![\mathrm{p}]\!])) = 1$, $F_w([\![\mathrm{p}]\!])$ being *the p*-world most like w (F_w a Stalnakerian selection function). However, in Schlenker's informal discussion systems with plural reference to worlds are also discussed.

Considerations from coordinated *if*-clauses favor a system (like S) with "plural reference", i.e. not imposing uniqueness on f. With uniqueness, *if p and if q, r* would entail that *if p, r* which is clearly incorrect empirically. S can be brought closer to Schlenker, as follows

S' [if ϕ], DIST χ

a. $[\![\text{if } \phi]\!]^w = \mathrm{f}_w([\![\phi]\!])$

b. $[\![\text{DIST } \chi]\!]^w = \lambda \mathrm{S} \,.\, \forall w'\big([R_w \sqcap \in S](w'){=}1 \rightarrow [\![\chi]\!](w'){=}1\big)$

$\mathrm{f}_w(\alpha)$ is as in (15-b) and S is the characteristic function of S.

In S', *if*-clauses denote sets (pluralities) of worlds and consequents denote distributive properties of such pluralities, analogous to (inherently distributive) predicates of individuals. The latter is implemented via a syntactic operator DIST but there are other options that go beyond the scope of this squib. Conditional Excluded Middle, which is validated by uniqueness in Schlenker's system, can be retained via a homogeneity

If p and if q, r for example will be equivalent to *if p, r and if q, r*, given type flexible *and*. This is not the reading we need to derive (see fns. 2 and 5).

presupposition on DIST (von Fintel, 1997),(Križ 2015; 2019). Similarly CEM can be added to S itself via a homogeneity presupposition on □.[10]

In conclusion, while many issues remain open, we hope that this short paper has contributed data and considerations that bear on the fine-grained compositional semantics of conditionals. Such details may be significant not only for understanding the linguistic system but for broader debates in logical and philosophy.

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Declarations

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Ethics Compliance The author declares that he has no conflicts of interests.

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[10] Without a homogeneity presupposition added to □/DIST the following two sentences are predicted to be consistent:

(i) a. If the US has nukes and if Russia has nukes, there will be war.
b. It's not the case that if the US has nukes, there will be war.

This may seem incorrect and thus a reason to adopt homogeneity since it ensures that the conditional negated in the second sentence cannot be defined when the first is true. Thus it seems S/S' may need homogeneity, independently of more general considerations for CEM. On the other hand, as a reviewer points out, homogeneity may not be an adequate solution in general for considerations about CEM. Homogeneity would seem to fail for cases such as 'If I flip this coin it will land heads', making them undefined. The latter result may be counterintuitive and also leave us without an account of the truth of beliefs about the probabilities of such statements (50%). I leave such issues for future research.

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