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Iffiness*

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Abstract

How do ordinary indicative conditionals manage to convey conditional information, information about what might or must be if such-and-such is or turns out to be the case? An old school thesis is that they do this by expressing something iffy: ordinary indicatives express a two-place conditional operator and that is how they convey conditional information. How indicatives interact with epistemic modals seems to be an argument against iffiness and for the new school thesis that *if*-clauses are merely devices for restricting the domains of other operators. I will make the trouble both clear and general, and then explore a way out for fans of iffiness.

Keywords: indicative conditionals, epistemic modality, if-clauses, conditionals, strict conditionals, dynamic semantics

1 An iffy thesis

One thing language is good for is imparting plain and simple information: *there is an extra chair at our table* or *we are all out of beer*. But — happily — we

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do not only exchange plain information about tables, chairs, and beer mugs. We also exchange conditional information thereof: *if we are all out of beer, it is time for you to buy another round*. That is very useful indeed.

Conditional information is information about what might or must be, if such-and-such is or turns out to be the case. My target here has to do with how such conditional information manages to get expressed by indicative conditionals (not so called because anyone thinks that's a great name but because no one can do any better). Some examples:

(1) a. If the goat is behind door #1, then the new car is behind door #2.
b. If the No. 9 shirt regains his form, then Barça might advance.
c. If Carl is at the party, then Lenny must also be at the party.

Each of these is an ordinary indicative, two of them have epistemic modals in the consequent clause, and all of them express a bit of ordinary conditional information.[1] What I am interested in is how well the indicatives play with the epistemic modals.

What these examples say is plain. Take (1b). This says that — within the set of possibilities compatible with the information at hand — among those in which the star striker regains his form, some are possibilities in which Barça advance. Or take (1c). It says something about the occurrence of Lenny-is-at-the-party possibilities within the set of Carl-is-at-the-party possibilities — that, given the information at hand, every possibility of the latter stripe is also of the former stripe. So what sentences like these say is plain. How they say it isn't. That's my target here: How is it that the *if*s in our examples manage to express conditional information and do so in a way compatible with how they play with epistemic modals?

The simplest story about how the *if*s in our examples manage to express conditional information is that each of them expresses the information of a conditional. Which is to say: what these conditional *sentences* mean can be read-off the fact that *if* expresses a conditional *operator*. Let's say that a story about *if* is *iffy* iff it takes *if* to express a bona fide operator, a bona fide iffy operator (that is, a conditional operator properly so called), and the same bona fide iffy operator in each of the sentences in (1). We will have to sharpen that up by saying what it means for an operator to be a conditional

1 We ought to be careful to distinguish between conditional *sentences* (sentences of natural language), conditional *connectives* (two-place sentential connectives in some regimented language that may serve to represent the logical forms of conditional sentences), and conditional *operators* (relations that may serve as the denotations of conditional connectives).

operator properly so called. But that is the gist: iffiness — a.k.a. *the operator view* — is the thesis that ordinary indicative conditionals manage to express conditional information because *if* expresses a conditional operator.

Depending on your upbringing, the operator view of *if* may well seem either obvious or obviously wrongheaded. More on that below. Either way, it *is* a hard line to maintain: how conditional sentences play with epistemic modals seems to refute it. A seeming refutation isn't quite the same as an actual one, though. I will show that the refutation isn't quite right by showing how fans of iffiness can account for what needs accounting for. But before showing how the operator view can be made to account for how *if*s and modals interact I want to make it look for all the world like it can't be done.

2 Doom and how to avoid it (sketches thereof)

The operator view is an old school story about indicatives. It says that *if* expresses some relation between the (semantic value of the) antecedent and consequent. So *if* takes its place alongside other connectives and expresses an operator — the *same* operator — on the semantic values of the sentences it takes as arguments.[2] To tell a story like this we have to say exactly what that operator is. But not just any telling will do. I want to show how our simple examples cause what looks like insurmountable trouble (doom, even) for any version of the operator view. Here's an informal sketch of the trouble, what rides on it, and how — eventually — we can and ought to get out of the mess. Take this sketch as a promissory note that a formally precise version of all that can be given; the rest of the paper makes good on that.

Suppose *if* expresses the limit case conditional operator of material implication. Iffiness requires that in sentences like (1b) and (1c) either the epistemic modals outscope the conditionals or the conditionals outscope the modals. Neither choice gets the truth conditions right if the conditional operator is the horseshoe. That's easy to see (and well known).[3] Linguists grow up on arguments like that. That is one reason why even though the operator view is the first thing a logician thinks of, it is the last thing a linguist does.

2 *If* is a little word with a big history — a big history that we can't adequately tour here. But there are guides for hire: for instance, Bennett (2003) and von Fintel (2009).

3 The material conditional analysis of ordinary indicatives is defended (in somewhat different ways) by, for example, Grice (1989), Jackson (1987), and Lewis (1976). A textbook version of this "no-scope" argument that has the horseshoe analysis as its target appears in von Fintel & Heim 2007.

But (as I'll show) this very same trouble holds *no matter* what conditional operator an iffy story says *if* expresses. To see that requires two things. First, we need to say in a precise way what counts as a conditional operator (Section 4). Given some pretty weak assumptions iffiness requires that *if* means *all* (well, *all relevant*). Second, there are some characteristic Facts about how indicatives and epistemic modals interact (Section 5). These neatly divide: there are some consistency facts and there are some intuitive entailment facts. The operator view requires that either the conditionals outscope the modals or the modals outscope the conditionals. Something general then follows: no matter what conditional operator we say *if* expresses, one scope choice is ruled out by the consistency facts, the other by the entailments (Section 6).

That seems to be bad news for any fan of any version of the old school operator view. And there seems to be more bad news in the offing since the operator view isn't the only game in town (in some circles, it's a game played only on the outskirts of town). The anti-iffiness rival — a.k.a. *the restrictor view* — is a new school approach. It embraces Kratzer's thesis that *if* is not a connective at all: it doesn't express an operator, a fortiori not an iffy operator, and *a fortiori* not the same iffy operator in each of our example sentences it figures in.[4] Instead, says the restrictor analysis, *if* simply restricts other operators. In the cases we will care about, it restricts (possibly covert) epistemic modals. The restrictor view makes embarrassingly quick work of the data that spells such trouble for the operator view (Section 7).

But the success of the restrictor analysis is no argument against Chuck Taylors and skyhooks tout court. That's because there are old school stories that say that *if* expresses a strict conditional operator over possibilities compatible with the context, and that it can do all the restricting that needs doing (Sections 8). Once we see just how, we can look back and see more

4 The restrictor view gets its inspiration from Lewis's (1975) argument that certain *if*s (under adverbs of quantification) cannot be understood as expressing some conditional but rather serve to mark an argument place in a polyadic construction. Kratzer's thesis is that this holds for *if* across the board. The classic references are Kratzer 1981, 1986. There is another rival, too: some take *if* to be an operator, but an operator that does not (when given arguments) express a proposition (Adams 1975; Gibbard 1981; Edgington 1995, 2008). Instead, they say, *if*s express but do not report conditional beliefs on the part of their speakers. I will ignore this view here: it doesn't really start off as the most plausible candidate, the trouble I make here about how *if*s and modals interact makes it less plausible not more, and it will just take us too far afield.

clearly what is at stake in the difference between new school and old, why iffiness is worth pursuing (Section 9), and how this version of the old school story relates to recent dynamic semantic treatments (Section 10).

3 Ground rules

Let's simplify. Assume that meanings get associated with sentences by getting associated with formulas in an intermediate language that represents the relevant logical forms (LFs) of them. Thus a story, old school or otherwise, has to first say what the relevant LFs are and then assign those LFs semantic values.

We will begin with an intermediate language L that has a conditional connective that will serve to represent the LFs of ordinary indicatives. So let L be generated from a stock of atomic sentence letters, negation ($\neg$), and conjunction ($\wedge$) in the usual way. But L also has the connective $(\textit{if}\ \cdot)(\cdot)$, and the modals *must* and *might*. What I have to say can be said about an intermediate language that allows that the modals mix freely with the formulas of the non-modal fragment of L but restricts $(\textit{if}\ \cdot)(\cdot)$ so that it takes only non-modal sentences in its first argument. So assume that L is such an intermediate language. When these restrictions outlive their utility, we can exchange them for others.[5]

Iffiness requires that the *if* of English expresses something properly iffy. That leaves open just which conditional operator we say that the *if* of English means. But our choices here are not completely free, and some ground rules will impose some order on what we may say. These will constrain our choice by saying what must be true for a conditional operator to be rightfully so called. But before getting to that, I'll start with what I will assume about contexts.

First, a general constraint: assume that truth-values — for the *if*s and the modals (when we come to that), as well as for the boolean fragment of L — are assigned at an *index* (world) i with respect to a *context*. I will assume that W, the space of possible worlds, is finite. Nothing important turns on this, and it simplifies things.

For the fragment of L with no modals and no *if*s, contexts are idle. It will be the job of the modals to quantify over sets of live possibilities and the job

5 Conventions: $p, q, r, \ldots$ range over sentences of L (subject to our constraints on L); $i, j, k, \ldots$ range over worlds; and $P, Q, R, \ldots$ range over sets of worlds. And let's not fuss over whether what is at stake is the '*if*' of English or the '*if*' of L; context will disambiguate.

of contexts to select these sets of worlds over which the modals do their job. What I want to say can be said in a way that is agnostic about just what kinds of things contexts are: all I insist is that, given a world, they determine a set of possibilities that modals at that world quantify over.[6] The functions doing the determining need to be well-behaved.

Given a context c — replete with whatever things contexts are replete with — an epistemic modal base C determined by it is just what we need:

Definition 3.1 (MODAL BASES)**.** Given a context c, C is a modal base (for c) only if:

$$C = \lambda i.\,\{j:\ j \text{ is compatible with the } c\text{-relevant information at } i\}$$

Since the only context dependence at stake here will be dependence on such bases, we can get by just as well by taking them to go proxy for bona fide contexts, granting them the honorific "contexts", and relativizing the assignment of truth-values to index–modal base pairs directly. So we'll be saying just which function $[\![\cdot]\!]^{C,i} : L \to \{0,1\}$ is, where C represents the relevant contextual information. No harm comes from that, and it makes for a prettier view.[7]

But not just any function from indices to sets of indices will do as a (proxy) context. So we constrain C's accordingly, requiring that they are well-behaved — that is, reflexive and euclidean:

6 The problems and prospects for iffiness are independent of just whose information in a context — speaker, speaker plus hearer, just the hearer, just the hearer's picture of what the speaker intends, and so on — counts for selecting the domains for the modals to do their job, and whether or not that information is information-at-a-context at all. So let's keep things simple here. If you'd rather be reading a paper which has these (and other) complexities at the forefront, see von Fintel & Gillies 2007, 2008a,b and the references therein.

7 Three comments. First: take $[\![\cdot]\!]^{C}$ to be shorthand for $\{i : [\![\cdot]\!]^{C,i} = 1\}$. If p's denotation is invariant across contexts – if $[\![p]\!]^{C} = [\![p]\!]^{C'}$ no matter the choice for C and C' – let's agree to conserve a bit of (virtual) ink and sometimes omit the superscript: so, e.g., the *if*s I am focusing on here have non-modal antecedents, and so those antecedents will be context-invariant. Second: it's a little misleading to say that the *only* context dependence is dependence on modal bases since we will want to allow the possibility that what worlds are relevant to an *if* at a world can vary across contexts. But, in fact, we can (and will) still leave room for that possibility by constraining how contexts and the sets of *if*-relevant possibilities relate. Third: if I had different ambitions, we couldn't simplify quite like this. If the interaction at center stage were how *if*s and quantifiers interact, or if the modals in the *if*/modal interaction were deontic, then we'd want our contexts to rightly characterize the kind of information at stake and taking them to determine sets of possibilities compatible with what is known would not do. But my ambitions here aren't different from what they are.

Definition 3.2 (WELL-BEHAVEDNESS)**.** C is well-behaved iff:

i. $i \in C_i$ (REFLEXIVENESS)
ii. if $j \in C_i$ then $C_i \subseteq C_j$ (EUCLIDEANNESS)

C represents a (proper) context only if it is well-behaved.

Observation 3.1. If C is well-behaved then C_i is *closed*—well-behavedness implies that if $j \in C_i$, then $C_j = C_i$.

Proof. Suppose $j \in C_i$. Consider any $k \in C_j$. Since C is euclidean and $j \in C_i$, $C_i \subseteq C_j$. Since C is reflexive, $i \in C_i$ and thus $i \in C_j$. Appeal to EUCLIDEANNESS again: since $k \in C_j$, $C_j \subseteq C_k$; but $i \in C_j$ and so $i \in C_k$. And once more: since $i \in C_k$, $C_k \subseteq C_i$. And now REFLEXIVENESS: $k \in C_k$ and so $k \in C_i$. (The inclusion in the other direction just is EUCLIDEANNESS.) □

Gloss C_i as the set of live possibilities at i in C. That C_i is closed means that the live possibilities in C_i do not vary across worlds compatible with C.[8]

4 Conditional operators

By saying something about what must be true of an operator for it to be a conditional operator properly so called we thereby say something about what must be true for a story to be iffy. Taking *if* to express a bona fide conditional operator requires, minimally, two things.

Thing one: it requires, in the cases we'll care about, that *if such-and-such, then thus-and-so* doesn't take a stand on whether such-and-such is the case and so conditionals like that are typically happiest being uttered in circumstances in which such-and-such is compatible with the context as it stands when the conditional is issued. I will take this as a definedness condition on the semantics for our conditional connective.

Definition 4.1 (DEFINEDNESS)**.** $[\![(\mathit{if}\ p)(q)]\!]^{C,i}$ is defined only if p is compatible with C_i.

This is a weak constraint.[9]

8 Given EUCLIDEANESS, we could get by with different assumptions on C to the same effect. But REFLEXIVENESS is a constraint it makes sense to want since, when we come to them, epistemic modals—what might or must be in virtue of what is known—in a given context will quantify over the set of possibilities compatible with that context.

9 The motivating idea isn't novel (see, e.g., Stalnaker 1975): if it's ruled out that p in C, and you want to say something conditional on p in C, then you should be reaching for a

Thing two: it requires that *if* expresses a relation between antecedent and consequent. Whether *if such-and-such, then thus-and-so* is true depends on whether the relevant worlds at which *such-and-such* is true bears the right relationship to the worlds where *thus-and-so* is true. Take an arbitrary conditional like $(if\ p)(q)$ at i, in C. And let P and Q be the sets of antecedent and consequent possibilities so related by the *if*. Now we need to zoom in on the relevant worlds in P. So let D_i be the set of *if*-relevant worlds at i. For *if* to express a conditional operator properly so called, its denotation must be a relation R between P-together-with-the-relevant-possibilities-D_i and Q.

D_i is the set of possibilities relevant for the *if* at i. Since D_i is a function of i, different worlds may be relevant for one and the same *if* when evaluated at different worlds. But, depending on your favorite theory, D_i may be a function of more than just i: it may be a function of i, of C, of p, of q, or of your kitchen sink. We will return to that shortly. No matter your favorite theory, we can still ex ante agree to this much: i is *always* among the possibilities relevant for an *if* at i, and *only* possibilities compatible with the context are relevant for an *if* at i. That is: D_i is the set of *if*-relevant worlds at i only if $i \in D_i$ and $D_i \subseteq C_i$. The first requirement is a platitude: the facts at a world are always relevant to whether an indicative at that world is true. The second means that an indicative in a context is supposed to say something about the possibilities compatible with that context.

Beyond this, what your favorite theory implementing the operator view says about D_i may vary because what stories say counts as an *if*-relevant possibility varies. But what does not vary is that all such stories determine D_i in a pretty straightforward way and so the denotation they assign to *if* can be put as a relation between the relevant antecedent possibilities and the consequent possibilities. Three examples:

Example 1 (VARIABLY STRICT CONDITIONAL). Suppose your favorite story takes *if* to be a variably strict conditional based on some underlying ordering of possibilities (Stalnaker 1968; Lewis 1973). For every world i, let $\preceq_i$ be an ordering of worlds, a relation of comparative similarity (at least) weakly centered on i. Given a conditional $(if\ p)(q)$ at i in C, you will want to identify D_i with the set of possibilities no more dissimilar than the most similar p-world to i, restricted by C_i.

Example 2 (STRICT CONDITIONAL). Suppose your favorite Lewis-inspired story

counterfactual not an indicative. That can be implemented in any number of ways, including making it a presupposition of *if*-clauses (see, e.g., von Fintel 1998a).

comes not from D.K. but from C.I. You thus take *if* to be strict implication (restricted to C). But that, too, can be put in terms of orderings: your ordering $\preceq_i$ is universal, treating all worlds the same. Whence it follows that — since the nearest p-world is the same distance from i as is every world — taking D_i to be the set of possibilities no further from i as the nearest p-world amounts to taking D_i to be the set of all worlds W, restricted by C_i.

Example 3 (MATERIAL CONDITIONAL). Suppose you are smitten by truth-tables, and your favorite incarnation of the operator view is the material conditional story. Equivalently: you will have a maximally discerning ordering (every world an island) and take D_i to be the set of closest worlds to i *simpliciter* according to that ordering. For an *if* at i you will thus take D_i to be $\{i\}$. (For an *if* at some other world j, even an *if* with the same antecedent and consequent as the one at i, take D_j to be $\{j\}$.)

Summing this all up: even before taking a stand on just what relation between relevant antecedent possibilities and consequent possibilities that *if* must express in order to express a conditional operator properly so called, we know that it must still express such a relation. So let's insist that we can put things that way, parametric on just how D_i gets picked out and so parametric on what counts as "relevant" antecedent possibilities and so parametric on the details of your favorite theory:

Definition 4.2 (RELATIONALITY)**.** $(if\ \cdot)(\cdot)$ expresses a conditional only if its truth conditions can be put this way:

$$\text{if defined, } [\![(if\ p)(q)]\!]^{C,i} = 1 \text{ iff } R(D_i \cap P, Q)$$

for some set of possibilities D_i and relation R, where $i \in D_i$ and $D_i \subseteq C_i$.

But not just any relation between $D_i \cap P$ and Q counts as a conditional relation properly so called. I insist on three minimal constraints on R, for any P and Q: (i) that $D_i \cap P$ imposes some order on the set of Q's so related; (ii) that Q matters to whether the relation holds; and (iii) that — plus or minus just a bit — only the relationship between the possibilities in $D_i \cap P$ and the possibilities in Q matter to whether the relation holds. These are not controversial, but do bear some unpacking.[10]

First, the order imposed by the antecedent:

10 This general way of characterizing conditionality is not new: both the assumptions and the results here are inspired by van Benthem's (1986: §4) investigation of conditionals as generalized quantifiers. There are, however, differences between his versions and mine.

Definition 4.3 (ORDER). R is orderly iff:

i. $R(D_i \cap P, P)$
ii. $R(D_i \cap P, Q)$ and $Q \subseteq S$ imply $R(D_i \cap P, S)$
iii. $R(D_i \cap P, Q)$ and $R(D_i \cap P, S)$ imply $R(D_i \cap P, Q \cap S)$

R is something $(if\ \cdot)(\cdot)$ at i could mean only if it is orderly.

Such R's are precisely those for which the set of Q's a $D_i \cap P$ bears it to form a filter that contains P.[11] That is an aesthetic reason for constraining R this way. Such R's also jointly characterize the basic conditional logic.[12] The relational properties correspond to reflexivity, right upward monotonicity, and conjunction. That is another — only partly aesthetic — reason for constraining them this way.

Second, R must care about consequents. This is just the requirement that conditional relations, like quantifiers, be *active*:

Definition 4.4 (ACTIVITY). R is active iff:

> if $D_i \cap P \neq \emptyset$ then there is a Q and Q' such that: $R(D_i \cap P, Q)$ but not $R(D_i \cap P, Q')$

R is something $(if\ \cdot)(\cdot)$ at i could mean only if it is active.

This means that R cares about how $D_i \cap P$ relates to Q. So long as there are some relevant P-possibilities, there have to be some Q's for which the relation holds and some for which it doesn't.

And finally: R is a relation between the sets of possibilities. Thus if R holds at all between P-plus-the-relevant-possibilities-D_i and the consequent-possibilities Q, R will hold between any two sets of things that play the right possibility role. Intrinsic properties of worlds don't count for or against the relation holding. The idea is simple, the execution harder. That is because I have allowed you to choose your favorite iffy theory, and what goes into determining D_i depends on your choice.

What is important is this: suppose your favorite story posits some additional structure to modal space to find just the right worlds which, when combined with P, gives the set of worlds relevant for evaluating Q. That means that your favorite story cares about how P relates to Q but also about the distribution of the worlds in P compared to the distribution in Q — for

11 It follows straightaway that orderly R's are fully reflexive in the sense that $R(D_i \cap P, D_i \cap P)$.
12 See Veltman 1985 for a proof.

example, perhaps insisting that it is the *closest* worlds in P to i that must bear R to Q. If we systematically swap possibilities for possibilities in a way that preserves the relevant structure, then the conditional relation ought to hold pre-swapping iff it holds post-swapping. And mutatis mutandis for D_i: since once the posited structure does its job determining D_i, then any systematic swapping of possibilities that leaves the domain untouched should also leave the conditional relation untouched.[13]

Where π is such a mapping and P a set of worlds, let $\pi(P)$ be the set of worlds i such that $\pi(j) = i$ for some $j \in P$. Then:

Definition 4.5 (QUALITY)**.** R is qualitative iff:

$$R(D_i \cap P, Q) \text{ implies } R(\pi(D_i \cap P), \pi(Q))$$

R is something $(\textit{if } \cdot)(\cdot)$ at i could mean only if it is qualitative.

This does generalize the familiar constraint on quantifiers — it allows conditional operators to care about both the relationship between P and Q and also where the satisfying worlds are. If $\preceq_i$ is the universal ordering then this requirement reduces to the more familiar quantitative one (restricted to C_i). And if $D_i = \{i\}$, it trivializes.

I am insisting that a story is iffy only if the truth conditions for an indicative $(\textit{if } p)(q)$ at i in C_i can be put as a relation between R between $D_i \cap P$ and Q. And we have insisted that the relation be constrained in sensible ways — it must impose some order on sets of consequent possibilities, it must care about consequents, and it must not care about the intrinsic properties of possibilities. Each example of an instance of the operator view above — variably strict, strict, and material conditionals — lives up to these constraints. Still, it seems like for all we have said it is possible to take the conditional to be true just in case most/many/several/some/just the right possibilities in $D_i \cap P$ are in Q. But that is not so: given our constraints, *if* must mean *all*.[14]

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13 This is the natural extension of the familiar requirement that quantifiers be *quantitative*: for $\mathcal{Q}$ to be a quantifier (with domain E) it must be that $\mathcal{Q}_E(A, B)$ iff $\mathcal{Q}_E(f(A), f(B))$ where f is an isomorphism of E. Once we have structure to our domain, this will not do. The more general constraint is then to require that $\mathcal{Q}$ be invariant under $\mathcal{O}$-automorphisms of the domain, where $\mathcal{O}$ is the ordering that imposes the posited structure. We can get by with slightly less: namely, stability under D_i-invariant automorphisms.

14 Well, *all relevant*. This was first proved by van Benthem — see, e.g., van Benthem 1986. The version I give is simpler (we're ignoring the infinite case) and a bit more general (slightly weaker assumptions); the proof is based on one in Veltman 1985, but generalizes it slightly.

Observation 4.1. Assume R is a conditional relation properly so called. Then $R(D_i \cap P, Q)$ iff $D_i \cap P \subseteq Q$.

Proof. I care about the left-to-right direction.

Suppose — for *reductio* — that $R(D_i \cap P, Q)$ but $D_i \cap P \nsubseteq Q$. What we'll see is: (i) $R(D_i \cap P, P \cap Q)$; (ii) the world that witnesses that $D_i \cap P \nsubseteq Q$ can be exploited (by QUALITY) to show that no world in $P \cap Q$ plays a role in $R(D_i \cap P, P \cap Q)$ holding — from which it follows that $R(D_i \cap P, \emptyset)$; (iii) from which it follows that $D_i \cap P$ must be empty — a contradiction.

(i): By hypothesis $R(D_i \cap P, Q)$. By ORDER it follows that $R(D_i \cap P, P)$ and hence that $R(D_i \cap P, P \cap Q)$.

(iia): *Claim*: $D_i \cap P \cap Q \neq \emptyset$. *Proof of Claim*: Assume otherwise. ORDER guarantees that $R(D_i \cap P, D_i \cap P)$. By hypothesis $R(D_i \cap P, Q)$, and so by ORDER $R(D_i \cap P, D_i \cap P \cap Q)$. Applying the assumption that $D_i \cap P \cap Q = \emptyset$: $R(D_i \cap P, \emptyset)$. Appeal to ORDER again and we have that $R(D_i \cap P, S)$ for any S. But then $D_i \cap P$ must be empty (ACTIVITY), contradicting the assumption that $D_i \cap P \nsubseteq Q$ and proving the *Claim*.

(iib): Let j be a witness to $D_i \cap P \nsubseteq Q$. So $j \in D_i \cap P$ but $j \notin Q$. Now pick any confirming instance k — that is, any $k \in D_i \cap P \cap Q$ — and let π be the mapping that swaps k and j and leaves all else untouched:

- $\pi(j) = k$
- $\pi(k) = j$
- $\pi(i) = i$ for every $i \notin \{j, k\}$

By (i) $R(D_i \cap P, P \cap Q)$. Hence, by QUALITY, $R(\pi(D_i \cap P), \pi(P \cap Q))$. But π doesn't affect $D_i \cap P$. So: $R(D_i \cap P, \pi(P \cap Q))$. That is: R holds between $D_i \cap P$ and both $P \cap Q$ and $\pi(P \cap Q)$. Hence — by ORDER — it holds also between $D_i \cap P$ and their intersection: $R(D_i \cap P, (P \cap Q) \cap \pi(P \cap Q))$. But $\pi(P \cap Q) = ((P \cap Q) \setminus \{k\}) \cup \{j\}$, so their intersection is $(P \cap Q) \setminus \{k\}$. So: $R(D_i \cap P, (P \cap Q) \setminus \{k\})$. Which is to say that k is irrelevant for R's holding. But k was any world in $D_i \cap P \cap Q$, so finiteness plus ORDER implies $R(D_i \cap P, \emptyset)$.

(iii): Appeal to ORDER again: since $R(D_i \cap P, \emptyset)$, it holds that for any S whatever $R(D_i \cap P, S)$. Whence, by ACTIVITY, it follows that $D_i \cap P = \emptyset$. And that contradicts the assumption that $D_i \cap P \nsubseteq Q$. □

The intuitive version is just this: if R holds between $D_i \cap P$ and Q then the former must be included in the latter. That is because if things didn't go that way then the witnessing counterexample world could play the role of any one of the confirming worlds. But that would mean that confirming worlds play no role. Nothing like that could be something a conditional properly so called could mean. So $D_i \cap P$ must be included in Q after all.

5 Three facts

Iffiness requires that *if* is a conditional connective that expresses a conditional operator, and that pretty much means that *if* has to mean *all*. It requires that no matter what other operators we might find in its neighborhood. That spells trouble because of three simple Facts about how indicative conditionals and epistemic modals play together.[15]

I have lost my marbles. I know that just one of them — Red or Yellow — is in the box. But I don't know which. I find myself saying things like:

(2) Red might be in the box and Yellow might be in the box.
So, if Yellow isn't in the box, then Red must be.
And if Red isn't in the box, then Yellow must be.

Conjunctions of epistemic modals like *Red might be in the box and Yellow might be in the box* are especially useful when the bare prejacents partition the possibilities compatible with the context. The first fact is simply that *if*s are consistent with such conjunctions of modals.

Fact 1 (CONSISTENCY)**.** Suppose S_1 and S_2 partition the possibilities compatible with the context. Then the following are consistent:

i. *might* S_1 *and might* S_2
ii. *if not* S_1*, then must* S_2*; and if not* S_2*, then must* S_1

15 Three notes about the Facts. First: "Facts" may be laying it on a little thick. The *judgments* are robust, and the costs high for denying the generalizations as I put them. That's all true even if what we may say about them is a matter for disputing. But it does not much matter: what I really care about is three characteristic *seeming facts* about *if*s, *might*s, and *must*s that *at first blush* look like the kind of thing our best story ought to answer to. So let's agree to take them at face value and see where that leads. Later, if your English breaks with mine or if your old school pride overwhelms, you can deny the Facts or explain them away as your preferences dictate. Second: the Facts may seem eerily familiar. They are not far removed from the sorts of examples of the interplay between adverbs of quantification and *if*-clauses in Lewis 1975 and Kratzer 1986. That is no coincidence, as we'll see (briefly) in Section 7. Third: since the operator view isn't the only game in town and since predicting the Facts is something any story (old school or otherwise) must do, we should state the Facts in a way that is agnostic on the iffy thesis. So the Facts characterize what is true of sentences in (quasi-)English, not necessarily what is true of their LFs in our regimented intermediate language.

I do not know whether Carl made it to the party. But wherever Carl goes, Lenny is sure to follow. So if Carl is at the party, Lenny must be — Lenny is at the party, if Carl is. We just glossed an *if* with a commingling epistemic *must* by a bare *if* with no (overt) modal at all. Thus:

(3) a. If Carl is at the party, then Lenny must be at the party. ≈
b. If Carl is at the party, then Lenny is at the party.

This pair has the ring of (truth-conditional) equivalence. Fact 2 below records that. But there are also arguments for thinking that the truth-value of (3a) should stand and fall with the truth-value of (3b).

For suppose that such *if*s validate a deduction theorem and modus ponens, and that *must* is factive.[16] The left-to-right direction: assume that (3a) is true. And consider the argument:

(4) If Carl is at the party, then Lenny must be at the party.
Carl is at the party.
So: Lenny is at the party.

The first two sentences — intuitively speaking — entail the third. And that is pushed on us by the assumptions: from the first two sentences we have (by modus ponens) that *Lenny must be at the party*, which by factivity entails *Lenny is at the party*. Apply the deduction theorem and we have that *If Carl is at the party, then Lenny must be at the party* entails *If Carl is at the party, then Lenny is at the party*. Since we have assumed that (3a) is true, it follows that (3b) must be. There are spots to get off this bus to be sure — by denying either modus ponens or by denying the factivity of *must* — but those costs are high.[17]

The right-to-left direction: assume that (3b) is true and consider:

16 Remember that, for now, we are dealing with properties of sentences of (quasi-)English not properties of those sentences' LFs in some regimented language. The argument here isn't meant to convince you of Fact 2, it is meant to make some of the costs of denying the data vivid. Geurts (2005) also notes that bare conditionals and their *must*-enriched counterparts are "more or less equivalent".

17 You have to troll some pretty dark corners of logical space for deniers of modus ponens, but that's not true for deniers of the factivity of *must*. That view has something of mantra status among linguists (philosophers are surprised to hear that). Mantra or not, it is wrong. For an all-out attack on it see von Fintel & Gillies 2010. Here is just one sort of consideration: if *must* p didn't entail p (because *must* is located somewhere below the top of the scale of epistemic strength), then you'd expect *must* to combine with *only* in straightforward ways the way *might* can:

(5) If Carl is at the party, then Lenny is at the party.
Carl is at the party.
So: Lenny must be at the party.

This is as intuitive an entailment as we are likely to find. Whence it follows by the deduction theorem that *If Carl is at the party, then Lenny is at the party* on its own entails *If Carl is at the party, then Lenny must be at the party*. So if (3b) is true so must be (3a): that's why the former seems to gloss the latter.

Fact 2 (IF/MUST)**.** Conditional sentences like these are true in exactly the same scenarios:

i. *if* S_1*, then must* S_2
ii. *if* S_1*, then* S_2

The glossing that this pattern permits is a nifty trick. But that is only half the story since *if* can also co-occur with epistemic *might*. The interaction between *if* and *might* is different and underwrites a different glossing.

Alas, my team are not likely to win it all this year. It is late in the season and they have made too many miscues. But they are not quite out of it. If they win their remaining three games, and the team at the top lose theirs, my team will be champions. But our last three are against strong teams and their last three are against cellar dwellers. Still, my spirits are high: if we win out, we might win it all. Put another way, within the (relevant) my-team-wins-out possibilities — of which there are some — lies a my-team-wins-it-all possibility; there is a my-team-wins-out possibility that is a my-team-wins-it-all possibility. But that is just to say that there are (relevant) my-team-wins-out-and-wins-it-all possibilities. Maybe not very many, and maybe not so close, but some.[18]

Apart from keeping hope alive, the example also illustrates that we can gloss an indicative with a co-occurring epistemic *might* by a conjunction under the scope of *might*:

(6) a. If my team wins out, they might win it all. ≈
b. It might turn out that my team wins out and wins it all.

(i) a. I didn't say it is raining, I only said it might be raining.
b. #I didn't say it is raining, I only said it must be raining.

But it doesn't.

18 For the record: the Cubs. Please don't bring it up.

That gloss sounds pretty good. And for good reason: conjunctions that you would expect to be happy if the truth of (6a) and (6b) could come apart are not happy at all:

(7) a. #If my team wins out, they might win it all; moreover, they can't win out and win it all.
b. #It might turn out that my team wins out and wins it all, and, in addition there's no way that if they win out, they might win it all.

That gives us the third Fact about how *if*s play with modals.[19]

Fact 3 (IF/MIGHT)**.** Sentences like these are true in exactly the same scenarios:

i. *if* S_1*, then might* S_2
ii. *it might be that* [S_1 *and* S_2]

It's now a matter of telling some story, iffy or otherwise, that answers to these Facts. Old school operator views will have trouble with them; the new school restrictor view predicts them trivially.

6 Scope matters

The operator view takes *if* to express an operator, an iffy operator, and the same iffy operator no matter whether we have a co-occurring epistemic modal or not and no matter whether the modal is *must* or *might*. In cases where there is a modal, scope issues have to be sorted out. Take a sentence of the form

(8) If S_1 then MODAL S_2

19 There is a wrinkle: Fact 3 implies that *if* S_1*, then might* S_2 is true in just the same spots as *if* S_2*, then might* S_1. Seems odd:

(i) a. If I jump out the window, I might break a leg.
b. If I break a leg, I might jump out the window.

The first is true, the second an overreaction. I intend, for now, to sweep this under the same rug that we sweep the odd way in which *Some smoke and get cancer*/*Some get cancer and smoke* don't feel exactly equivalent even though *Some* is a symmetric quantifier if ever there was one. (The rug in question seems to be the tense/aspect rug; similar considerations drive von Fintel's (1997) discussion of contraposition of bare conditionals.)

and let S_1' (S_2') be the L-representation for sentence S_1 (S_2), and *modal* the L-representation for MODAL. We have a short menu of options for the relevant LF for such a sentence — either the narrowscoped (9a) or the widescoped (9b):

(9) a. $(if\ S_1')(modal\ S_2')$
b. $modal\ (if\ S_1')(S_2')$

If you want to put your LFs in tree form, be my guest: opting for narrowscoping means opting for sisterhood between MODAL and S_2; opting for widescoping means opting for sisterhood between MODAL and *if* S_1 *then* S_2.

The trouble for the operator view is that, since *if* has to express inclusion, neither choice will do. One choice for scope relations seems ruled out by CONSISTENCY (Fact 1), the other by IF/MUST (Fact 2) and IF/MIGHT (Fact 3).

To put the trouble precisely, we need one more ground rule. Contexts, we said, have the job of determining the domains the modals quantify over. Modals, I'll assume, do their job in the usual way by expressing their usual quantificational oomph over those domains: *must* (at i, with respect to C) acts as a universal quantifier, and *might* as an existential quantifier, over C_i.

Definition 6.1 (MODAL FORCE)**.**

i. $[\![might\ p]\!]^{C,i} = 1$ iff $C_i \cap [\![p]\!]^C \neq \emptyset$
ii. $[\![must\ p]\!]^{C,i} = 1$ iff $C_i \subseteq [\![p]\!]^C$

Now suppose we plump for narrowscoping. Then, given the ground rules, we cannot predict the consistency of the likes of (2) and that means that we cannot square iffiness with Fact 1. That's true no matter how you fill in the particulars of the iffy story.

Here is the narrowscoped analysis of my lost marbles. We have a modal and two indicatives:

(10) a. Red might be in the box and Yellow might be in the box.
$might\ p \wedge might\ q$
b. If Yellow isn't in the box, then Red must be.
$(if\ \neg q)(must\ p)$
c. If Red isn't in the box, then Yellow must be.
$(if\ \neg p)(must\ q)$

Any good story has to allow that the bundle of *if*s in (10b) and (10c) is consistent with the conjunction in (10a). But, assuming narrowscoping, this — even without taking a stand on how we choose D_i and so without taking a stand on what counts as the set of *if*-relevant worlds — seems to be beyond what can be delivered by any version of the operator view.

Observation 6.1. Suppose p and q partition the possibilities in C and that (10a) is true. Then the (narrowscoped) sentences in (10) can't all be true.

Proof. Suppose otherwise — that the regimented formulas in L are all true at a live possibility, say i, with respect to C. Just one of my marbles is in the box. So any world in C_i is either a p-world or a q-world, but not both; C is well-behaved, so $i \in C_i$. That leaves two cases.

CASE 1: $i \in [\![\neg q]\!]$. By hypothesis $[\![(\mathit{if}\ \neg q)(\mathit{must}\, p)]\!]^{C,i} = 1$, and so $D_i \cap [\![\neg q]\!]^C \subseteq [\![\mathit{must}\, p]\!]^C$. Since $i \in D_i$, it then follows that $i \in [\![\mathit{must}\, p]\!]^C$ — which is to say $[\![\mathit{must}\, p]\!]^{C,i} = 1$. Thus C_i has only p-worlds in it. But that is at odds with the second conjunct of (10a): that *might* q is true at i guarantees a q-world, hence a $\neg p$-world, in C_i.

CASE 2: $i \in [\![\neg p]\!]$. By hypothesis $[\![(\mathit{if}\ \neg p)(\mathit{must}\, q)]\!]^{C,i} = 1$, and so $D_i \cap [\![\neg p]\!]^C \subseteq [\![\mathit{must}\, q]\!]^C$. Since $i \in D_i$, it then follows that $i \in [\![\mathit{must}\, q]\!]^C$ — which is to say $[\![\mathit{must}\, q]\!]^{C,i} = 1$. Thus C_i has only q-worlds in it. But that is at odds with the first conjunct of (10a): that *might* p is true at i guarantees a p-world, hence a $\neg q$-world, in C_i. □

Narrowscoping has the virtue of taking plain and simple LFs to represent indicatives with apparently epistemic modalized consequents. But it has the vice of not squaring with CONSISTENCY. This is true *no matter* the particulars of your favorite version of the operator view.[20]

So suppose instead that co-occurring modals scope over the *if*-constructions in which they occur. Now it is the generalizations IF/MUST and IF/MIGHT that cause trouble. Again, that's true no matter how D_i is chosen and so no matter what counts as an *if*-relevant possibility and so no matter what conditional operator we say *if* expresses.

Here is a widescope analysis of the key examples (3) and (6):

(11) a. If Carl is at the party, then Lenny must be at the party.
$\mathit{must}\ (\mathit{if}\ p)(q)$
b. If Carl is at the party, then Lenny is at the party.
$(\mathit{if}\ p)(q)$

20 Thus by supplying how your favorite version of the operator view says D_i is determined, you can use this proof to show how that story (assuming narrowscoping) departs from Fact 1.

(12) a. If my team wins out, they might win it all.
might $(if\ p)(q)$
b. It might turn out that my team wins out and wins it all.
might $(p \wedge q)$

The facts are that $must(if\ p)(q) \approx (if\ p)(q)$ and that $might(if\ p)(q) \approx might\,(p \wedge q)$. What we need is a semantics for the conditional connective $(if\ \cdot)(\cdot)$ that can predict both patterns. But paths that might lead to one pretty reliably lead away from the other.

So far I have insisted that i is always among the relevant worlds to an *if* at i ($i \in D_i$) and also that only worlds compatible with the context are relevant ($D_i \subseteq C_i$). Here I am in good company. But perhaps there is even more interaction between domains of *if*-relevant worlds and contexts.

Some theories say that there can be no difference in domains for conditionals between worlds compatible with the context, others disagree:

Definition 6.2 (EGALITARIANISM & CHAUVINISM)**.**

i. A semantics is egalitarian iff if whenever $j \in C_i$ then $D_j = D_i$.
ii. A semantics is chauvinistic iff it is not egalitarian.

EGALITARIANISM requires domains to be invariant across worlds compatible with a context. That means that distinctions between worlds made by D's — this world is relevant, that one isn't — are unaffected when those distinctions are made from behind the veil of ignorance (we don't know which world compatible with C is the actual world). Chauvinistic theories allow differences from behind the veil to matter to what possibilities get selected for domainhood, and thus allow that a possibility $j \in C_i$ may determine a different set of relevant possibilities than does i. Once we have agreed that, for any i, D_i selects from the worlds compatible with C and must include i, it is a further question whether we want to be egalitarians or chauvinists.[21]

21 The history of the conditional is littered with chauvinists. The material conditional analysis is chauvinistic. It says that the only possibility relevant for the truth of an *if* at i in C is i itself. And similarly for an *if* at j: only j matters there. Thus, except in the odd case where the context rules out uncertainty altogether, we will have that $D_j \neq D_i$, for any choice of i and j compatible with C. A variably strict conditional analysis, based on a family of orderings (one for each world), is chauvinistic if we do not impose an "absoluteness" condition — the requirement that orderings around any two worlds be the same. (Lewis (1973: §6) discusses absoluteness in the process of characterizing the V-logics.) What to say about absoluteness is optional and so there is room for agnosticism about CHAUVINISM. Stalnaker's (1975) treatment of indicatives is not officially agnostic about CHAUVINISM, but

It is hard to be a chauvinist. That is because, assuming the particulars of the chauvinistic theory are compatible with there being a $(p \wedge \neg q)$-world in C_i but not in D_i, no such story will predict IF/MUST. The data say that bare indicatives and their *must*-enriched counterparts are true in the same scenarios. But CHAUVINISM plus widescoping guarantees that the domain the *if* quantifies over is properly included in the domain its *must*-enriched counterpart quantifies over. Thus the former says something strictly weaker than — true in strictly more spots than — the latter. That is at odds with Fact 2:

Observation 6.2. Suppose that $D_i \subset C_i$. There are scenarios in which the widescoped (11b) is true but (11a) isn't. Thus CHAUVINISM plus widescoping can't explain Fact 2.

Proof. Consider a $(p \wedge \neg q)$-world — call it j — and suppose that C_i does, but D_i does not, contain j. Then every possibility in $D_i \cap [\![p]\!]$ is in $[\![q]\!]$ and the plain *if* is true (at i, in C): $[\![(\textit{if}\ p)(q)]\!]^{C,i} = 1$. But not the widescoped *must*-enriched *if*. That is because there is a world in C_i — namely j — such that not every possibility in $D_j \cap [\![p]\!]$ is a possibility in $[\![q]\!]$. Thus $[\![(\textit{if}\ p)(q)]\!]^{C,j} = 0$ and so it is not true that the plain *if* is true at every world in C_i and so $[\![\textit{must}\ (\textit{if}\ p)(q)]\!]^{C,i} = 0$. □

Again, this is true no matter how we fill in the particulars of the operator view. If we widescope the modals, and the story is chauvinistic, it will not square with Fact 2.

Given widescoping, EGALITARIANISM fares no better. But here it is IF/MIGHT (Fact 3) that causes trouble. This time the issue is triviality: *must*-enriched *if*s are true iff their *might*-enriched counterparts are.

Here is why. First, EGALITARIANISM implies that D_i covers C_i:

Observation 6.3. EGALITARIANISM implies that $D_i = C_i$.

Proof. Assume otherwise. $D_i \subseteq C_i$, so there must be a $j \in C_i$ such that $j \notin D_i$. By EGALITARIANISM, $D_j = D_i$. But we know that $j \in D_j$. Contradiction. □

that is only because he requires that $\preceq_i$ induce a total order that is centered pointwise on i, and that rules against absoluteness. But the pragmatic mechanisms he develops there *are* agnostic on the CHAUVINISM question — what he says about how the context constrains selection functions is compatible with both EGALITARIANISM and CHAUVINISM. I myself see little reason to go for CHAUVINISM.

Thus if D_i reflects some measure of proximity to i, EGALITARIANISM implies that the underlying ordering is centered not pointwise on i but setwise on the worlds compatible with C. So EGALITARIANISM implies that *if* is really a strict conditional. That's true whether D_i is derived from some underlying ordering or not: *if*, *might* and *must* quantify over the same domain of possibilities, and an *if* is true at i iff all of the antecedent worlds in that domain are consequent worlds.[22] That means that an *if* at i (in C) is true iff the corresponding material conditional is true at every possibility compatible with C. And that means that such an *if* is true at i iff the material conditional, widescoped by *must*, is true at i.[23]

But from this degree of fit between D_i and C_i it follows straightaway that no two possibilities compatible with C can differ over an *if* issued in C. There is solidarity among *if*s; they stand and fall together:

Observation 6.4. EGALITARIANISM implies

$$[\![(\textit{if}\ p)(q)]\!]^{C,i} = 1 \text{ iff for every } j \in C_i\text{: } [\![(\textit{if}\ p)(q)]\!]^{C,j} = 1$$

Proof. $[\![(\textit{if}\ p)(q)]\!]^{C,i} = 1$ iff $D_i \cap [\![p]\!] \subseteq [\![q]\!]$. By EGALITARIANISM: iff, for any $j \in C_i$, $D_j \cap [\![p]\!] \subseteq [\![q]\!]$. Equivalently: iff, for any $j \in C_i$, $C_j \cap [\![p]\!] \subseteq [\![q]\!]$ — that is, iff for every such j, $[\![(\textit{if}\ p)(q)]\!]^{C,j} = 1$. □

Given widescoping, any story with this equivalence will have a hard time saying why conditionals like (12a) seem to be true iff modalized conjunctions like (12b) are and so will have trouble with IF/MIGHT. That is because, given the usual story for the modals (Definition 6.1), we get triviality:

Observation 6.5. EGALITARIANISM implies:

$$[\![\textit{might}\ (\textit{if}\ p)(q)]\!]^{C,i} = 1 \text{ iff } [\![\textit{must}\ (\textit{if}\ p)(q)]\!]^{C,i} = 1$$

Thus widescoping plus EGALITARIANISM implies that *must* $(\textit{if}\ p)(q)$ is true iff *might*$(p \wedge q)$ is. Not even Cubs fans fall for that.

22 Strictness makes it easy to understand why negating a bare conditional sounds so much like saying the counterexample might obtain. For more on context-dependent strictness (of different flavors) see, e.g., Veltman 1985, von Fintel 1998a, 2001, and Gillies 2004, 2007, 2009.

23 Thus, given WELL-BEHAVEDNESS (Definition 3.2), explaining Fact 2 is easy for widescoping egalitarians: $(\textit{if}\ p)(q)$ is equivalent to *must* $(p \supset q)$ which, given WELL-BEHAVEDNESS, is equivalent to *must must* $(p \supset q)$. And that, in turn, is equivalent to *must* $(\textit{if}\ p)(q)$.

Proof. Note that $[\![\textit{might}\,(\textit{if}\;\;p)(q)]\!]^{C,i} = 1$ iff the plain conditional $(\textit{if}\;\;p)(q)$ is true somewhere in C_i. But by Observation 6.4 the plain *if* is true somewhere in C_i iff it is true everywhere in C_i. And it is true everywhere in C_i just in case $[\![\textit{must}\,(\textit{if}\;\;p)(q)]\!]^{C,i} = 1$. That trivializes rather than explains Fact 3. □

No matter the particulars, widescoping plus EGALITARIANISM can't predict Fact 3.

Iffiness requires conditionals to have a structure that does not play nice with modals. That's because no way of resolving the relative scopes will work.[24] What causes the trouble is that the operator view requires *if* to mean *all*. But the Facts don't seem to allow that. If we widescope, then sometimes that seems all right — if the modal in question happens to have universal quantificational force. But when the modal is existential, *if* looks more like conjunction than inclusion. And narrowscoping seems no better, rendering all manner of coherent bits of discourse inconsistent.

That is pretty bad news for the operator view. True, we could save iffiness by denying some Fact or other. (With defenders like that who needs detractors?) Adding insult to injury: the Facts were chosen not at random but with an eye to the competition. They are Facts that the new school restrictor view predicts so easily hardly anyone has noticed.

7 Iffiness lost

Lewis (1975) famously argued that *if*s appearing in certain quantificational constructions (under adverbs of quantification) are not properly iffy, that the *if* in

24 Could we go for widescoping *must*-enriched indicatives and narrowscoping *might*-enriched indicatives? For all we've said so far: yes. But that strategy faces an uphill battle. It is ad hoc, three times over. First because there is no good reason to think we should settle for anything less than a uniform story. Second because it is not obvious what it says we should do when we consider ways in which the modal might be embedded. What if the modal is *can't* (a possibility modal scoped under negation) or *needn't* (a universal under negation)?

(i) a. If my team doesn't win out, they can't win it all.
b. If the gardener didn't do it, the culprit needn't be the butler.

Do we widescope or narrowscope these? What principled story is there that predicts, rather than stipulates, that the first is widescoped and the second narrowscoped? Third because as soon as we consider epistemic modals that lie between the existential *might* and the universal *must* — like *probably* and *unlikely* — it is doomed to failure anyway.

(13) $\left\{\begin{array}{r}\text{Always}\\ \text{Sometimes}\\ \text{Never}\end{array}\right\}$ if a man owns a donkey, he beats it.

is not a conditional connective with a conditional operator as its meaning but instead acts as a non-connective whose only job is to mark an argument-place for the adverb of quantification. The relevant structure is not some $\mathcal{Q}$-ADVERB scoped over a conditional nor some conditional with a $\mathcal{Q}$-ADVERB in its consequent, he said, but instead something like

(14) $\mathcal{Q}$-ADVERB + *if-clause* + *then-clause*

The job of the *if*-clause in (13) is merely to restrict the domain over which the adverb (unselectively) quantifies, and allegedly that restricting job is a job that cannot be done by treating *if* as a conditional connective with a conditional operator as its meaning. If $\mathcal{Q}$-ADVERB is universal, maybe an iffy *if* will work; but if it is existential, then conjunction does better. I want to set the issue about adverbial (and adnomial, for that matter) quantifiers aside for two reasons. First because I doubt the allegation sticks. But that is another argument for another day.[25] And second because it will do us good to focus on simple cases.

Still, the trouble for the operator view that is center stage here does look quite a lot like the problem Lewis pointed out. We have to make room for interaction between *if*-clauses and the domains our modals quantify over. But that interaction is tricky. That is because it looks impossible to assign *if* the same conditional meaning — thereby taking its contribution to be an iffy one — in all of our examples. Indeed, when the modal is universal a conditional relation looks good; but when the modal is existential, conjunction looks better. This is pretty much the same trouble Lewis saw for *if*s occurring under adverbs of quantification, and led him to conclude that such *if*s do not express operators at all (and a fortiori not conditional operators).[26] Just as with adverbial quantifiers, there is a fast and easy solution to the problem if we get rid of the old school idea that *if* is a conditional connective and plump instead for anti-iffiness. The most forceful way of putting the anti-iffy thesis is Kratzer's (1986: 11):

25 There are ways to get the restricting job done after all. The operator-based stories in, e.g., Belnap 1970, Dekker 2001, and von Fintel & Iatridou 2003 all manage.

26 For recent and more thorough-going defenses of *if*s-as-quantifier-restrictors see, e.g., Kratzer 1981, 1986 and von Fintel 1998b. But see Higginbotham 2003 for a dissenting view.

> The history of the conditional is the history of a syntactic mistake. There is no two-place "if… then" connective in the logical forms for natural languages. "If"-clauses are devices for restricting the domains of various operators.

The thesis is that the relevant structure for the conditionals at issue here is not some modal scoped over a conditional nor some conditional with a modal in its consequent, but is instead something like

(15) MODAL + *if-clause* + *then-clause*

Or, closer to the way we've been putting things:

(16) MODAL(*if-clause*)(*then-clause*)

The job of the *if*-clause is to restrict the domain over which the modal quantifies. So instead of searching for a conditional operator properly so called that *if* contributes whether it commingles with a modal or not, we search for an operator for *if* to restrict. And, for indicative conditionals, we do not have to search far: the operators are (possibly covert) epistemic modals.[27]

So it is the modals, not the *if*s, that take center stage. They have logical forms along the lines of MODAL$(p)(q)$, with the usual quantificational force:

Definition 7.1 (MODAL FORCE, AMENDED)**.**

i. if defined, $[\![might\,(p)(q)]\!]^{C,i} = 1$ iff $(C_i \cap [\![p]\!]) \cap [\![q]\!]^C \neq \emptyset$
ii. if defined, $[\![must\,(p)(q)]\!]^{C,i} = 1$ iff $(C_i \cap [\![p]\!]) \subseteq [\![q]\!]^C$

This plus two assumptions gets us the now-standard and familiar restrictor view. It easily accounts for CONSISTENCY (Fact 1), IF/MUST (Fact 2), and IF/MIGHT (Fact 3).

First assumption: assume that when there is no *if*-clause and so no restrictor is explicit — as in *Blue might be in the box* or *Yellow must be in the box* — the first argument in the LF of the modal is filled by your favorite tautology ($\top$). In those cases there is nothing to choose between an analysis that follows our earlier Definition 6.1 and an analysis that follows Definition

27 Officially, our intermediate language now also goes in for a change. L had one-place modals *might* and *must* and a two-place connective $(if\ \cdot)(\cdot)$. That won't do to represent the restrictor view. Instead, we need the two-place modals *might* $(\cdot)(\cdot)$ and *must* $(\cdot)(\cdot)$ and have no need for a special conditional connective that expresses a conditional operator.

7.1, and so the latter generalizes the former.

Second assumption: assume that the job of *if*-clauses is to make a (nontrivial) restrictor explicit. If there is no overt modal — as in a bare conditional — the *if* restricts a covert *must*. Collecting the pieces:

Definition 7.2 (ANTI-IFFINESS)**.** For any sentence S, let S' be its LF in our intermediate language. Then:

i. A sentence of the form *if* S_1 *then* S_2 has LF:
   a. $\text{MODAL}(S'_1)(R')$ if $S'_2 = \text{MODAL}\ R'$
   b. $\textit{must}\,(S'_1)(S'_2)$ otherwise

ii. Truth conditions as in Definition 7.1

Return to the case of my missing marbles. Taking the *if*-clauses to be restrictors in the example:

(17) a. Red might be in the box and Yellow might be in the box.
$\textit{might}\,(\top)(p) \wedge \textit{might}\,(\top)(q)$
b. If Yellow isn't in the box, then Red must be.
$\textit{must}\,(\neg q)(p)$
c. If Red isn't in the box, then Yellow must be.
$\textit{must}\,(\neg p)(q)$

It's modals all the way down. And the modals can all be true together.

Observation 7.1 (ANTI-IFFINESS & CONSISTENCY)**.** Assume ANTI-IFFINESS (Definition 7.2). And suppose, in C, that (17a) is a partitioning modal. Then the sentences in (17) can all be true together.

Proof. I am in i and there are just two worlds compatible with the facts I have, i and j. The first is a $(p \wedge \neg q)$-world, the second a $(q \wedge \neg p)$-world. The restrictors in (17a) are trivial, so it is true at i iff C_i has a p-world in it and a q-world in it; i witnesses the first conjunct, j the second. The restricting *if*-clause of (17b) makes sure that the *must* ends up quantifying only over the $\neg q$-worlds compatible with C: (17b) is true at i iff all of the worlds $C_i \cap [\![\neg q]\!]$ are p-worlds. And the only one, i, is. Similarly for the *must* in (17c): it quantifies over the $\neg p$-worlds in C_i, checking to see that they are all q-worlds. □

It is just as easy to square this picture with IF/MUST (Fact 2) and IF/MIGHT (Fact 3). Here are the examples with their new school LFs:

(18) a. If Carl is at the party, then Lenny must be at the party.
$must\,(p)(q)$
b. If Carl is at the party, then Lenny is at the party.
$must\,(p)(q)$

(19) a. If my team wins out, they might win it all.
$might\,(p)(q)$
b. It might turn out that my team wins out and wins it all.
$might\,(\top)(p \wedge q)$

Observation 7.2 (ANTI-IFFINESS, IF/MUST, & IF/MIGHT)**.** Assume ANTI-IFFINESS (Definition 7.2). Then:

i. *If* S_1*, then* $S_2 \approx$ *If* S_1*, then must* S_2
ii. *If* S_1*, then might* $S_2 \approx$ *might* $[S_1$ *and* $S_2]$

Proof. ANTI-IFFINESS assigns the same LF to a bare conditional like (18b) and its *must*-enriched counterpart (18a): $must\,(p)(q)$. It would thus be hard, and pretty undesirable, for their truth conditions to come apart. That explains IF/MUST.

Now consider the *if*-as-restrictor analysis of the sort of examples behind IF/MIGHT in (19). If (19b) is true at i in C then C_i has a $(p \wedge q)$-world in it. But then that same world must be in $C_i \cap [\![p]\!]$. It is a q-world, and that will witness the truth of (19a) at i. Going the other direction: if (19a) is true at i in C, then there are some q-worlds in $C_i \cap [\![p]\!]$. Any one of those will do as a $(p \wedge q)$-world in C_i, and that is sufficient for (19b) to be true at i. That explains IF/MIGHT. □

These explanations are easy. And, given the trouble for the operator view, it looks like the only game in town is to say that *if* doesn't express an operator and so not an iffy operator. That stings.

8 Iffiness regained

The problem for iffiness is that there is an interaction between *if*-clauses and the domains our modals quantify over. That is an interaction that seems hard to square with the thesis that *if* is a binary connective with a conditional meaning if we assume that it has the same meaning in each of the cases we care about here.

But we have overlooked a possibility. We insisted that for a story to be iffy it must say that $(if\ p)(q)$ at i in C expresses some relation R between $D_i \cap P$ and Q, where $D_i \cap P$ is the set of (relevant) worlds where the antecedent is true and Q the set of worlds where the consequent is true. That is all right. But we unthinkingly assumed that the context relevant for figuring out what these sets of worlds are must always be C just because that was the context as it stood when the *if* was issued. That was a mistake. Setting it straight sets the record straight for old school iffiness.

The Ramsey test — the schoolyard version, anyway — is a test for when an indicative conditional is acceptable given your beliefs. It says that $(if\ p)(q)$ is acceptable in belief state B iff q is acceptable in the derived or subordinate state B-plus-the-information-that-p. You zoom in on the portion of B where p is true and see whether q throughout that region. But our job is to say something about the linguistically encoded meanings of indicatives not to dole out epistemic advice. Still, the Ramsey test (plus or minus just a bit) can be turned into a strict conditional story about truth-conditions.

Here's how (in three easy steps). Step one: sentences get truth-values at worlds in contexts. So swap C's for B's. Step two: embrace EGALITARIANISM. The worlds compatible with the context are the *if*-relevant worlds. These first two steps give us a strict conditional analysis of indicatives, requiring that $(if\ p)(q)$ is true at i in C iff all the p-possibilities in C_i are possibilities at which q is true. But truth depends on both index and context. Question: What context is relevant for checking to see whether q is true at these p-possibilities? Answer: The Ramseyan derived or subordinate context C-plus-the-information-that-p, or $C + p$ for short. That's step three.

The Ramsey test invites us to add the information carried by the antecedent to the contextually relevant stock of information C and check the fate of the consequent. What we fans of iffiness overlooked was that this assigns two jobs to *if*-clauses, and we only paid attention to one of them. One job is the *index-shifting* job. The *if*-clause tells us to shift to various alternative indices — the antecedent-possibilities compatible with C — to see whether the consequent is true at them. This job is familiar and most versions of the operator view do a fine job tending to it. But there is another job. When we add the information carried by the antecedent to C we also add to the context relevant for figuring out whether the consequent is true. That is the *context-shifting* job. The *if*-clause tells us to shift to an alternative derived or subordinate state to see whether the consequent is true. We fans of old school iffiness made the mistake of only making sure that the first job got done.

So far this isn't a story about the meaning of *if* (much less an iffy one). It is a blueprint for how to construct a semantics that gives a uniform and iffy meaning to *if*s whether or not those *if*s mix and mingle with other operators. To construct a story using it we need to take a stand on what it means to add the information carried by an antecedent to the contextually relevant stock of information. Taking that stand depends on the aspirations of the theory since different constructions may depend on different sorts of contextually available information and there is every reason to think that augmenting information of different sorts goes by different rules. But our aspirations are pretty modest here: how indicatives interact with epistemic modals. So we can opt for an equally simple stand on what it means to add information to a context.

Even before getting all the details laid out, we can see how the doubly shifty behavior of *if*-clauses will be able to predict what needs predicting about how indicatives and epistemic modals interact. The difference between interpreting q against the backdrop of the prior context C and against the backdrop of $C + p$ is a difference that makes no difference if q has no context sensitive bits in it. No wonder we missed it! But if q does have context sensitive bits in it — like *might* or *must*, whose semantic value depends non-trivially on C — then this is a difference that makes all the difference. For example: consider a modal like *must* q. The contexts C and $C + p$ may well determine different sets of possibilities. Since *must* q depends exactly on whether that set of possibilities has only q-worlds in it, we then get a difference. Thus if *must* q is the consequent of an indicative, context-shiftiness matters.

Here is the simplest way of constructing a semantics around the blueprint:

Definition 8.1 (IFFINESS + SHIFTINESS)**.**

i. if defined, $[\![(if\ p)(q)]\!]^{C,i} = 1$ iff $C_i \cap [\![p]\!]^C \subseteq [\![q]\!]^{C+p}$
ii. $C + p = \lambda i.C_i \cap [\![p]\!]^C$

Such a story about *if* is iffy: *if* expresses a relation between relevant antecedent and consequent worlds and that relation lives up to all the constraints we insisted on earlier. Hence *if* means *all*. And it expresses that no matter whether it scopes over a universal modal or an existential modal or no modal at all in the consequent. It is also doubly shifty. It is index-shifty since the truth of $(if\ p)(q)$ at i depends on the truth of the constituent q

at worlds other than i. It is context-shifty since the truth of $(\mathit{if}\ p)(q)$ in C depends on the truth of the constituent q in contexts other than C.

The *if*/modal interactions that were such trouble were only trouble because we forgot to keep track of the context-shifting job of *if*-clauses. And doing that, even in the simple context-shifting in Definition 8.1, is enough to make iffiness sit better with the Facts.

I know that just one of my marbles is in the box — either Red or Yellow — but do not know which it is. Narrowscope the modals. Then all of these can be true together:

(20) a. Red might be in the box and Yellow might be in the box.
$\mathit{might}\, p \wedge \mathit{might}\, q$
b. If Yellow isn't in the box, then Red must be.
$(\mathit{if}\ \neg q)(\mathit{must}\, p)$
c. If Red isn't in the box, then Yellow must be.
$(\mathit{if}\ \neg p)(\mathit{must}\, q)$

Observation 8.1 (IFFINESS & CONSISTENCY)**.** Assume IFFINESS + SHIFTINESS (Definition 8.1). Suppose p and q partition the possibilities in C. The (narrowscoped) sentences in (20) can all be true together in C.

Proof. Here is why. Suppose — for concreteness and without loss of generality — that C contains just two worlds: i, a $(p \wedge \neg q)$-world and j, a $(q \wedge \neg p)$-world. So (20a) is true at i.

Now take (20b). It is true at i in C, given IFFINESS + SHIFTINESS, iff all the possibilities in $C_i \cap [\![\neg q]\!]$ are possibilities that $[\![\mathit{must}\, p]\!]^{C+\neg q}$ maps to true. Thus we have to see whether the following holds:

$$\text{if } k \in C_i \cap [\![\neg q]\!] \text{ then } [\![\mathit{must}\, p]\!]^{C+\neg q,k} = 1$$

Iff this is so is (20b) true at i in C. But $C_i \cap [\![\neg q]\!] = \{i\}$, so we have to see whether or not $[\![\mathit{must}\, p]\!]^{C+\neg q,i} = 1$. Equivalently: the *if* is true at i iff $(C + \neg q)_i \subseteq [\![p]\!]$. And since i is in fact a p-world the *if* is true at i in C. And mutatis mutandis for (20c). □

The operator view isn't at odds with CONSISTENCY after all. It is also easy to predict IF/MUST (Fact 2) and IF/MIGHT (Fact 3). Here are the narrowscoped analyses of the motivating examples:

(21) a. If Carl is at the party, then Lenny must be at the party.
$(\mathit{if}\ p)(\mathit{must}\, q)$

b. If Carl is at the party, then Lenny is at the party.
$(if\ p)(q)$

(22) a. If my team wins out, they might win it all.
$(if\ p)(might\, q)$

b. It might turn out that my team wins out and wins it all.
$might\,(p \wedge q)$

Observation 8.2 (IFFINESS, IF/MUST, & IF/MIGHT)**.** Assume IFFINESS + SHIFTINESS (Definition 8.1). Then:

i. *If* S_1*, then* $S_2 \approx$ *If* S_1*, then must* S_2
ii. *If* S_1*, then might* $S_2 \approx$ *might* $[S_1$ *and* $S_2]$

Proof. If *must* q is true then so is q, no matter the world and context. So it's easy to see that when (21a) is true so is (21b). Now suppose (21b) is true at i (with respect to C). Then all of the p-worlds in C_i are q-worlds ($C_i \cap [\![p]\!] \subseteq [\![q]\!]^{C+p}$). But if they are all worlds at which q is true, then i — and so, given WELL-BEHAVEDNESS, every world in C_i — is equally a world at which *must* q is true (with respect to $C + p$). And so (21a) is true, at i in C, if (21b) is. That's just what IF/MUST requires.

IF/MIGHT is no different. The noteworthy part is seeing how IFFINESS + SHIFTINESS predicts that when (22a) is true then so is (22b). Note that (22a) is true at i (with respect to C) just in case all of the p-worlds in C_i are worlds where *might* q, evaluated in $C + p$, is true. By WELL-BEHAVEDNESS we have that:

$$\text{if } j, k \in C_i \cap [\![p]\!] \text{ then } (C + p)_j = (C + p)_k = C_i \cap [\![p]\!]$$

If there is a q-world in $(C + p)_j$, then *might* q is true throughout this set. Since *might* q is an existential modal, if it is true with respect to $C + p$ it must also be true with respect to C. (Updating contexts with + is monotone.) Whence it follows that the *if* with a commingling *might* is true at i iff among the p-worlds in C_i lies a q-world. And any such q-world will do to witness the truth of *might* $(p \wedge q)$ at i in C. That's just what IF/MIGHT requires. □

Indicatives play well with epistemic modals. That interaction seemed hard to square with old school views that take *if* to express a conditional operator. No way of sorting out the relative scopes between the modals and the conditional seemed right. But that is because we mistakenly thought that antecedents of conditionals only have one job to do. They shift the index at which we check to see if the consequent is true. But they also contribute to the context that is relevant when we do that checking. Once we let antecedents do both their index-shifting and context-shifting jobs we can safely narrowscope and there is no special problem posed for old school iffiness. The *if* in $(if\ p)(\text{MODAL}\, q)$ means the same iffy thing — inclusion! — saying that all the (relevant) worlds where p is true are worlds where MODAL q is true. That's so whether the oopmh of MODAL is universal or existential or null and does nothing to get in the way of explaining the Facts. That is something we fans of iffiness ought to dig.[28]

9 What is at stake

Given the success of anti-iffiness why bother with iffiness at all? A fair question. Given the context-shifting I'm advocating for fans of iffiness, what's the difference between old school and new school? Another fair question. I owe some answers.

I make three (not wholly unrelated) claims. First, even if the shifty version of the operator view and the basic version of the restrictor view covered the same ground, there is still reason to explore the operator view. Second, the views have different conceptual roots and different allegiances. Third, the views don't cover the same ground. I need to argue for each of these.

Suppose that — at least when it comes to accounting for data about the sorts of constructions at issue here — there's nothing to choose between IFFINESS + SHIFTINESS and ANTI-IFFINESS. Even under that assumption there is reason to take this version of the operator view seriously. That is because it is important to set the record straight. Maybe you don't like skyhooks, Chuck Taylors, and conditional connectives expressing iffy operators in your LFs. It is important to know that whatever your reasons, it *can't* be because iffiness can't be squared with the Facts about how *if*s and modals interact. The Ramsey test intuition leads naturally to a story according to which *if* expresses a bona fide conditional operator that captures the restricting behavior of *if*-clauses. Thus the restricting behavior of *if*-clauses can be a

28 Before I said that I wanted to ignore issues about how this version of the operator view can meet Lewis's challenge about the ways *if*-clauses and adverbs of quantification interact, saving that argument for another day. I want to stick to that (it really is an argument for another day), but the general idea is straightforward. First, adjust the kinds of information represented by a context so that we can sensibly quantify over individuals and the events they participate in. Second, allow that quantificational domains can be restricted by material in *if*-clauses — those domains play the role of the subordinate or derived context. Adverbs of quantification appear under the conditional and have their usual denotations.

part of, rather than an obstacle to, their expressing something iffy. That is cool.

But what's the real difference between the views? One view says we have no conditional operator, just a complicated modal with a slot for a restrictor. The other says we have a conditional operator but that its antecedent shifts the context thereby acting like a restrictor. Tomāto/tomăto, right? Wrong! Here is one way of seeing that. Consider three indicatives:

(23) a. If Scorpio succeeds, then the end must be near.
b. If Scorpio succeeds, then the end is near.
c. If Jimbo is in detention, then Nelson might be.

Compare (23a) and (23c). The restrictor view says these have different modals and different arguments for each of the slots in those modals. So, apart from the fact that each is a modal expression of some flavor or other, there is nothing much in common between the two. They are as different as *Some students smoke* and *All dogs bark*: each is a quantificational expression of some flavor or other. The operator view says something different. It says that, despite their different antecedents and different consequents, they still share a common iffy core: there is a conditional connective in common between them and it contributes the same thing to each of the sentences it occurs in.

Or compare the *must*-enriched (23a) with its bare counterpart (23b). The restrictor view says the bare indicative *just is* the *must*-enriched version in disguise. That is how it predicts IF/MUST (Fact 2). It thus treats bare indicatives as a special case, dealt with by positing a covert and inaudible necessity modal. Maybe there is reason to posit such an operator, and an independent and principled reason to posit the necessity modal instead of an existential one or some different modal with different quantificational force, and maybe those reasons outweigh the cost of the positing. The operator view adopts a very different stance here and that is what I want to point out. It says that bare indicatives like (23b) are ordinary conditionals and their counterparts with *must*-ed consequents like (23a) are ordinary conditionals that happen to have *must* in their consequents. No special cases, no positing of inaudible operators, and IF/MUST comes out as a prediction not as a stipulation. None of this is a knock-down argument for or against either of the views — it's not meant to be — but it does highlight their difference in worldview.

All of this has been under the assumption that both the doubly shifty iffy view and the anti-iffy restrictor view cover the same ground about how *if*s and modals interact. But that's not quite right.[29] So far we have only worried about how it is that a conditional sentence manages to express what might be if such-and-such or how it manages to express what must be if such-and-such. But conditional information can be more economically expressed than that. We can just as well have a single conditional sentence that expresses what must be and what might be if such-and-such.

A case in point: although I have lost my marbles, I know that some of them — at least one of Red, Yellow, and Blue — are in the box. In fact I know a bit more. I know that Yellow and Blue are in the same spot and so that Red can't be elsewhere if Yellow isn't in the box. Another example: arriving at the party, I'm not sure who's there and who isn't. I do know that Lenny goes wherever Carl goes (but sometimes Lenny goes alone), but Monty never goes where Lenny goes.

(24) a. If Yellow is in the box, then Red might be and Blue must be.
b. If Lenny is at the party, then Carl might be but Monty isn't.

These are not exotic, each conditional is a true thing to say in the circumstances, and there is space for the iffy view and incarnations of the anti-iffy restrictor view to differ on the truth conditions they assign to conditionals like these — and so the two views can't be stylistic variants.

Here is the issue: (24a) and (24b) have glosses:

(25) a. If Yellow is in the box, then Red might be *and* if Yellow is the box, then Blue must be.

29 There are reasons independent of interaction with epistemic modals to think that anti-iffiness, in its purest *if*-only-restricts form, can't be the whole story. If it were, and *if*-clauses and *when*-clauses have the same restricting behavior, then we wouldn't expect differences in cases like this:

(i) a. If the Cubs get good pitching and timely hitting after the break, they might win it all.
b. When the Cubs get good pitching and timely hitting after the break, they might win it all.

But we do detect a difference. I can say something true-if-hopeful with (ia). But (ib) passes optimistic and heads straight for delusional. It's hard to see where to locate the difference — whether it's semantic or pragmatic — if the semantic contribution of *if* and *when* is purely to mark the restrictor slot for the common operator *might*. (Lewis (1975) noticed that sometimes a restricting *if* is odd when its corresponding restricting *when* is fine. But he labeled these differences "stylistic variations".) Some arguments along these lines are pushed by von Fintel & Iatridou (2003).

b. If Lenny is at the party, then Carl might be *but* if Lenny is at the Party, then Monty isn't.

These swap a single conditional with a complicated consequent for a conjunction of simple conditionals. The simple incarnation of the anti-iffy restrictor view in Definition 7.2 says we do one thing when a conditional consequent has an overt modal, and do another when there isn't. But we didn't say how out in the open a modal must be to count as overt. Depending on what we say, we can get divergence between the operator view and the restrictor view for cases like these.

Assume — for now — that a modal is overt in a sentence iff it is the connective featured in (the LF of) that sentence.[30] Under that assumption, it is then easy to see that the two stories come apart: IFFINESS + SHIFTINESS predicts that (24a) is equivalent to (25a) and so true (in the relevant context) and ANTI-IFFINESS does not. That is because the consequent of (24a) isn't decorated with a leading modal (it's a conjunction of modals), and so we have to posit one. So (24a) gets an *L*-representation like

(26) $\mathit{must}\,(p)(\mathit{might}\,(\top)(q) \wedge \mathit{must}\,(\top)(r))$

But the truth conditions of (26) do not match the truth conditions of (25a) and so do not match the truth conditions of the original (24a): (26) is false in the context as we set it up even though both (24a) and (25a) are true.

Now assume, instead, that a modal is overt iff it is pronounced — no matter how arbitrarily deeply embedded. Then (26) isn't the right anti-iffy LF for (24a). Instead, we get something more sensible: (24a) and (25a) have the same LF. There's no in-principle problem with that.[31] But what about conditionals like (24b)? We don't want to posit a *must* that outscopes the pronounced *might*. So we have to posit a narrowscoped one. In order to get the posited modal appropriately restricted — so that (24b) comes out equivalent to (25b) — we have two obvious options. Option (i): Argue that conditionals like those in (24) are not single conditionals at all, that they are really conjunctions of two simple modals. That way there is no difference at all between the conditionals in (24) and the glosses in (25). Option (ii): Enrich our intermediate language to allow for explicit domain-restricting variables, and provide a mechanism for the inheriting of those restrictions

30 In this sense, a modal is any (non-equivalent) stack of *must*s, *might*s, and negations.

31 Though it doesn't come free: it puts strain on the process of assigning formulas of *L* to serve as the LFs of sentences of natural language.

across intervening operators like conjunction. Both options are open, and party line proponents of anti-iffiness are free to pursue them. But they do require work. Option (i) posits movement we'd not like to have to posit, treats conditionals with apparent conjoined consequents as yet another special case, and describes rather than explains why the conditionals in (24) are glossable by those in (25). Option (ii) requires more expressive resources for *L* than we thought necessary and requires something over and above the anti-iffy story as it stands to say when and how domain restriction gets inherited over distance and across intervening operators. That's not an argument against this option but a description of it.[32]

But none of that really matters: my point was that IFFINESS + SHIFTINESS and ANTI-IFFINESS aren't notational variants. And they are not: the iffy story takes conditionals like (24) in perfect stride. No special cases, no positing of inaudible operators, no stress on the parser in assigning formulas of *L* to serve as the LFs of conditional sentences, no movement. We get the right truth conditions, and we get as a prediction not a stipulation that the conditionals in (24) are equivalent to those in (25).

10 Context and dynamics

Not every fan of old school iffiness will want to follow me this far. But there is a cost to cutting their trip short since they must then deny or explain away one of the Facts. Iffiness, they'll no doubt point out, is not without its own costs: the price of iffiness is shiftiness twice over.

I reply that there are costs and then there are costs. Embracing context-shiftiness may be a cost, but I want to point out that it is not a new cost: it makes the analysis here a broadly dynamic semantic account of indicatives.[33] So shiftiness is a cost you may already be willing to bear. I want to (briefly) point out how it is that this shiftiness amounts to a four-fold dynamic perspective on modals and conditionals.

32 Something in the neighborhood of Option (ii) is developed (though not with an eye to conjoined consequents) in von Fintel (1994). For a recent discussion see Rawlins 2008.

33 The general idea that consequents are evaluated in a subordinate or derived context is standard in dynamic semantics — see, e.g., dynamic treatments of donkey anaphora (Groenendijk & Stokhof 1991) or dynamic treatments of presupposition projection in conditional antecedents and consequents (Heim 1992; Beaver 1999) or dynamic treatments of counterfactuals (Veltman 2005; von Fintel 2001; Gillies 2007). But exploiting a derived context isn't quite a litmus test for dynamics since that is something shared by a lot of Ramsey-inspired accounts, whether or not they count as 'dynamic'.

The version of the operator view I'm advocating for fans of iffiness takes the truth of an indicative (at an index, in a context) to be doubly shifty. That doubly shifty behavior makes the semantics dynamic in the sense that interpretation both affects and is affected by the values of contextually filled parameters. Whether $(\textit{if } p)(q)$ is true at i in C depends on C; the indicative can be true at i for some choices of C and false at i for others. So interpretation is context-dependent. Whether $(\textit{if } p)(q)$ is true at i in C also depends on the subordinate context $C + p$. Interpreting the indicative in C affects — temporarily — the context for interpreting some subparts of it. So interpretation is also context-affecting.

This analysis is also dynamic in a second sense. It makes certain sentences *unstable* — the truth-value a sentence gets in a context C is not a stable or persistent property since it can have a different truth-value in a context C' that contains properly more information.

Definition 10.1 (PERSISTENCE)**.**

i. p is t-persistent iff $[\![p]\!]^{C,i} = 1$ and $C' \subseteq C$ imply $[\![p]\!]^{C',i} = 1$
ii. p is f-persistent iff $[\![p]\!]^{C,i} = 0$ and $C' \subseteq C$ imply $[\![p]\!]^{C',i} = 0$

p is persistent iff it is both t- and f-persistent.

The boolean bits are, of course, both t- and f-persistent and so persistent full-stop. But not the modals: *might*, being existential, is f- but not t-persistent; *must* goes the other way. And since *if* is a strict conditional, equivalent to a necessity modal scoped over a material conditional, its pattern of persistence is just like that for *must*.[34]

These two senses in which the story is dynamic are two sides of the same coin. Together they explain how it is that the narrowscoped conditionals $(\textit{if } \neg p)(\textit{must } q)$ and $(\textit{if } \neg q)(\textit{must } p)$ are consistent with the partitioning modals in $\textit{might } p \wedge \textit{might } q$. From the fact that $i \in [\![(\textit{if } \neg p)(\textit{must } q)]\!]^C$ and $i \in [\![\neg p]\!]^C$ it does not follow that $i \in [\![\textit{must } q]\!]^C$. Indeed, with my marbles lost, this is sure to be false at i in C since $\textit{might } p$ is true. What *is* true at i is that — in the subordinate or derived context $C + \neg q$ — $\textit{must } q$ is true. That is allowed because *must* isn't f-persistent. But that is not at odds with the *might* claim. And mutatis mutandis for the other *if*.

34 This pattern makes the treatment of indicatives here similar in some respects to Veltman's (1985) data semantic treatment of indicatives. But there are important differences between the two stories. Here's one: $(\textit{if } p)(\textit{might } q)$ is data semantically equivalent to $(\textit{if } p)(q)$. That won't do given Fact 3.

So we have dynamics twice over. But so far none of this looks quite like what is usually called "dynamic semantics". In that sense of dynamics meaning isn't associated with truth conditions or propositions but with *context change potentials*, effects on relevant states of information. Take an information state s to be a set of worlds, and say that what a sentence means is how its LF updates information states. That assigns to sentences the semantic type usually reserved for programs and recipes; they express relations between states — intuitively, the set of pairs of states such that executing the program in the first state terminates in the second. We can think of all sentences in this way, thereby treating them as instructions for changing information states. Thus: the meaning of a sentence p is how it changes an arbitrary information state. We might put that by saying the denotation $[p]$ applied to s results in state s'; in post-fix notation $s[p] = s'$.[35] Now say that p is true in s iff $s[p] = s$, for then the information p carries is already present in s.[36]

Having gone this far, we can make good on the Ramsey test this way:

Definition 10.2 (Dynamic Iffiness)**.**

$$s[(\mathit{if}\ p)(q)] = \{i \in s\colon\ q \text{ is true in } s[p]\}$$

Some programs have as their main point to make such-and-such the case; others to see whether such-and-such. Programs of the latter type are *tests* and they either return their input state (if such-and-such) or fail (otherwise). That is the kind of program Definition 10.2 says *if* is.[37] It says an *if* tests s to see whether the consequent is true in $s[p]$. But — in good Ramseyian spirit — $s[p]$ is just the subordinate context got by hypothetically adding p to s. Truth isn't persistent here, either. That is because a state may pass a test posed by an existential (`Are there` p`-possibilities?`) and yet have

35 For the fragment without *if*s the updates are as you would expect (Veltman 1996). For the *if*-free fragment of L, define $[\cdot]$ as follows:

i. $s[p_{\text{atomic}}] = \{i \in s\colon\ i(p_{\text{atomic}}) = 1\}$
ii. $s[\neg p] = s \setminus s[p]$
iii. $s[p \wedge q] = s[p][q]$
iv. $s[\mathit{might}\ p] = \{i \in s\colon\ s[p] \neq \emptyset\}$

It then follows straightaway that — for the *if*- and modal-free fragment — $s[p] = s \cap [\![p]\!]$.

36 This generalizes the plain vanilla story about satisfaction we were taught when first learning propositional logic: as the story usually goes, a boolean p is true relative to a set of possibilities s iff all the possibilities in s are in $[\![p]\!]$. But that is equivalent to saying that adding $[\![p]\!]$ to the information in s produces no change: $s \cap [\![p]\!] = s$ iff $s \subseteq [\![p]\!]$.

37 See, e.g., Gillies 2004.

some narrower, less uncertain state fail it (`No more` p`-possibilities!`). And dually for the universal *must* and *if*.

An iffy account like the one in Definition 10.2 is dynamic in this third sense. But the doubly-shifty operator view IFFINESS + SHIFTINESS doesn't look much like a dynamic semantics in that sense. That analysis looks static, assigning truth-conditions to indicatives at a world in a context. And we can recover propositions if the mood strikes us. But the two stories are in fact the same: lack of persistence plus the global behavior of the modals and *if*s in the doubly shifty story make it equivalent to a dynamic story of the indicative that dispenses with the assignment of propositions of the normal sort from the beginning.[38] Even though I told the story about truth-values assigned at contexts and indices, it is equivalent to a story about changing information states. So we have dynamics thrice over.

We have gotten this far, and found ways to predict the Facts about how indicatives and epistemic modals interact, without taking a stand on when one sentence entails another. (Having said nothing about entailment we couldn't have said anything about modus ponens either.) Entailment is usually taken to be preservation of truth at a point of evaluation: iff q is true at a point if $p_1, \ldots, p_n$ are all true at that point do the latter entail the former. Not necessarily so in a dynamic semantics. Often enough, what is important and what an entailment relation ought to capture is not preservation of truth but preservation of information flow — what must be true after adding the information carried by the premises. That is an *update-to-test* entailment relation.[39] Similarly, since the story as I have told it turns out to be a dynamic one, we ought to expect a larger menu of options for what it takes for a collection of premises to entail a conclusion. That is because truth is sensitive to both context and index and contexts can shift about as we move from the p_i's to q. To make sure entailment is sensitive to those shifts, we shouldn't merely require preservation of truth-at-a-point. Instead, just as in a more explicitly dynamic set-up, we want to augment the

38 The standard benchmark for dynamics is whether the interpretation function $[\cdot]$ is either *non-introspective* (Can it be that $s[p] \notin s$?) or *non-continuous* (Can it be that $s[p] \neq \bigcup_{i \in s} \{i\}[p]$?). In set-ups like the one in Definition 10.2, the behavior of indicatives is not continuous. See Gillies 2009 for the details on how the iffy story as I have put it is equivalent to a more directly dynamically iffy semantics, and how the right notions of entailment coincide in the two set-ups.

39 For more about the space of options for entailment relations in dynamic semantics see van Benthem 1996 and Veltman 1996. Update-to-test entailment is a lot like Stalnaker's (1975) notion of *reasonable inference*.

context with the information of the premises, evaluating q not in C but in $(C + p_1) + \cdots + p_n)$. And that corresponds exactly to the dynamic update-to-test entailment relation over our language L. That is the fourth way in which the semantics here is dynamic.

So the doubly shifty behavior of indicatives reflects this four-fold dynamic perspective. That is useful to know for two reasons. First because it makes clear what the costs of iffiness are and it makes clear that some of those costs are not completely new. Second because it makes clear that the dynamic perspective on modals and conditionals is broader than we may have thought. The senses in which the story here reflects a dynamic perspective are familiar senses, but the mechanisms of that iffy story aren't the usual mechanisms in a dynamic semantics. The semantics traffics in things like truth conditions and propositions, not in things like support or programs or context change potentials. So nothing in the dynamic perspective on modals and conditionals requires the latter sort of semantic trafficking at the expense of the former sort. It's broader than that.

11 An iffy upshot

My preferred version of the operator view says that an indicative is a doubly-shifty strict conditional over sets of live possibilities. It assigns two jobs to *if*-clauses. They have the index-shifting job of shifting the point at which we check for a consequent's truth, but they also have the context-shifting job of shifting the context relevant for deciding at such a point whether a consequent is true. That is how *if* can mean the same iffy thing no matter whether the consequent is modal, and no matter the quantificational force of that modal, without running afoul of the Facts.

We began with the iffy thesis that conditional information is information of a conditional. Then we showed that — given some broad constraints for what counts as a conditional operator properly so called — apparently no operator view could be squared with the Facts since no way of sorting out the scopes would work. But all of that assumed that antecedents have no context-shifting role. So if you want to plump for an incarnation of the operator view, and you want to square your story with the Facts, you had better allow for context-shifting.

It's easy to get the idea that how *if*s and operators like epistemic modals interact is an argument for anti-iffiness. But since some iffy stories — this one! — can account for that data, that's not right. Nothing about shiftiness rules out anti-iffiness, of course. And so it's open to go for a restrictor view that co-opts context-shifting to account for the way that conditionals with conjoined consequents turn out equivalent to conjunctions of simpler conditionals. So if you want to toe the anti-iffy line, you might want to allow for context-shifting anyway. Of course, that makes toeing the line a bit like not toeing the line.

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