Bare conditionals in the red

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Abstract Bare conditionals, I argue, exhibit Conditional Duality in that when they appear in downward entailing environments they differ from bare conditionals elsewhere in having existential rather than universal force. Two recalcitrant phenomena are shown to find a new explanation under this thesis: bare conditionals under *only*, and bare conditionals in the scope of negative nominal quantifiers, or what has come to be known as Higginbotham's puzzle. I also consider how bare conditionals behave when embedded under negation, arguing that such conditionals often involve denial negation. One important conclusion that emerges from the discussion is that an account of bare conditionals that validates Conditional Excluded Middle is not warranted. By limiting the scope of the (variably) strict analysis Conditional Duality is also a way of maintaining such an account.

Keywords Conditionals · Negation · Only · Higginbotham's puzzle · Conditional Excluded Middle · CEM

1 Introduction

Many conditionals are 'bare' in that they lack an overt adverb of quantification, modal or probability expression in their consequent. (1a) is such an example, contrasting with its 'dressed' counterparts in (1b) and (1c):

(1) a. If you work hard you succeed.
    b. If you work hard you usually succeed.
    c. If you work hard you'll probably succeed.

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Bare conditionals have long been observed to have universal force (e.g. Wallis 1687; Sommers 1982). Modal in nature, they are often thought to involve quantification over possible worlds (Strict Conditional). (1a) is thus analyzed as saying that in all possible worlds where you work hard you succeed:

(2) Strict conditional: (Lewis 1918)
     If p, q is true when all *p*-worlds are *q*-worlds.

Because the strict analysis is modal, it avoids the material conditional's unwelcome prediction that (3), for example, is true just because Pakistan does not invade Kashmir. More in line with our intuitions, the strict conditional invites us to consider all possible worlds where Pakistan invades Kashmir (even if it does not in the actual world) and check if India uses nuclear weapons then. If it does (3) is true, if not it is false.

(3) If Pakistan invades Kashmir India will use nuclear weapons.

But because the strict analysis is a modalized version of the material conditional analysis, it also inherits some of its problems. Much has been made of the fact that the strict account does not predict failures of antecedent strengthening, as is illustrated by the lack of inference from (4a) to (4b) (Stalnaker 1968):

(4) a. If this match were struck, it would light.
     b. If this match had been soaked in water overnight and it were struck, it
         would light.

Put in the most neutral, non-committal terms, (4) illustrates how some antecedent cases, for some reason, do not matter for the interpretation of the consequent. Different accounts have been proposed to explain this (e.g. Lewis 1973; von Fintel 2001; Schein 2003). Their considerable differences notwithstanding, they all subscribe to the view that bare conditionals have universal(-like) force of some sort, even if this force has to be limited to relevant instances.

In what follows I raise the possibility that bare conditionals do not always have universal force. What I dub Conditional Duality claims that they typically display existential force when they appear in a negative or downward entailing environment. I explore how this thesis helps explain the interpretation of *only if* conditionals, following Herburger (2015a, b) (Sect. 3). It is then discussed in some detail how the thesis also helps to elucidate the curious behavior of bare conditionals under negative quantifiers (Higginbotham's puzzle) (Sect. 4). Regarding the interaction between conditionals and negation, I note that a denial reading of the negation often preserves the denied conditional's universal force (Sect. 5). Because an account in terms of Conditional Duality does not validate CEM (and several arguments against a CEM analysis are laid out), an explanation is owed for certain bare conditionals that appear outside of negative environments and that seem

to descriptively support CEM. This issue is attended to in Sect. 6, which argues that the relevant examples involve unbound anaphora and do not as such pose an argument against a (variably) strict account and for a CEM account. An "Appendix" discusses how the proposed duality of bare conditionals relates to other instances where we seem to find similar duality.

A note: The discussion will not distinguish between indicative and counterfactual conditionals because the difference, though of course important, is orthogonal to the issue at hand. Following Stalnaker (1975) and many others since, I assume that we can attribute the difference between indicative and counterfactual conditionals to difference in the way in which they relate to the previous discourse. More specifically, the antecedent of indicative conditionals is, unless the sentence specifies otherwise, taken to be consistent with the background assumptions (Common Ground) shared by the discourse participants. The counterfactual or subjunctive conditionals, in contrast, are the 'elsewhere case', typically signaling that the antecedent describes something inconsistent with the background assumptions. This explains how *If Oswald didn't shoot Kennedy, then someone else did* can be judged true while at the same time its counterfactual version *If Oswald hadn't shot Kennedy, then someone else would have* is judged false (Adams 1975). The idea is that the antecedent of the former is signaled to be consistent with our commonly held assumptions that someone killed Kennedy whereas the antecedent of the latter is not; it is typically taken to be moving beyond the assumption that someone shot Kennedy.

2 Background: curtailing universal force: Stalnaker (1968, 1981) and Lewis (1973)

Evidently, antecedents cannot always be strengthened. In light of this, Stalnaker (1968) recommends restricting the interpretation of the *if*-clause to a single closest world.

(5) Stalnaker conditional:
    If p q is true in a world of evaluation iff in the unique world that is closest to the world of evaluation where *p* is true *q* is true also.

The lack of inference from (4a) to (4b) is now captured to the extent that in the closest world for (4a) the match is dry, a not unlikely scenario.

But, as Lewis (1973) notes, Stalnaker's account collapses *would* and *might* conditionals, in conflict with the meaning difference we find in examples like those in (6):

(6) a. If we had left 5 minutes earlier we might have avoided traffic.
    b. If we had left 5 minutes earlier we would have avoided traffic.

A related problem Lewis ([1973](#)) observes is that there may not always be a single closest possible world in which the antecedent is true. This may either be because for each close one there is one that is even closer (Limit Assumption):

(7) If I were over 5' 7'',….

Or it may be because there are ties in closeness (Uniqueness Assumption), as in the following examples:

(8) a. If Bizet and Verdi had been compatriots, they would have been Italian.
     b. If Bizet and Verdi had been compatriots, they would have been French.

(9) a. If this fair coin is flipped, it will land heads.
     b. If this fair coin is flipped, it will land tails.

In response, Stalnaker ([1981](#)) argues that *might* is epistemic in a way that explains the difference with *would*. He further argues that the issue of there sometimes being infinitely many ever-closer worlds can be abstracted away from in terms of contextual relevance. Finally, he proposes to handle ties in closeness in terms of supervaluations. On Stalnaker's supervaluationist view, (9a) is true relative to valuations where the coin lands heads but false with respect to those where it lands tails. Since it is not true with respect to both kinds of valuations, it is not true *simpliciter* but indeterminate in truth-value. But the disjunctions in (10) come out as true *simpliciter*: on one type of valuation one disjunct is true, on the other the other disjunct is true.

(10) a. If this fair coin is flipped, it will land heads
          or if this fair coin is flipped, it will land tails.
      b. If Bizet and Verdi were compatriots, they would be French
          or if Bizet and Verdi were compatriots, they would be Italian.

Stalnaker's analysis thus validates the Conditional Excluded Middle (CEM). It predicts that either a conditional or its opposite (the negation of its consequent) is true:

(11) Conditional Excluded Middle (CEM):
      $p > q \lor p > \neg\, q$

While this seems desirable as far as (10) goes, according to Stalnaker's analysis the antecedents in (12) also pick out the singularly close world, predicting that like (10a,b), (12) is true as well:

(12) If his sister wins at chess, Alex is envious
      or if his sister wins at chess, Alex is not envious.

This, however, seems to conflict with speaker judgment; if Alex is envious some of the times that his sister wins at chess (e.g. when she wins against his big brother) but not at other times (e.g. when she wins against his little cousin), (12) as a whole is not judged true as both its disjuncts are judged false. (12) is, in other words, a counterexample to the generalization captured by CEM that either a conditional or its opposite conditional is true. The reason is that the main clauses in (12) are interpreted as having generic, quasi-universal force, which renders them both, and hence their disjunction, false. Other counterexamples to the claim that either a conditional or its opposite conditional are true are not difficult to find:

(13) a. The students do well if the third question is an easy one
          or the students don't do well if the third question is an easy one.
      b. If Sandra is Salvadoran she is catholic
          or if Sandra is Salvadoran she is not catholic.

A student's performance on a quiz is likely independent of whether question 3 (as opposed to, say, question 4) is an easy one; neither disjunct of (13a) is true then, causing (13a) as a whole to be false as well. Similarly, since many but by no means all Salvadorans are catholic, knowing that Sandra is Salvadoran does not allow one to infer that she is catholic, but neither does it license the inference described in the second disjunct, that she is not catholic.

A 'variably strict' analysis makes different predictions than the Stalnaker analysis as it does not endorse the Uniqueness Assumption nor the Limit Assumption.

(14) Variably Strict Conditional: (cf. Lewis 1973)
      If p q is true iff all p-worlds that are close to the world of evaluation
      are q-worlds.

As for the locus of the universal quantificational force, it is often said to originate in a phonologically silent modal or adverbial quantifier (e.g. Lewis 1975; Kratzer 1986).[1]

The close worlds correspond to those that are close by some contextually given standard of closeness, and because there is no Limit Assumption, all even closer ones are included as well. Because the variably strict conditional dispenses with singular reference, it avoids the problems with the Limit and Uniqueness assumptions the Stalnaker theory encounters. It similarly avoids the collapse of *might* and *would* conditionals. And the variably strict analysis is also consistent with

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[1] Strictly speaking, Lewis says that a counterfactual is (non-vacuously) true iff some accessible world where the antecedent and the consequent is true is closer to the world of evaluation than any world where the antecedent is true but the consequent is false. As a reviewer notes, this is not quite the same as (14). In a situation where there is no close world where the antecedent is true the conditional comes out true (vacuously) on (14), but on Lewis's actual analysis it could be that when there are no close antecedent worlds, there is a non-close one where the consequent is false and it is closer than any antecedent world where the consequent is true. In that case the conditional would be predicted to be false. As far as I can see, for the present discussion the difference does not matter, and I use (14) as it is simpler and is also commonly used.

the counterexamples to CEM in (12) and (13); since in these examples both disjuncts are effectively analyzed as involving universal quantification over the closest antecedent worlds and, as a result, both disjuncts can come out false, the entire disjunction may be false, in accordance with the speaker judgment we observed earlier. But, by the same token, the variably strict conditional leaves us puzzled by the perceived truth of the examples in (10), where the universal quantification makes it unlikely that either disjunct comes out true. The disjunctions of tied conditionals in (10) thus seem to offer a strong argument for an analysis that validates CEM.

And, as we will see next, CEM also comes in handy elsewhere, namely in the analysis of *only if* sentences and in the account of bare conditionals under negative quantifiers (Higginbotham's puzzle). But, as we will also see, while in these areas a CEM analysis compares favorably to a variably strict account as far as these phenomena are concerned, it also faces various empirical limitations. With this as background, I will advocate for Conditional Duality. I argue that once we recognize the dual nature of bare conditionals an account of the two puzzles becomes straightforward.

3 The *only if* puzzle

3.1 The problems posed by *only if*

Only if conditionals like those in (15) pose an interesting and long-standing puzzle in the semantics of conditionals.

(15) a. Only if you work hard do you succeed.
b. You only succeed if you work hard.

If all we have at our disposal is propositional logic, the best we can do to translate *only if p q* is to translate the same as *if q p,* namely as $q \rightarrow p$. This is what Logic 101 instructs us to do, following Quine. But it is not something that is intuitively appealing to the student, and for good reason. Neither this analysis, nor a strict version of it, which translates *only if p q* as $[\forall w: q(w)]\ p(w)$, does justice to the intuition that the antecedent describes something that is often taken to be temporally and/or causally prior to what is described by the consequent. This sequencing, reflected in the terms *antecedent* and *consequent*, tends to result in a significant meaning difference between *if q p* and *only if p q* (McCawley 1993):

(16) a. If you heat butter, it melts.
b. Only if butter melts do you heat it.

(17) a. If Mike straightens his tie once more, I'll kill him.
b. Mike will straighten his tie once more only if I kill him.

The temporal sequencing is why (16a), where the heating is described by the *if*-clause makes sense, and why (16b), where it is described by the consequent, sounds bizarre. To preserve the equivalence, explicit temporal information is needed to contravene the default ordering that has the antecedent precede the consequent (cf. von Fintel 1997; Schein 2003):

(18) a. If you heat butter, it melts.
     b. Only if butter melts have you heated it before.

Of course when temporal sequence is of no relevance then *only if p q* and *if q p* should be interchangeable, as is indeed the case:

(19) a. The door is locked only if they are out.
     b. If the door is locked they are out.

Apart from the sequencing issue, another reason to be skeptical of a 'reverse *if*' analysis of *only if* sentences is the intuition that *only if* is not an idiom. The meaning of an *only if* sentence should follow directly from the meanings of *only* and *if*. It turns out, however, that this cannot be achieved under standard assumptions. If we combine what is widely assumed about bare conditionals—a (variably) strict analysis of some sort—with what is widely assumed about *only,* we obtain truth-conditions that are both too weak and too strong.

Only is widely thought of as a complex, focus-sensitive negation. For concreteness, we can subscribe to the view that *only* is a propositional operator taking scope over its 'prejacent' *S* (the sentence without *only,* Horn 1996; von Fintel 1997) and that sentences have focus alternatives that can enter into the semantic computation, directly or indirectly, it does not matter (cf. e.g. Rooth 1985; von Fintel 1997).[2] *Only* negates all non-entailed focus alternatives to the prejacent *S*. In addition, *only S* also entails the prejacent.[3] The non-focused part of the entailed prejacent is, however, 'pragmatically backgrounded' or 'assertorically inert' (e.g. Atlas 1993; Horn 2002).[4]

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[2] The assumption is that when *only* combines with NP to form a DP in the surface syntax as in (i) *only* also effectively takes sentential scope and does not function as a determiner (e.g. von Fintel 1997). Nothing hinges on this here. (Capital letters mark the semantic domain of focus.)

(i) Only MEN had the right to vote back then.

[3] This observation goes back a long way, at least to Peter of Spain, and its history from the Middle Ages to the present day is recounted in Horn (1996, 2002).

[4] Support for the backgrounded entailment view comes from (i); if the speaker does not love the addressee (i) is a lie. Or, in happier terms, (i) can be understood as a declaration of (exclusive) love. For the present argument it actually does not matter whether the non-focused part of the prejacent is entailed in a backgrounded way, or merely presupposed in one form or another, as has been argued by some (see Horn 1996; von Fintel 1997), though I think the former is more convincing (Herburger 2000).

(i) I love only YOU.

(20) *Only S* is true in *w* iff (i) all focus alternatives of *S, S'* that are not entailed by *S* are false in *w* and (ii) the prejacent *S* is true in *w*.

Accordingly, (21) is thus true exactly when Heidi went hiking in the Alps and no other contextually relevant person did. Moreover, the sentence requires that the notion that there was hiking in the Alps be in the background pragmatically.

(21) Only HEIDI went hiking in the Alps.

The positive meaning contribution of *only,* the entailment of *S,* masks *only*'s ability to create a downward entailing context, but it does not obliterate it. As soon as we take the non-focused part of the second sentence in (22) ('the Matterhorn was climbed') as a premise to the argument, downward entailment becomes again visible. Against the background that the Matterhorn was summited, the truth of (22a) guarantees that of (22b) as an instance of downward entailment (cf. von Fintel 1999; Horn 1996):

(22) a. Only HEIDI went hiking in the Alps.
      b. Only HEIDI climbed the Matterhorn.

Taking this widely used account of *only* to be a reasonable one, the meaning of *only if* conditionals should now fall out as a simple matter of semantic composition from combining *only* with what is commonly assumed about bare conditionals, namely that they have the universal force (variably) strict conditional. But the marriage between the two is not a happy one.

One of the issues it runs into is that the resulting truth-conditions do not capture the exclusionary force of *only if* sentences. More concretely, (15a,b), which are annotated for a plausible focus in (23), are predicted to merely negate that *all* instances of working little are followed by success, that *all* instances of working an average amount are followed by success, etc.

(23) a. Only if you work HARD do you succeed.
      b. You only succeed if you work HARD.

(24) Assertion: $\neg \ [\forall w: \text{Close}(w', w) \land \text{Work-little}(w')] \ \text{Succeed}(w')$
                  $\land \neg \ [\forall w: \text{Close}(w', w) \land \text{Work-a-normal-amount}(w')]$
                  $\text{Succeed-}(w')$
                  $\land \neg \ [\forall w: \text{Close}(w', w) \land \text{Work-very-little}(w')] \ \text{Succeed}(w')$
                  $\land \neg \ [\forall w: \text{Close}(w', w) \land \neg\text{Work}(w')] \ \text{Succeed}(w') \land \ldots$

This is not enough, however, because (15a,b) deny that *any* instances of working little, an average amount, etc. are rewarded with success. Or, put differently,

according to (15a,b) hard work is a necessary condition for success but (24) fails to capture that.[5]

The second problem of wedding an analysis of *only* with a (variably) strict account stems from the positive meaning contribution of *only*, the fact that it entails the prejacent *S* (while pragmatically backgrounding its non-focused part). To put it in a nutshell, if the bare conditional prejacent has universal force, then because the prejacent of *only* is entailed, (15a,b) should entail that in *all* worlds where you work hard you succeed, as shown in (25). That, however, would effectively assimilate *only if* conditionals to bi-conditionals:

(25) Positive entailment: $[\forall w': \text{Close}(w', w) \wedge \text{Work-you-hard}(w')]$
      $\text{Succeed-you}(w')$

(26) If and only if you work hard you succeed.

And though *only if* and *if and only if* are similar in meaning, they are clearly not equivalent. Unlike *only if* clauses, *if-and-only-if* clauses describe conditions that are both necessary and sufficient. That *only if* sentences, in contrast to bi-conditionals, do not entail what is expressed by the bare conditional without the *only* is clearly evidenced by the incoherence of (27b), which contrasts with the coherence of (27a):

(27) a. Only if you work hard do you succeed, but hard work doesn't
          guarantee success. You also need aptitude, luck and favorable
          circumstances.
      b. #If and only if you work hard you succeed, but hard work doesn't
          guarantee success. You also need aptitude, luck and favorable
          circumstances.

We can also see the difference between *only if* and *if and only if* in the following examples (provided by one of the reviewers):

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[5] The assumption here is that (i) is in the relevant context judged to be semantically stronger than (ii), and (ii) stronger than (iii)

(i)   If you work a little you succeed.
(ii)   If you work a normal amount you succeed.
(iii) If you work hard you succeed.

The inference pattern relies on certain assumptions about a connection between work and success, where more work means more success. It is interesting to note (and deserves further study) that what constitutes a relevant stronger alternative in the antecedent of a conditional depends on the relation between antecedent and consequent that the speaker has in mind.

(28) a. You will only get your degree if you keep up with your tuition payments.
      b. You will get your degree if and only if you keep up with your tuition payments.

A university student might receive a letter stating (28a) as an admonition to pay some missing tuition. (28b) in contrast suggests that paying the tuition is apart from necessary also sufficient for getting the degree; maybe the outstanding payment is all that is missing to be cleared for graduation—or maybe the degree-granting institution is woefully corrupt. Clearly, though similar, (28a) and (28b) do not mean the same.

Finally, the contrast in (29) (Horn 1996) is also interesting to consider:

(29) a. I'll go only if you do, and maybe not even then.
      b. #I'll go if and only if you do, and maybe not even then.

(29b) entails that the speaker will go every time the addressee goes and this entailment is difficult to suspend without falling into incoherence. In (29a), on the other hand, the continuation is felicitous. This is consistent with (29a) not expressing that the addressee's going is a sufficient condition for speaker's going.[6]

In sum, if we combine what we think we know about *only* with the widely adopted (variably) strict analysis of bare conditionals we do not derive the meaning of *only if* because we fail to capture the exclusionary force of *only if* sentences (i.e. that their *if*-clauses describe necessary conditions) and we moreover predict positive entailments that are too strong and more appropriate for a bi-conditionals.

3.2 *Only if* and CEM

To resolve the *only if* conundrum we need to either give up the analysis of *only*, which, however, seems well-motivated, or else change our assumptions about the semantics of the bare conditionals embedded under *only*. Taking the latter course, one analysis of bare conditionals that immediately comes to mind is one that validates CEM. But, while CEM helps capture the exclusionary force of *only if*, it does not do so in all instances, and, moreover, the positive meaning contribution of *only* continues to create a general problem.

Only, as observed, negates the alternatives to the prejacent that are not already entailed by it. The problem with assuming a (variably) strict analysis was that the

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[6] It is also worth noting that *only if* sentences trigger negative inversion but *if and only if* do not (or at least less so, as there seems to be some variation noted in Horn 1996). This fits in with the fact that negative inversion signals that the rest of the sentence constitutes a downward entailing environment.

(i)   Only if you work hard do you succeed.
(ii)   *Only if you work hard you will succeed.
(iii) %If and only if you work hard will you succeed.
(iv)   If and only if you work hard you will succeed.

negation was an outer negation that took scope over a universal quantifier. Consequently not enough cases were excluded as we only ruled out that *all* instances of not working hard result in success, when in fact the sentence excludes that *any* such instances do. But given CEM (and assuming that not both sides of the disjunction are true, see below), the outer negation of a bare conditional, $\neg(p > q)$, will entail the inner negation ($p > \neg q$); there is no way the outer negation can be true without the inner negation being true also.[7]

(30)   OINE: $\neg(p > q) \vdash p > \neg q$

Given this entailment, the exclusionary force of (15a,b) is predicted now; the various conjuncts in (31) jointly rule out that any alternative to working hard is followed by success:

(31)   Assertion: [$\iota w'$: Close(w', w) $\wedge$ Work-little(w')] $\neg$Succeed(w')
                $\wedge$ [$\iota w'$: Close(w', w) $\wedge$ Work-a-normal-amount(w')]
                $\neg$Succeed-(w')
                $\wedge$ [$\iota w'$: Close(w', w) $\wedge$ Work-very-little(w')] $\neg$Succeed(w')
                $\wedge$ [$\iota w'$: Close(w', w) $\wedge$ $\neg$Work(w')] $\neg$ Succeed(w') $\wedge$…

An alternative way to exploit CEM to explain *only if*, proposed in von Fintel (1997), supplements a version of a variably strict conditional with a 'Homogeneity Presupposition'. *If*-clauses on this view are likened to plural definite descriptions and generic bare plurals. These have been claimed to behave 'homogeneously' in that (32a) is equivalent to denying that any boy is blond and (32b) that any woman likes doing dishes (Fodor 1970; Löbner 1985).

(32)   a.   The boys are not blond.
        b.   Women don't like doing dishes.

The Homogeneity Presupposition von Fintel (1997) posits for the *if*-clauses of bare conditionals predicts now that when a universally quantified alternative to the prejacent is negated by *only*, the wide scope negation is interpreted as if it just took

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[7] Given CEM and the 'Weak Boethius' Thesis' that the inner negation entails the outer negation, the inner negation and the outer negation will in fact be equivalent, as can be seen in the equivalence between (iii) and (iv) (Pizzi and Williamson 2005):

(i) $p > q \vee p > \neg q$ CEM
(ii) $p > \neg q \rightarrow \neg(p > q)$ WBT
(iii) $(p > q \vee p > \neg q) \wedge (p > \neg q \rightarrow \neg(p > q))$
(iv) $\neg(p > q) \leftrightarrow p > \neg q$

scope over the consequent. This too accurately represents the exclusionary force of *only if* :[8]

(33) Assertion: $[\forall w$: Close(w', w) $\wedge$ Work-you-little(w')] $\neg$Succeed(w')
$\wedge$ $[\forall w$: Close(w', w) $\wedge$ Work-you-a-normal-amount(w')]
$\neg$ Succeed(w')
$\wedge$ $[\forall w$: Close(w', w) $\wedge$ Work-you-very-little(w')] $\neg$Succeed(w')
$\wedge$ $[\forall w$: Close(w', w) $\wedge$ $\neg$Work-you(w')] $\neg$Succeed(w') $\wedge$…

(31) and (33) would seem to suggest then that accounts of bare conditionals that validate CEM, be it directly such as the Stalnaker conditional or indirectly with the help of a Homogeneity Presupposition, work well for *only if*. But we must of course not lose sight of the abundance of counterexamples to CEM, as Barker (1994) reminds us. And not only would a CEM account have to find an independent explanation for the counterexamples, which may not be an easy undertaking, such an account would also predict that *only if* versions of conditionals that are counterexamples to CEM should not have the same exclusionary force as the examples in (15a,b). This prediction, however, does not seem to be born out. Analogous to (15a,b), (34) denies that with *any* nationality other than Salvadoran is Sandra catholic. And that claim is consistent with (13b), repeated here as (35), being false, contra CEM:

(34)   Only if Sandra is Salvadoran is she catholic.

(35)   Sandra is catholic if she is Salvadoran or Sandra is not catholic if she is Salvadoran.

  CEM and the exclusionary force of *only if* also come apart in the following example:

(36)   You can't assume that if an applicant for a NASA position is a woman the applicant is not a mother. But neither can you assume that if an applicant is a woman the applicant is a mother. But you have to of course assume that only if the applicant is a woman is the applicant a mother.

(36) is consistent. The third sentence has the regular exclusionary force we observe for *only if* sentences, despite the fact that the first two sentences show that CEM does not hold.

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[8] As universal quantifiers do not actually show homogenous behavior (*It is not the case that every high school kid is rebellious* is not equivalent to *Every high school kid is not rebellious*), von Fintel analyzes bare conditionals in terms of generic (rather than universal) quantification. Cohen (2004) asks, not unreasonably, whether this does not predict a weaker exclusionary force than the one we observe, given that generic bare plurals allow for 'exceptions' in a way that conditionals under *only* do not. One way to appeal to homogeneity might then be to drop the idea of generic quantification and instead adopt the view that *if*-clauses denote plural definite descriptions (Schein 2003; Schlenker 2004). But this, too, might be problematic as plural definite descriptions may allow exceptions too (e.g. Lasersohn 1999), and, more generally, also because the homogenous behavior plural definite descriptions seem to exhibit may be an epiphenomenon (Schein 2016, see also footnote 23).

A second problem for a CEM account of *only if* sentences is that for conditionals with impossible antecedents CEM holds but because both sides are true, $p > q$ as well as $p > \neg q$. On a Stalnaker account this follows from reference to a world δ where contradictions are true (Stalnaker 1968), while on a homogeneity account it follows from the vacuity of the universal quantification. But if both *if p_{imp} q* and *if p_{imp}, not q* are always true, the outer negation of *if p_{imp} q* will always be false. The outer and inner negation will not be equivalent and the outer negation will then entail not just *if p_{imp}, not q* but also *if p_{imp} q*. This would predict that *only if* conditionals with impossible antecedents do not have the same exclusionary force as other *only if* sentences, because the account requires that the outer negation entail just the inner negation (and not also the non-negated version). And yet, (37) seems to have the same exclusionary force as other *only if* sentences and to deny that there is any condition other than $2+2=5$ under which it will rain tomorrow (whatever that means, see below).

(37) Only if $2+2=5$ will it rain tomorrow.

A third argument against a CEM analysis of *only if* sentences stems from the positive meaning component of *only*, the requirement that S be true (though its non-focused material is assertorically inert). Since a CEM analysis assumes a univocal account of bare conditionals, (15a,b) are predicted to entail a prejacent that is crucially held to be synonymous with the bare conditional *If you work hard you succeed.*

(38) Positive entailment: [ɿw': Close(w', w) ∧ Work-Hard(w')] Succeed(w')

We then face a version of the problem we already encountered when we considered a (variably) strict analysis of *if* in *only if;* on a CEM analysis we end up wrongly predicting that *only if* sentences are equivalent to *if and only if* sentences, but while the *if*-clauses of *only if* sentences express necessary conditions they do not also express sufficient ones.

3.3 *Only if* sentences and Conditional Duality

In light of the various difficulties we encounter when we try to analyze *only if* while maintaining a (variably) strict analysis or one that validates CEM, I want to suggest that we consider setting aside our desire for a univocal analysis and instead explore the possibility of qualifying a (variably) strict account in a way that embraces duality (Herburger 2015a, b):

(39) Conditional Duality:
      If p then q is ambiguous between [∀w': Close(w', w) ∧ p(w')] q(w') and [∃w':
      Close(w', w) ∧ p(w')] q(w'). In upward entailing contexts we find the
      universal reading, in downward entailing contexts the existential one.

Borrowing from the bookkeeping practice of writing deficits in red, when a bare conditional is in a downward entailing context—'in the red'—, it shows existential force rather than its usual 'strict' force. As (40) illustrates, since *only* creates a downward entailing environment in the relevant sense, this now excludes, as desired, that (15a,b) allow that *any* instance of working less than hard will be followed by success:

(40) ONLY [∃w': Close(w', w) ∧ Work-you-hard(w')] Succeed(w')

(41) Assertion: ¬[∃w': Close(w',w) ∧Work-little(w')] Succeed(w')
        ∧ ¬[∃w': Close(w',w) ∧ Work-a-normal-amount(w')] Succeed(w')
        ∧ ¬[∃w': Close(w',w) ∧ Work-you-a-little(w')] Succeed(w')
        ∧ ¬ [∃w': Close(w',w) ∧¬Work(w')] Succeed(w') ∧...

And since CEM is not part of the analysis, the duality account of *only if* also extends to examples that are counterexamples to CEM. (34) is interpreted as negating that there is *any* nationality other than Salvadoran that is compatible with Sandra's being catholic. It does not matter whether or not only some Salvadorans are catholic.

(42) ONLY [∃w': Close(w',w) ∧ Salvadoran-Sandra(w')] Catholic-Sandra(w')

(43) Assertion: ¬[∃w': Close(w',w) ∧ Sandra-Sri-Lankan(w')] Sandra-Catholic(w')
        ∧¬[∃w': Close(w',w) ∧ Sandra-Slovenian(w')] Sandra-Catholic(w')
        ∧¬[∃w': Close(w',w) ∧ Sandra-Somali (w')] Sandra-Catholic(w')
        ∧¬ [∃w': Close(w',w) ∧ Sandra-Swiss(w')] Sandra-Catholic(w')∧...

Similarly, Conditional Duality also explains *only if* sentences with impossible antecedents. It correctly predicts that (37) negates that it will snow in *any* world where $2+2 \neq 5$:

(44) ONLY [∃w': Close(w',w) ∧ 2+2=5(w')] Snow(w')

(45) Assertion: ¬[∃w': Close(w',w) ∧ 2+2=4(w')] Snow(w')
        ∧ ¬[∃w': Close(w',w) ∧ 2+2=6(w')] Snow(w')
        ∧ ¬[∃w': Close(w',w) ∧ 2+2=23 (w')] Snow(w')
        ∧ ¬ [∃w': Close(w',w) ∧ 2+2=51(w')] Snow(w') ∧...

As we saw, *only* does not only negate the focus alternatives to the prejacent but it also entails the prejacent, pragmatically backgrounding its non-focused component. Since Conditional Duality gives the prejacent existential force we expect the positive entailment for *Only if p q* to amount to an existential entailment: [∃w': Close(w',w) ∧ p(w')] q(w'). It follows that *only if* sentences differ from bi-conditionals in not describing sufficient conditions. For (15a,b), for example, Conditional Duality predicts that they entail (in the background as far as the non-

focused material goes) that there is *some* close world where you both work hard and succeed:

(46) Positive entailment: $[\exists w\text{'}: \text{Close}(w\text{'}, w) \wedge \text{Work-hard}(w\text{'})]$ Succeed$(w\text{'})$

This is not the same as saying that in every close world where you work hard you succeed. (46) is consistent with there being an equally close world where you work hard and do not succeed (maybe because you lack the necessary aptitude, luck, support, etc.).[9]

The existential force of the prejacent that is entailed by *only* in *only if* is evidenced in (47). As a piece of advertising (47) would be rather bizarre as it would license the inference that there is a close possible world where you drink kale juice and reach the age 127. Odds are none of us will live to 127, kale juice or not.

(47) #Only if you drink kale juice do you live to be 127.

An interesting issue arises with *only if* sentences with impossible antecedents. The positive entailment that we find for (48) states that there is a close possible world where 2+2=5 and where it will snow tomorrow:

(48) Positive entailment: $[\exists w\text{'}: \text{Close}(w\text{'}, w) \wedge 2+2=5(w\text{'})]$ Snow$(w\text{'})$

Of course there is no such world. This, in combination with the negation of all the relevant alternatives, illustrated in (45) above, can be used to explain why this kind of sentence is a rhetorically interesting and rather roundabout way of expressing the speaker's strong confidence in there not falling any snow whatsoever the next day.

Finally, it may be useful to directly compare bare conditionals under *only* to 'dressed' ones in the same environment:

(49) Only if you follow a cake recipe carefully do you usually get a good result.

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[9] A reviewer asks whether the positive of entailment of *only* does not wrongly predict that (i) entails that some passenger that needed assistance or was traveling with small children had already boarded:

(i) Only if a passenger has small children or needs assistance has she already boarded.

But the positive entailment of (i), given in (ii), merely says that there is a close possible world where there is such a passenger that needed extra time and that passenger has already boarded. It does not follow that in the world of evaluation there was such a passenger.

(ii) $[\exists w\text{'}: \text{Close}(w\text{'}, w) \wedge [Ax: \text{Passenger}(x, w\text{'}) \wedge (\text{Has-small-children}(x, w\text{'}) \vee \text{Needs-assistance}(x, w\text{'}))]$ Has-already-boarded$(x, w\text{'})$

As for the entailment that *all* passengers that needed help if there were any have already boarded, also noted by the reviewer, I think this can be attributed to extra-linguistics facts, in particular the orderliness with which (US) airlines try to get their passengers to board.

(49) claims that when you carefully follow the recipe you usually get a good result and it rules out that if you eyeball the amounts, substitute ingredients etc. you usually get a good result. It does not say that using hazelnuts instead of almonds, for instance, will necessarily taste bad; *usually* here is part both of the entailed prejacent and of the focus alternatives that are negated by *only*. That the sentence without *only* and the prejacent of the *only* sentence should have the same quantificational force, namely that provided by *usually,* is not surprising; Conditional Duality, which causes the conditional and the homophonous prejacent under *only* to vary in quantificational force, only characterizes conditionals whose quantificational force is not phonologically spelled-out, namely bare ones.

3.4 Precursors of Conditional Duality for *only if*

Naturally, the puzzle posed by bare conditionals under *only* has not gone unnoticed and among the various solutions that have been contemplated are not just ones involving CEM but also some that can be seen as precursors to the present analysis. Already Geis (1973) sets out to analyze *only if* sentences in compositional terms. But though he generally treats *if* as meaning 'in all cases', when a conditional is embedded under *only* he implicitly switches to analyzing *if* as in 'in some cases'. If one assumes that bare conditionals always have the same force, as Geis ostensibly does, this is of course a problem, and is noted as such in McCawley (1974) and also von Fintel (1997). If, however, we embrace the duality of bare conditionals, as I argue we should, rather than try to explain it away, then we directly expect that *if* under *only* should mean something more like 'some' and less like 'every'.

McCawley (1974) essentially already points out what we saw above, namely that if we assume that bare conditionals uniformly have universal force we would not capture the exclusionary force of *only if* conditionals and, furthermore, we would also predict the wrong positive entailments.[10] But he seems reluctant to abandon a univocal analysis of *if,* and leaves it as an open, though in his view somewhat troubling possibility that the quantificational force of bare conditionals should be underspecified and vary with context. Building on McCawley (1974), von Fintel (1997) is careful to also consider the possibility that the conditional prejacents under *only* have existential force, a view which he notes would make things simple. But, in the end he opts, as we saw above, for a CEM account of

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[10] McCawley (1974) notes that if we assume that *if* always means in 'all cases' we mistakenly assimilate (i) to (ii). He notes that (i) does not commit the speaker to assuming that Tom will leave in all cases that John comes back by midnight any more than (iii) commits the speaker to assuming that all Southerners voted for Humphrey. This, he observes, (iii) does not.

(i)   Tom will leave only if John comes back by midnight.
(ii)   Tom will leave only in all cases in which John comes back by midnight.
(iii) Only Southerners voted for Humphrey.

The similarities between bare plurals and bare conditionals under *only* play an important role in McCawley's squib and also receive detailed attention in von Fintel (1997).

bare conditionals, one that amalgamates a (variably) strict account with a Homogeneity Presupposition.[11]

Finally, Dekker (2001) treats bare conditionals as material conditionals but posits an operator that in downward entailing contexts, including the one created by *only,* turns the material conditional into what amounts to its dual, a conjunction. We are of course not assuming a truth-functional analysis of *if* here, nor do I posit a dualization operator, but in essential aspects Conditional Duality is very much in the spirit of what is already suggested in Dekker (2001).

4 Higginbotham's puzzle

If Conditional Duality is real, we expect that bare conditionals also display existential force in other downward entailing environments besides the one provided by *only.* The puzzling behavior of bare conditionals under negative nominal quantifiers supports this.

4.1 The problem of bare conditionals under negative quantifiers

As prominently discussed in Higginbotham (1986, 2003), bare conditionals are puzzling in that they seem to be interpreted rather differently depending on whether they appear in the scope of a universal quantifier like *every student* or a negative one like *no student*:

(50) a. Every student succeeds if they work hard.
      b. No student passes if they goof off.

Staying within the confines of a truth-functional analysis of *if,* Higginbotham notes that while translating *if* in (50a) as a material conditional would be reasonable (setting the well-known problems of the material conditional aside, see Sect. 1), it would fail rather spectacularly in (50b) because it would predict that no student is

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[11] Assuming a very close parallel between bare plurals and bare conditionals under *only*, von Fintel (1997) argues that the (conditional) prejacents under *only* are not existential because there is a contrast between (i) and (ii) in terms of the licensing of the NPI *any*:

(i)   Only students who have any experience in math (manage to) master this course.
(ii) *Only sm students who have any experience in math (manage to) master this course.

How the conclusion that the bare plural *students* licenses the NPI in (i) because it has generic, universal-like force here can be reconciled with McCawley's (1974) observation regarding *only Southerners voting for Humphrey* not presupposing that all Southerners voted for Humphrey (see previous note) is not clear. Moreover, as von Fintel himself observes, bare plurals differ from bare conditionals in that bare plurals allow for existential readings (in combination with stage level predicates), but it is not clear that bare conditionals do. In the end, the fact that bare conditionals, unlike bare plurals, do not seem to allow for existential readings on their own seems to be his main justification for not assuming prejacents under *only* have existential force. He grants, however, that while he is skeptical of the existential prejacent theory, and eager to propose an alternative theory where the prejacent is generically quantified (see main text), he has not disproved the existential prejacent theory.

such that he or she does not goof off or passes. This amounts to saying that every student goofs off and does not pass. The *if* in (50b), he notes, would be better translated as a conjunction. It would then be predicted to be true when no students both goof off and pass, as shown in (52):

(51) a. [∀*x*: Student(*x*)] Works-hard(*x*) → Succeeds(*x*)
      b. [No *x*: Student(*x*)] Goofs-off(*x*) → Passes(*x*)

(52) [No *x*: Student(*x*)] Goofs-off(*x*) ∧ Passes(*x*)

One might have conceptual qualms about the analysis in (51)—Higginbotham (1986, 2003) faults it with violating compositionality because it has *if* mean one thing in one context but something else altogether in another. On top of that, it also raises an empirical concern. Just as the material conditional does not capture the modal nature of (50a), conjunction similarly fails to capture that (50b) is about possibilities. To show this, Leslie (2009) invites us to think of a scenario involving Meadow, whose father (mobster Tony) has intimidated her teacher to the point that Meadow will pass the class regardless of how much or how little she studies. In this scenario Meadow renders (50b) false; if she goofs off, she still passes. But if Meadow (maybe to spite Dad?) does not actually goof off and works hard for the class, she does not actually falsify (52). The truth conditions of (50b) and (52) clearly come apart then, showing that conjunction in (52) cannot be the right translation of a bare conditional under a negative quantifier like *no student*.

4.2 Conditional Duality and Higginbotham's puzzle

4.2.1 The basic case

Higginbotham's puzzle is easily explained if we assume Conditional Duality. Conditional Duality gives the bare conditional in (50a) universal force because it appears in the upward entailing environment provided by the scope of *every student.* In contrast, in (50b), where *no student* furnishes a downward entailing context, the bare conditional reveals existential force. (53b) says that for no student is there *any* close world where he or she goofs off and he or she passes. If Meadow actually does all the work required for the class and does it reasonably well, she is now predicted to be a counterexample to the truth of (50b), as in fact she should.

(53) a. [Every *x*: Student(*x*,*w*)] [∀*w'*: Close(*w'*,*w*) ∧ Work-hard(*x*, *w'*)] Succeed(*x*, *w'*)
      b. [No *x*: Student(*x*,*w*)] [∃*w'*: Close(*w'*,*w*) ∧ Goof-off(*x*, *w'*)] Passes(*x*, *w'*)

As for the conceptual worry about the conditional having a different interpretation depending on whether the quantifier is universal or existential, it is part of a more general pattern, one that we also find with bare conditionals under *only.*

4.2.2 Further examples: counterexamples to CEM, impossible antecedents

Bare conditionals that are counterexamples to CEM receive a parallel account. Since CEM plays no role, we expect that these examples do not behave differently than those we just saw when embedded under quantifiers. This is born out by the equivalence between the (a) and (b) examples we can observe in the following pairs:

(54) a. Every boy is envious if his sister wins at chess.
      b. No boy is not envious if his sister wins at chess.

(55) a. Every student will do well if the third question on the quiz is an easy one.
      b. No student will not do well if the third question on the quiz is an easy one.

(56) a. Every doctor is catholic if she is Salvadoran.
      b. No doctor is not catholic if she is Salvadoran.

Conditional Duality directly predicts these equivalences: The (a) sentences have the logical syntax schematically represented in (57a) and thus come out as equivalent to a sentence with the logical syntax in (57b).

(57) a. [Every x: $H(x, w)$] [$\forall w'$: Close(w',w) $\wedge$ $p(w')$] $q(w')$
      b. [No x: $H(x, w)$] [$\exists w'$: Close(w',w) $\wedge$ $p(w')$] $\neg q(w')$

Embedded conditionals with impossible antecedents also show the equivalence; the sentences in (59) seem to be as truth-conditionally interchangeable as those in (58):

(58) a. Every student fails the oral exam if professor Barnes has a migraine.
      b. No student passes the oral exam if professor Barnes has a migraine.

(59) a. Every student fails if $2+2=5$.
      b. No student passes if $2+2=5$.

This parallel is not surprising given Conditional Duality; (60a) says that for every student all close worlds where $2+2=5$ are ones where he or she fails. (60b) states equivalently that for no student is there any close world where $2+2=5$ and the student passes:

(60) a. [Every x: Student(x, w)] [$\forall w'$: Close(w', w) $\wedge$ $2+2=5(w')$] Fail(x, w')
      b. [No x: Student(x, w)] [$\exists w'$: Close(w', w) $\wedge$ $2+2=5(w')$] Passes(x, w')

Since there are no worlds where $2+2=5$, a speaker expresses no commitment regarding every student failing when uttering (60a) and no commitment regarding no student passing when uttering (60b). If the hearer makes the further pragmatic assumption that the speaker was co-operative in that had there been a truly relevant condition on the students failing/passing he would have mentioned it, she can then

further infer that the speaker means to convey that every student will pass or, equivalently, that no student will fail.[12]

4.2.3 Other determiners and pragmatics

Going beyond *every* and *no,* we may also wonder how other determiners behave. I will argue that Conditional Duality extends to them as well—once scalar implicatures and pragmatic context are reckoned with.

In a meritocratic frame of mind hard work is considered conducive to doing well in a class and goofing off an impediment to passing it. It therefore makes sense pragmatically that the combination *hard work* and *success* should be felicitous under quantifiers that are upward entailing in their scope, because it is there that we predict universal quantification—and universal quantification lends itself to expressing that one thing guarantees another. Conversely, the combination *goofing off* and *pass* should sound felicitous under quantifiers that are downward entailing in their scope, because we expect existential quantification there—and existential quantification can be taken to describe the compatibility of two things. These predictions fit the pattern we see in (61) and (62). The quantifiers in (61b), which are all downward entailing in their scope, sound odd together with the *work hard/succeed* combination. Conversely, the quantifiers in (62a), all upward entailing in their scope, sound odd with the *goof off/pass* version:

(61) a. No/few/hardly any students pass if they goof off.
     b. #No/few/hardly any students succeed if they work hard.

(62) a. #All/many/most students pass if they goof off.
     b. All/many/most students succeed if they work hard.

Adding *even* reverses the pattern and renders those combinations that were pragmatically strange before felicitous and *vice versa*. This makes sense because when *even* associates with an *if*-clause it marks the condition as surprising, unlikely or noteworthy:

(63) a. #No/few/hardly any students pass even if they goof off.
     b. No/few/hardly any students succeed even if they work hard.

(64) a. All/many/most students pass even if they goof off.
     b. #All/many/most students succeed even if they work hard.

A suitable pragmatic context can also have a rescuing effect, as the following example shows (Larry Horn, personal communication):

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[12] An alternative interpretation can be imagined as well. If basic facts about math are being taught wrong (a reading which is favored by interpreting $2+2=5$ as being quoted as a wrong teaching), then (59a,b) can be taken to say that every student will fail and no student will pass because the students know in fact better than what they are being taught and what is presumably asked on the test.

(65) Yes, lazy Susan passed. In fact, all/most/many students pass if they goof off. That's the problem with grade inflation.

Curiously, when we turn to quantifiers that are headed by determiners like *some* and *a few*, we find that the combination of *work hard* in the *if*-clause with *succeed* in the consequent can lead to a pragmatically odd result even though Conditional Duality would lead us to expect that *some/a few* pattern with *every* since they are both monotone increasing in their scope:

(66) #Some/a few students succeed if they work hard.

There is, however, an independent explanation of the marked status of this example. Unlike *every,* the determiners *some* and *a few* give rise to a neo-Gricean quantity based implicature 'some but not all' in upward entailing contexts (e.g. Horn 1989). (66) is no exception; it generates an implicature that not all students succeed if they work hard. But this makes you wonder: Why should it be that hard work guarantees success only for some? It seems rather puzzling.[13]

Similar questions arise with examples where instead of *some/a few* we have determiners like (*at least*) *eight* and *at most eight*. *At least eight* makes the hearer wonder why for eight and possibly more hard work should lead to success, but why not for all? Conversely, the *at most eight* version of the example raises the question why for eight and possibly fewer than that hard work should merely be compatible with success. I think it is precisely because they generate these questions that these examples seem pragmatically odd.

As for quantifiers like *exactly eight students,* they can be thought of as a combination of an increasing and decreasing determiner along the lines of 'eight and no more than eight' (e.g. Spector 2007). (67) then says 'eight students are such that if they study hard they succeed and no more than eight students are such that if they study hard they succeed.'

(67) Exactly eight students succeed if they work hard.

If we adopt such a conjunctive analysis, Conditional Duality interprets (67) as in (68). The bare conditional embedded under the *eight students* in the first conjunct exhibits universal force. But the bare conditional embedded under *at most eight students* in the second conjunct has existential force. The difference correlates with the different montonicity properties of the determiners *eight* and *at most eight*:

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[13] Again, context can come to the rescue and the pragmatics may independently provide answer, in which case the combination becomes felicitous again (Larry Horn, personal communication):

(i) The system is rigged. OK, {a few/some} poor students succeed if they work hard, but…

(68) [Eight x: Student(x, w)] [[∀w': Close(w', w) ∧ Work-hard(x, w')]
      Succeed(x, w') ∧
      [At most eight x: Student(x, w)] [∃w': Close(w', w) ∧ Work-hard(x, w')]
      Succeed(x, w')

The resulting truth conditions for (67) are pragmatically strange. It asserts that for at least eight students hard work always leads to success and at the same time it asserts that for at most eight students hard work sometimes leads to success. This leaves the relation between hard work and success bizarrely unclear. On this view then the likes of (67) are pragmatically strange, but not as such uninterpretable (cf. Kratzer in press). By the same token it would not be surprising to find that with a different pragmatics *exactly*+numeral can be felicitous, and indeed there seem to be such examples (cf. Higginbotham 2003):

(69) Exactly three kids in Ms. Liang's pre-K class would have a severe allergic reaction if they ate any of those peanut M&Ms that someone left on her desk.

(70) [Three x: Kids(x,w)] [[∀w': Close(w',w) ∧ Eat-peanuts(x, w')] Allergic-reaction(x, w') ∧ [At most three x: Kids(x,w)] [∃w': Close(w',w) ∧ Eat-peanuts(x, w')] Allergic-reaction(x, w')

(69) describes a for Ms. Liang nerve-wrecking situation involving the three children in her class with an allergy to peanuts actually having the opportunity to ingest some. For at least three children in her class eating peanuts invariably provokes a bad reaction, and for at most three children is there a risk that eating peanuts will cause a dangerous reaction. Unlike in the hard work example no puzzling question arises here about the relation between what the antecedent describes, eating peanuts, and the consequent allergic reaction it provokes.[14]

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[14] A reviewer notes that if (i) is coherent, which it seems to be, this is a problem for the proposed analysis:

(i) Exactly eight hamsters get food pellets if they press the lever, exactly eight hamsters get an electric shock if they press the lever, and exactly eight hamsters get randomly food pellets or an electric shock if they press the lever.

The worry is that the random food pellets that the third group of hamsters get are not compatible with the assertion in the first clause that no more than eight hamsters get food pellets. Note, however, that the problem seems to have little to do with conditionals, as it persists when we delete all the *if*-clauses: (ii) seems as coherent as (i).

(ii) Exactly eight hamsters get food pellets, exactly eight hamsters get an electric shock, and exactly eight hamsters get randomly food pellets or an electric shock.

Given that it seems reasonable to assume that *exactly eight* means 'eight and not more than eight', a plausible reason for the coherence of (i) and (ii) might be that *get food pellets* and *get an electric shock* is interpreted as 'get only/consistently food pellets' and as 'get only/consistently an electric shock'. The most plausible reading of (ii) is one that describes a pattern. But while such a generic reading of the

To recap, Conditional Duality does not only explain *only if* conditionals, it also offers a simple account of Higginbotham's puzzle. We saw how it accounts for the basic *Every H q if p* and *No H not q if p* equivalence, and, beyond that, also for examples that pose counterexamples to CEM and conditionals with impossible antecedents, which also exhibit the equivalence. Also explored was how various determiner meanings, including non-monotonic ones, scalar implicature and pragmatic context interact with the embedding of bare conditionals under nominal quantifiers.

4.3 Previous accounts of Higginbotham's puzzle

As one would expect, much of the theorizing about bare conditionals under negative quantifiers has sought to preserve a univocal analysis, which, all things being equal, would of course be the most parsimonious kind. Proposed solutions range from CEM accounts (von Fintel and Iatridou 2002; Williams 2010; Klinedinst 2010) to analyses that extend the Lewis/Kratzer restrictor theory to nominal quantifiers (von Fintel 1998; Leslie 2009). The issue is also taken up in Kratzer (in press), who at least for a particular subset of cases proposes an account where *if*-clauses do double duty and function simultaneously as antecedents (of material conditionals) and as part of the restrictors of nominal quantifiers. The discussion that is to follow underscores, I believe, how simply and efficiently Conditional Duality accounts for the facts.

4.3.1 CEM accounts

Aiming for a univocal analysis of bare conditionals, von Fintel and Iatridou (2002) combine a version of a strict analysis with a Homogeneity Presupposition, an idea reminiscent of von Fintel's (1997) analysis of *only if* conditionals (see Sect. 3.2). Homogeneity is thus deployed to strengthen (71c) to (71d) in order to capture that (71a) and (72) have the same truth conditions: (I am assuming here that *no* can be analyzed as a universal quantifier taking scope over negation.)

(71) a. No student passes if they goof off.
 b. [No x: Student(x)] [$\forall w'$: Goof-off(w) $\wedge$ Closest(w', w)] Pass(w')
 c. [$\forall x$: Student(x)] $\neg$ [$\forall w'$: Goof-off(w) $\wedge$ Closest(w', w)] Pass(w')
 d. [$\forall x$: Student(x)] [$\forall w'$: Goof-off(w) $\wedge$ Closest(w', w)] $\neg$Pass(w')

(72) Every student fails if they goof off.

Footnote 14 continued

various conjuncts is compatible with there being implicit conditional antecedents (a possibility raised by the reviewer), it does not require it. This is shown in (iii).

(iii) The experimental design was such that over the span of two months exactly eight patients got the test substance, exactly eight got a placebo, and exactly eight got the test substance or the placebo.

On a Stalnaker analysis the equivalence that gives rise to Higginbotham's puzzle is also derived (Williams 2010; Klinedinst 2010). Instead of a universal quantifier that is assumed to carry a Homogeneity Presupposition we find the likes of a singular definite description:

(73) a. [No x: Student(x)] [$\iota w'$: Goof-off(w') $\wedge$ Closest(w', w)] Pass(w')
   b. [$\forall x$: Student(x)] $\neg$[$\iota w'$: Goof-off(w') $\wedge$ Closest(w', w)] Pass(w')
   c. [$\forall x$: Student(x)] [$\iota w'$: Goof-off(w') $\wedge$ Closest(w', w)] $\neg$Pass(w')

However, analyses that rely on CEM, whatever their precise shape, predict that embedding of conditionals involving counterexamples to CEM or impossible antecedents should not show the equivalence known as Higginbotham's puzzle. The reasons are familiar from our earlier discussion of *only if* sentences: if CEM does not hold, the step from the outer negation in (73b) to the inner negation in (73c) fails. And even if CEM holds, the inference from outer and inner negations will be vacuous with impossible antecedents because the outer negation will always be false and thus not just entail the inner negation but also the non-negated version. But, as we have already seen, Higginbotham's puzzle also arises with conditionals that are counterexamples to CEM and with conditionals with impossible antecedents.

A second issue we face when analyzing Higginbotham's puzzle with the help of the Stalnaker conditional (though not with homogeneity) arises in connection with (74). Because there is no single closest world where a fair coin that is flipped lands heads, this sentence violates the Uniqueness Assumption that characterizes the Stalnaker conditional and is indeterminate in truth-value on Stalnaker's (1981) analysis:

(74) If this fair coin is flipped it will land heads.

The lack of semantic value that is said to characterize (74) has consequences elsewhere, as observed in Leslie (2009). It means that the open sentence embedded under the quantifier in (75) will also be semantically valueless. This makes it challenging to explain why (75) is typically judged false:

(75) No fair coin will land heads if flipped.

The challenge is addressed in Klinedinst (2010), who aims to develop an account of Higginbotham's puzzle in terms of the Stalnaker conditional. He first observes that the kinds of valuations where some coins land heads and some land tails together with those where all coins land heads jointly outnumber the valuations where all coins land tails. He then notes (if I understand correctly) that if the latter could somehow be excluded, (83) would indeed come out false, rather than indeterminate with respect to the remaining two types of valuations. He goes on to surmise that the land-tails scenarios are in fact set aside because speakers have an independently attested psychological tendency to overestimate 'randomness'.

While a psychological bias to overestimate randomness may well exist—Klinedinst cites research by Kahneman and Tverski—we can construct examples where explicit reference to statistics presumably eliminates from the equation any psychological bias to overestimate randomness:

(76) Given a statistically significant sufficiently large sample size, no fair coin will land heads if flipped.

(76) is false, but on a Stalnaker supervaluationist analysis it too would come out as semantically indeterminate. It is not easy to see how Klinedinst's psychological emendations could save it from this prediction.[15]

4.3.2 Modalized nominal restrictor account

Another approach to Higginbotham's puzzle aims to extend the Lewis/Kratzer restrictor thesis to nominal quantifiers. The idea is that the *if*-clause in the relevant sentences does not function as the antecedent of a conditional but rather denotes part of the restriction of the nominal quantifier. A direct analogy is drawn to *if*–clauses that are said to restrict adverbs of quantification and modals in e.g. Lewis (1975) and Kratzer (1986, 2012). On an early version of this analysis our paradigm examples (50a,b) have the corresponding logical forms in (77a,b) (von Fintel 1998):

(77) a. [Every x: Student(x) ∧ Works-hard(x)] Succeeds(x)
           'Every student who works hard succeeds'
      b. [No x: Student(x) ∧ Goofs-off(x)] Passes(x)
           'No student who goofs off passes'

While this version of the restrictor account gives *if* a uniform treatment, it does not reflect the modal nature of conditionals (Higginbotham 2003; Leslie 2009). Leslie's Meadow, who we already saw challenge the idea that *if* translates as simple truth-functional conjunction, causes trouble here too; if she actually works hard, she

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[15] Leslie claims that von Fintel and Iatridou's (2002) analysis of *No fair coin will land heads if flipped* will not only have it come out as equivalent to (i) but will also have the unwelcome consequence of predicting that (ii) is true:

(i)   Every fair coin will land tails if flipped.
(ii) Every fair coin will come up heads if flipped.

  Her reasoning seems to go as follows. Since every particular fair coin fails to satisfy 'x will come up tails if flipped', every fair coin satisfies 'it is not the case that x will come up tails if flipped'. Implicitly assuming a very general version of von Fintel and Iatridou's Homogeneity Presupposition, Leslie observes that this would render (i) equivalent to saying that *every* fair coin satisfies 'x will come up heads if flipped'. (ii) should consequently be true; but it seems as false as (i). Perhaps, however, this issue is not as serious as it seems (Barry Schein, personal communication). It is not obvious that von Fintel and Iatridou (2002) need to commit to the Homogeneity Presupposition also applying at a meta-level at 'every instance does not satisfy *if p q*' converting it to 'every instance satisfies *if p not q*'. Presumably, their Homogeneity Presupposition can be explicitly restricted to the universal quantification and negation involved in the *logical form* of the conditional, excluding meta-level instances.

is a counterexample to (50b), but not to (77b). (77b) can thus not be the logical form of (50b).

Leslie ([2009]), who extensively discusses this issue, recommends saving the restrictor account by embedding the construction under a modal operator, along the following lines:

(78) a. [∀w': Close(w', w)] [Every x: Student(x, w') ∧ Works-hard(x, w')] Succeeds(x, w')
'In every close possible world every student that works hard in that world succeeds in that world.'

b. [∀w': Close(w', w)] [No x: Student(x, w') ∧ Goofs-off(x, w')] Passes(x, w')
'In every close possible world no student that works hard in that world passes in that world.'

This solves the Meadow problem, if what is modalized is not just the restriction that the *if*-clause contributes to the quantifier but also the scope of the quantifier; modalizing just the restrictor would provide the wrong result ('Every student who would/might work hard passes'). This seems rather curious if the overall idea is that the *if*-clause is really just a disguised relative clause. Moreover, for the analysis to work the students would actually have to be excluded from the scope of the modal because (50a,b) are about what *actual* students do in actual or hypothetical cases (Huitink [2010]; Klinedinst [2010]).

(79) a. [∀w': Close(w', w)] [Every x: Student(x, w) ∧ Works-hard(x, w')] Succeeds(x, w')
'In every close possible world every actual student that works hard in that world succeeds in that world.'

b. [∀w': Close(w', w)] [No x: Student(x, w) ∧ Goofs-off(x, w')] Passes(x, w')
'In every close possible world no actual student that works hard in that world passes in that world.'

Another issue the modalized restrictor account has to contend with is that the *if*-clauses in the relevant examples are often understood to express something that is temporally and/or causally prior to what is expressed by the main clause consequent. That is clearly not true of relative clauses. The point is made in von Fintel and Iatridou ([2002]), who use minimal pairs like the following to highlight the difference:

(80) a. Every book that I needed for the seminar happened to be on the table.
b. #Every book happened to be on the table if I needed it for the seminar.

Similarly, (81b) is odd (unless interpreted as an epistemic conditional). (81b) makes it sound as if my looking at the coat had the consequence of raising its price. The relative clause in (81a) in contrast has no such bizarre effect.

(81) a. Every coat that I saw in that store was beautiful but expensive.
      b. #Every coat was beautiful but expensive if I saw it in that store.

On the restrictor view it would have to be stipulated that the restrictive relative clause that is supposed to be expressed by *if*-clauses differs from run-of-the-mill restrictive relative clauses in that it is interpreted as temporally or causally prior to what is described by the main clause. Of course, if the *if*-clauses in these examples are analyzed as conditional antecedents the fact that they behave like *if*-clauses both in modal and temporal/causal terms is no mystery.

How the difference between restrictive relative clauses and *if*-clauses under quantifiers can be handled on the modalized restrictor account is also taken up in Kratzer (in press). Kratzer constructs an argument to the effect that the contingent antecedents of indicative conditionals are impossible if they are known to be false by the discourse participants. She attributes this to the tension between the epistemic status of the antecedent ('false') and Stalnaker's (1975) requirement that the antecedent of indicative conditionals, in contrast with those of subjunctive ones, be compatible with the Common Ground (Stalnaker 1975).[16] Based on this, she then observes that even with such conditionals we still find the equivalence between *Every H q if p* and *No N not q if p*. To capture this equivalence, she has the *if*-clause function as the restrictor of the quantifier. But in order to also capture von Fintel and Iatridou's (2002) observation that the *if*-clauses under nominal quantifiers behave like *if*-clauses elsewhere and not like restrictive relative clauses, her analysis has the *if*-clause do double duty: in the relevant examples they are interpreted both as restrictors to nominal clauses and as the antecedent of a (material) conditional.

At this point I think it is fair to say that even if a modalized restrictor account could be modified to capture the right truth conditions, considerable modifications would be necessary because the restrictor account misses the generalization that the *if*-clauses and their consequents under nominal quantifiers behave in important respects (modality, temporal/causal sequencing) like *if*-clauses and consequents elsewhere. Saying that the *if*-clause on top of being a restrictor to a nominal quantifier is also the antecedent of a conditional ameliorates the problem, but it also concedes it. In addition, it raises the question why some parts of the sentence should be interpreted twice. None of these issues arise if we assume Conditional Duality. That the *if*-clauses in examples like (50a,b) should behave like conditional antecedents is directly predicted because that is what they are analyzed as. What varies between (50a) and (50b) is the quantificational force of the bare conditional in the scope of the nominal quantifier.

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[16] It is not entirely clear to me that the clash between the content of Common Ground and the knowledge of the participants regarding the lack of veracity of the indicative antecedent could not be also (more plausibly?) handled as a presupposition failure. The sentences in question would then be pragmatically inappropriate but not because they express something that is impossible but rather because, being indicative (as opposed to counterfactual) conditionals, they presuppose that the antecedent is incompatible with the Common Ground.

5 Bare conditionals and negation

5.1 The expectation

As negation provides the downward entailing environment *par excellence*, a bare conditional in the scope of *not* should proudly show its existential side. Its outer negation (*It is not the case that if p q*) should then be equivalent to its inner negation (*If p then not q*) (Pizzi and Williamson's 2005 'NegCond') and the outer negation should therefore entail the inner negation (OINE). Under Conditional Duality the equivalence between outer and inner negation reduces to a basic fact about quantifiers and negation:

(82) a. $\neg[\exists w': p(w') \wedge \text{Close}(w,w')]\, q(w')$ 'Outer negation'
      b. $[\forall w': p(w') \wedge \text{Close}(w,w')]\, \neg q(w')$ 'Inner negation'

CEM accounts also predict equivalence between outer and inner negation, though, as we saw above, not for conditionals with impossible antecedents or those that are counterexamples to CEM.

But is the outer negation of a bare conditional really equivalent to its inner negation? The following quote from Stalnaker (1968) can be taken to suggest that it is, see also Williams (2010):

'According to the formal system, the denial of a conditional is equivalent to a conditional with the same antecedent and opposite consequent (provided that the antecedent is not impossible). […] This explains the fact, noted by both Goodman and Chisholm in their early papers on counterfactuals, that the normal way to contradict a counterfactual is to contradict the consequent, keeping the same antecedent. To deny "If Kennedy were alive today, we wouldn't be in this Vietnam mess," we say, "if Kennedy were alive today, we would so be in this Vietnam mess."'(Stalnaker 1968: 48f).

5.2 Bare conditionals denied and negated

But judgments are more intricate (cf. e.g. Horn 1989: 379; Dummett 1973: 330). One may deny (83A) not just as in the above quote but also as in (83B):

(83) A: If Kennedy were alive today, we wouldn't be in this Vietnam mess.
      B: No, if Kennedy were alive today, we might be still in this Vietnam mess.

Especially in contexts where somebody utters *If p then q* and what follows is a denial (e.g. *No*), bare conditionals can preserve the universal force of what is being denied; when A utters *if p then q*, its denial can have the shape of (84B), which amounts to *if p then not necessarily q*. But the judgment reflected in the Stalnaker quote seems to be one where the addressee's response amounts to the stronger (84B') or, equivalently, (84B''), which are the genuine negation of (84A) and which

support Conditional Duality. Do we then have both denial and genuine negation of bare conditionals?

(84)   A: $[\forall w': p(w) \wedge \text{Close}(w,w')]\ q(w')$
      B: $\neg[\forall w': p(w) \wedge \text{Close}(w,w')]\ q(w')$ denial negation
      B': $\neg[\exists w': p(w) \wedge \text{Close}(w,w')]\ q(w')$ genuine negation
      B'': $[\forall w': p(w) \wedge \text{Close}(w,w')]\ \neg q(w)$ genuine negation

Interesting in this context is an experiment reported in Egré and Politzer (2013) that was aimed to test how subjects interpret the denial of *If it is a square chip, it will be black.* The authors observe a tendency for speakers to take it to mean 'If it is a square chip, it will not necessarily be black' when the likelihood of the square chip being black is relatively high and as 'If it is a square chip, it will not be black' when the likelihood of the square chip being black is relatively low. They do not explicitly distinguish between denial and regular negation and take their finding to show that the negation of a bare conditional corresponds to the outer negation of a variably strict conditional, as in (84B), and that the apparent strengthening to an inner negation (84B'') is not a matter of the logical syntax of the sentence but due to the extra-linguistic, additional information provided by the context. It is also conceivable, however, that when a speaker denies a previous utterance of a bare conditional, what comes after the *No,* if there is one, may either be just the denial of what was said—the repetition of which then preserves the original universal force, (84B)—or the actual negation of what was said as in (84B')/(84B''); the latter also makes pragmatic sense because except in cases of impossible antecedents the genuine negation of what was said (the 'inner negation') asymmetrically entails the denial (the 'outer negation'), and is thus a good justification for the denial signaled by *No.* This would explain the variation in judgment and the tendency to understand a stronger negation when the circumstances warrant it.

Embedding under locutions such as *it is not true that* or *it is not the case that* may also favor a denial reading (Krifka 1996). (85) can be continued by *It may happen, but it is by no means a given*. But a genuine negation reading may also be possible.

(85)   It is not true that the right will lose votes if the green party makes gains.

On the other hand, under verbs like *doubt* a genuine negation reading seems quite readily available. (86) can be taken to describe skepticism on part of the experts that in *any* close possible worlds where the green party gains votes it is at the expense of the right-wing party:

(86)   Political experts doubt that the far right will lose votes if the green party makes gains.

It seems that we can actually force the *if*-clause to be in the scope of a negation when the negation is within the main clause and the *if*-clause follows it. The licensing of the NPI *any* in (87) indicates that the quantified noun phrase is in the scope of negation. The binding of *his* by *any high school kid* requires that the *if*-clause be in its scope:

(87) A party isn't fun for any high school kid if his mother is there too.

Intuitively, (87) does not just say that not all parties where Mom is also a guest are fun for the high school kid. Rather, it denies that any of them are, as Conditional Duality predicts.

Not surprisingly, when the negation is not taken as a denial negation but as a genuine negation, (88a) and (88b) are equivalent, despite the impossible antecedent. Given Conditional Duality in (88a) the conditional has existential force and in (88b) universal force.

(88) a. The following is not true: if 2+2=5, it will snow tomorrow.
      b. If 2+2=5, it will not snow tomorrow.

The equivalence would not follow on a CEM based account. As already noted in connection with *only if*, on a CEM analysis conditionals with impossible antecedent we do not get an equivalence between outer and inner negation of bare conditionals because WBT fails: (88b) would always be true, but not (88b), because, like (88b) *If 2+2=5, it will snow tomorrow* will also always be true.

Extrapolating from these observations, we can say that while bare conditionals under negation often seem to involve a denial negation, and, as a result, carry over the universal force of what is being denied, there are instances where the negation (or the negation inherent in *doubt*) seems to be a regular, non-denial negation and in these cases the conditionals seem to have the existential force that Conditional Duality predicts. Even in instances where no signals a denial it is possible for a bare conditional that contains a negation in the main clause to be interpreted as a negated conditional; the negated conditional can serve as an argument for the denial because it is semantically stronger and entails it.

6 One-case conditionals and ties in closeness

I hope to have shown that Conditional Duality gives a simple and plausible account of bare conditionals in downward entailing environments, in particular those provided by *only*, quantifiers like *no student*, and by non-denial sentential negation and *doubt*. Given Conditional Duality, there is no need to appeal to CEM or homogeneity to solve the puzzles at hand. In fact, we saw that Conditional Duality predicts the facts better than CEM. But, there is one datum that remains yet unaccounted under this view, and for which the CEM analysis does offer a very appealing account. It involves the truth of the disjunction of opposite 'tied'

conditionals, which we encountered at the outset. In what follows I argue that a closer look at some relevant examples reveals that they are in fact not incompatible with Conditional Duality and the (variably) strict analysis that Conditional Duality provides for them. What needs to be factored in to explain them is the existence of one-case conditionals and what happens in instances of epistemic indeterminacy.

More specifically, the question is this: If we assume Conditional Duality and dispense with accounts that validate CEM, what are we to make of the fact that the examples in (10), repeated in (89), are easily judged true? Since both disjuncts appear in an upward entailing environment, they both should have universal force according to Conditional Duality, as shown in (90), and since both are false then, the entire disjunction should be false. Thus, just as these examples are a problem for (variably) strict acounts they are a problem for the current analysis, which inherits the predictions of a (variably) strict account for these examples:

(89) a. If this fair coin is flipped, it will land heads
       or if this fair coin is flipped, it will land tails.   (=10a)
    b. If Bizet and Verdi were compatriots, they would be French
       or if Bizet and Verdi were compatriots,
       they would be Italian.   (=10b)

(90) $[\forall w:$ Close$(w) \wedge$ [this x: Fair-coin$(x) \wedge$ Flip$(x, w)]$ Lands-heads$(x, w) \vee$
     $[\forall w:$ Close$(w) \wedge$ [this x: Fair-coin$(x) \wedge$ Flip$(x, w)]] \neg$ Lands-heads(x, w)

I think we can better understand the examples in (89) and related ones and actually maintain a (variably) strict analysis of them, consistent with Conditional Duality, if (i) we take into account the existence of one-case conditionals, and (ii) consider how our knowledge of the laws of chance comes to the rescue in situations of epistemic indeterminacy.

6.1 One-case conditionals

One important observation about bare conditionals that has gone unmentioned so far is that in non-negative environments they are sometimes read as 'weak' or 'one-case' conditionals (e.g. Kadmon 1989; Schubert and Pelletier 1989; Barker 1997; Schein 2003). For (91) to be judged true the speaker need not deposit all of his quarters in the meter. If all he wants to is to quickly drop off a jacket at the dry cleaner's a single quarter may be enough:

(91) If I have a quarter I'll put it in the meter.

Pragmatic circumstances affect the plausibility of a one-case reading, but also relevant is whether the main clause of the bare conditional is interpreted episodically or generically. And that, in turn, depends on the tense of the main clause predicate.

We independently know that in English simple present tense on an eventive verb favors a generic reading, whereas future and past tense, all things being equal, can be read episodically or generically. We can now observe that this difference patterns with the contrast between a multi-case reading and a one-case reading we see in (91). We get the multi-case reading when the main clause is interpreted generically and the one-case reading when it is interpreted episodically. Correlating with the simple present and the generic interpretation this tense triggers, (92b) only has a multi-case reading. In contrast, (92a) in addition to a multi-case reading can also be interpreted as a one-case conditional when the main clause is interpreted generically. The sentence then does not express a commitment to saving quarters but can, for instance, be used to cheer up a young child who would love to see more quarters in their piggy bank.

(92) a. If I find a quarter, I'll put it in the piggy bank.   one-case or multi-case
      b. If I find a quarter, I put it in the piggy bank.   multi-case

Universal quantification in upward entailing environments predicts a multi-case reading, provided that the domain of quantification involves a genuine plurality. One way to think of one-case readings is to say that the operator continues to be universal in force but that its domain is restricted to one instance, either through pragmatics (cf. Schein 2003) and/or the episodicity of the predicate of the main clause. For simplicity's sake, I will not distinguish between the two and represent their restricting force with a predicate 'singularly relevant':

(93) a. $[\forall w': \text{Close}(w,w') \land [\text{a } x: \text{Quarter}(x, w')] \text{ } I\text{-find } (x, w')]$
          $[[\text{the } x: \text{Quarter-}I\text{-found}(x)] \text{ Put-}I\text{-in-piggy-bank}(x, w')]$ multi-case
      b. $[\forall w: \text{Close}(w,w') \land [\text{a } x: \text{Quarter}(x,w')]$
          $I\text{-find } (x, w') \land \text{Singularly-relevant}(w')]$
          $[[\text{the } x: \text{Quarter-}I\text{-found}(x, w')] \text{ Put-}I\text{-in-piggy-bank}(x, w')]$[17]   one-case

6.2 Epistemic indeterminacy and the laws of chance

We can now observe that in (94a) the simple present strongly favors a multi-case reading. In (94b), in contrast, the future tense is compatible with the multi-case reading in (95a), but the one-case reading in (95b) is also possible:

(94) a. If this fair coin is flipped it lands heads.
      b. If this fair coin is flipped it will land heads.

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[17] I assume that e-type pronouns like the *it* in the main clause are interpreted as disguised definite descriptions. Nothing hinges on this particular assumption.

(95) a. [∀*w'*: Close(*w, w'*) ∧ [this *x*: Fair-coin(*x*)] Flip(*x, w'*)]
  Lands-heads(*x, w'*)   multi-case
  b. [∀*w'*: Close(*w,w'*) ∧ Singularly-relevant(*w'*) ∧ [this *x*: Fair-coin(*x*)]
  Flip(*x, w'*)]
  Lands-heads(*x, w'*)   one-case

On its multi-case reading (94b) is generally judged false because chances are not all coins that are flipped will land heads. What about its one-case interpretation, the one that is restricted to a singularly relevant world? Is it true or false? Absent a crystal ball, its truth-value is unknowable at the point of utterance. One might take this to mean that a sentence of this sort has no truth-value at all and that it is semantically indeterminate (Stalnaker 1981, Klinedinst 2010). I'd like to draw a different conclusion; (94b) is at the point of utterance epistemically indeterminate. Semantically, it may also be indeterminate at the moment of utterance and its truth-value may only be revealed when the coin flip has taken place. Or it may already be semantically determinate at the point of utterance. Which view one takes depends on one's view of future contingent statements, but this is a debate we can stir clear of. What matters is that at *some* point (94b) is semantically determinate. Support comes from the semantics of bets. If you utter (94b) as a bet and wager, say, $10, then, depending on the outcome of the coin-flip you will later either collect or pay $10.[18]

While on its one-case reading (94b) is epistemically indeterminate at the point of utterance and semantically true or false once the coin has landed (and perhaps before), on its multi-case reading (94b) is, as we noted, likely to already be judged false at the moment it is uttered; it is already epistemically determinate then. This is quite remarkable if we remember that for each particular coin we are in the epistemic dark until the coin-flip has actually taken place. Something seems to bridge the gap between the epistemic indeterminacy we experience regarding each individual coin-flip and our already having a judgment about truth conditions of the multi-case reading when it is uttered. A plausible explanation is that we let the epistemic indeterminacy about each individual event be counteracted by our knowledge of the laws of chance, a possibility noted in Klinedinst (2010) (though couched in terms of valuelessness). As we consider more cases we seem more willing to set aside the possibility of 'freaky' patterns and let our knowledge of the laws of chance compensate more strongly for our ignorance of what happens at any individual flip of the coin when we utter the sentence; we are more confident that (94b) is false when we have, say, 20 tosses in mind than just three.

Cases where coin flip conditionals are embedded under nominal quantifiers are also sensitive to numbers and 'statistical repair' (cf. Leslie 2009, Klinedinst 2010). This is so because quantifiers like *every student* or *no student* are typically interpreted with non-singular domains in mind. As a result, in these examples our knowledge of statistics also compensates for our present ignorance about the

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[18] I am grateful to one of the reviewers for pointing out to me that my analysis of disjoint tied conditionals is independent of what view one assumes about future contingent statements and does not require a deterministic view, as I had initially assumed.

outcome of any individual coin toss. Not surprisingly, as the size of the quantifier's domain increases—compare again a domain of three with one containing 20 coins—so does our confidence that (96a,b) are false and (96c,d) true:[19]

(96) a. No coin will land heads if flipped.
     b. No coin will land tails if flipped.
     c. Half the coins will land heads if flipped.
     d. Half the coins will land tails if flipped.

6.3 Putting it together

With the distinction between one and multi-case conditionals and the notions of epistemic indeterminacy and statistical repair in place, we can now look again at the disjunction of the opposite tied conditionals in (10)/(89), the kind of example that lent support to Stalnaker's (1981) supervaluationist CEM account. We see now that the future in (89a), for instance, gives rise to ambiguity between a multi-case and a one-case reading of the disjuncts. (89a) contrasts in this respect with (97), where the present tense forces a multi-case reading:

(97) If this fair coin is flipped it lands heads or if this fair coin is flipped it does not land heads.

(89a) on its multi-case reading is judged false, for the same reason that (97) is; having universal force over multiple cases, odds are that both its disjuncts are false (and more so as the 'sample size' increases). Consequently, the whole disjunction comes out as false as well. What remains to be understood yet is why on the episodic interpretation of the main clause, given in (98), the sentence can be judged true:

(98) $[[\forall w'$: Close$(w', w) \wedge$ [this x: Fair-coin$(x) \wedge$ Flip$(x, w') \wedge$ Singularly-relevant$(w')]$ Lands-heads$(x, w')] \vee$
     $[\forall w'$: Close$(w', w) \wedge$ [this x: Fair-coin$(x) \wedge$ Flip$(x, w') \wedge$ Singularly-relevant$(w')] \neg$Lands-heads(x, w')

An explanation that comes to mind is this. On its one-case reading the sentence is true, and necessarily so, exactly when in the assignment to the variables for both disjuncts the same world is chosen as singularly relevant. For pragmatic or processing reasons this may actually be a favored choice. On this interpretation the first disjunct is restricted to a single antecedent event and the *if*-clause of the second disjunct is anaphoric to the *if*-clause of the first, similar to how the subject of the second disjunct is anaphoric to the subject of the first disjunct in the following analogous examples from the nominal domain (offered by one of the reviewers):

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[19] Note that because the nominal quantifier already makes sure that we are considering multiple cases, the tense of the main clause need not be generic (though it of course can).

(99) a. The fair coin that is flipped next lands heads or tails.
  b. The fair coin that is flipped next lands heads or it lands tails.
  c. The fair coin that is flipped next lands heads or that coin lands tails.

But while this uniform assignment to the world variables is possible, nothing forces it because the variables in the two disjuncts are bound by different quantifiers. Relative to different assignments to the variables, the truth of the sentence is clearly contingent. The expectation is then that when we force assignments to the variable to be different, for instance through different adverbials, we make it harder to read the sentence as true. This prediction seems to be borne out; we are more reluctant to assent to (100) than to (98a):

(100) If this fair coin is flipped at 3:15 pm it will land heads
   or if this fair coin is flipped at 3:18 it will not land heads.

Since on the present analysis on the one-case reading of its disjuncts (89a) can but need not come out true, we now predict that, overall, speakers will judge (89a) true with less confidence than (101), which cannot but be true (given the normal assumptions about coin flips that I have made throughout, namely that a tossed coin can only land heads or tails):

(101) If this fair coin is flipped it will land heads or tails.

This seems right. Apart from sheer intuition, note also that were it not so, Lewis's (1973) variably strict analysis, on which (89a) comes out false, would have seemed as inadequate as any analysis that has (101) come out false. It certainly did not. It is also worth noting in this context that the contrast between (89a) and (101) is difficult to explain on a CEM analysis, where both kinds of sentences should be equal in terms of the confidence we have in their truth and both should in fact have the status of tautologies.

To summarize, one-case conditionals have universal force but it is severely restricted by pragmatics and also by the episodicity of the main clause, which in turn is tied to its tense. The truth of the disjunctions of opposite tied conditionals (coin flips, composers), which supported the CEM account, is now attributed to the world variables receiving the same value on a one-case reading of the disjuncts. Unlike a CEM analysis, this account explains why opposite tied conditionals can be true but do not have the status of tautologies. By showing how disjunctions of opposite tied conditionals can both be true and false the analysis resolves parts of the historic Stalnaker/Lewis debate. The analysis also explains why coin flip conditionals that are embedded under quantifiers or receive multi-case readings can be judged false at the moment of utterance. This becomes possible when we distinguish between epistemic and semantic indeterminacy and when we recognize how our knowledge of the laws of chance can come to the rescue in moments of epistemic indeterminacy.

7 Conclusion

In light of the puzzling behavior that bare conditionals display in negative environments, I have proposed that we set aside our desire for a univocal analysis, conceptually appealing though it may be, and instead recognize that while bare conditionals generally have universal force (e.g. assume a variably strict account), in downward entailing environments they have mere existential force. Conditional Duality predicts the strong exclusionary force of bare conditionals in the scope of *only* and their relatively weak (i.e. existential) positive entailments. The analysis further elucidates the interpretation of bare conditionals embedded under negative quantifiers (e.g. *no student*) and similar ones creating a downward entailing environment in their scope, thus providing a new solution to Higginbotham's puzzle. We can also find support for Conditional Duality in negative contexts provided by sentential negation and *doubt,* though care has to be taken to recognize denial negation interpretations, which inherit the universal force of the denied conditionals. Examples involving the disjunction of one-case tied conditionals are argued to only create the illusion of CEM and are explained as involving anaphoric reference. By curtailing the scope of the (variably) strict analysis, Conditional Duality can be seen as a means of preserving (parts of) it.

Appendix: Beyond *if*: Conditional Duality and the bigger picture

The fact that Conditional Duality can be observed in a series of downward entailing environments and that it resolves some recalcitrant analytical problems should assuage conceptual worries about it not providing a univocal account of bare conditionals. On a more general level, one might also point to the existence of other instances of what appears to be similar duality.

Variable force modals

A series of recent papers discusses the existence of variable force modals, particularly in languages of the Pacific Northwest. Of particular relevance in the present context is Nez Perce, whose *o'qa* modal is argued by Deal (2011) to have both an existential and universal reading and where in the scope of negation and in the antecedent of a conditional only the existential 'not possible' reading seems available. The parallel to the silent operator of bare conditionals, which is arguably also a modal operator, seems striking.

A somewhat similar situation can be found with Old English **motan*, which seems to have both existential and universal force in Old English. Yanovic (2016),

who, it should be noted, does not analyze this as an ambiguity, observes that in the scope of negation only the 'not possible' reading is available, citing the following example as one of various. This too is reminiscent of the behavior of the silent operator of bare conditionals.

(1) Eala hu   yfele me doð   mænege woruldmenn mid þæm þæt ic ne
    alas how   evil   me do   many world-men   so that   I not
    mot   wealdan minra   agenra [þeawa].
    motan.prs.ind.3sg   follow   my   own customs
    'Alas, how evilly I am treated by many worldly people, so that I mot not
    (=it is impossible for me to) follow my own customs.' (Boethius:7.17.23)

But though the similarities are interesting, an important difference should also be acknowledged. Conditional Duality states that the operator is universal in upward entailing contexts and existential in downward entailing ones. But while Nez Perce *o'qa* and Old English **motan* seem to show the existential reading in (at least some) downward entailing contexts, they also show it in upward entailing ones.[20]

Similarities to *ever*

Staying within English, *ever* quickly comes to mind as an analogue of the silent operator of bare conditionals. Its two interpretations, 'at some time' and 'every time', are strikingly similar to the silent quantification we can assume to characterize bare conditionals given Conditional Duality. Moreover, existential *ever* has the distribution of an NPI, as we can see in (2). Conversely, the universal reading typically appears in (some) upward entailing contexts, as shown in (3). It is archaic in some contexts, but still productive in others. Both readings can be discerned in the bits of the poem quoted in (4):

(2) a. Nothing/*something ever seemed to ruffle Mary.
    b. Few/*some who have ever visited Rome hated it.

(3) a. They'll stay there forever and ever.
    b. The family had to spend ever-increasing sums on corruption lawsuits.
    c. Obama found instead that the country was divided as ever.

(4) If ever two were one, then surely we.
    If ever man were lov'd by wife, then thee;
    If ever wife was envious in a man[…]
    That when we live no more, we may live ever.
    (To my Dear and Loving Husband, Ann Bradstreet)

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[20] It should perhaps also be noted that in other languages of the Pacific Northwest that have variable force modals, negative contexts do not seem to require an existential interpretation. In St'á'imcets (Rullmann et al. 2008) and in Gitskan (Peterson 2010; Matthewson 2013) the negation can also take over the necessity reading ('not necessary').

Perhaps the operator of bare conditionals is a silent *ever*? Interestingly, doublets like *ever/ever* are not the only instances where we find duality and a restriction of the existential(-like) reading to downward entailing contexts.[21]

Similarities to Excluded Middle examples

Yet another parallel that seems worth considering are expressions that have been observed to exhibit so-called Excluded Middle behavior. Among them are not only the plural definite descriptions and bare plurals we already encountered above, but also embedded questions, examples with *and*, and neg-raising examples (e.g., Bartsch 1973; Krifka 1996; Gajewski 2005; Szabolcsi and Haddican 2004).

(5) a. Mary has read the files on her desk.
    b. Mary hasn't read the files on her desk.

(6) a. Ravens are black.
    b. Ravens aren't black.

(7) a. Bill knows who was at the party.
    b. Bill doesn't know who was at the party.

(8) a. John saw Bill and Mary.
    b. John didn't see Bill and Mary.

(9) a. I think that the far-right candidate will win.
    b. I don't think that the far-right candidate will win.

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[21] *Even* too is arguably ambiguous between a universal-like reading along the lines 'the most noteworthy' ('least likely/surprising') and an existential-like, lower scale reading 'the least noteworthy' ('most likely/surprising') that has the distribution of an NPI.

(i)   She even invited her cousins from far away Denver.
(ii)   She didn't even invite her sister, who lives in town.

Any also comes to mind. It can be said to be ambiguous between an existential reading with the distribution of an NPI and a free-choice interpretation, which in many cases seems to have similar (though not identical) import to that of universal quantifier, though in some cases free-choice any seems to have an existential reading:

(iii) a. Anyone knows where the Empire State Building is.
      b. He is said to answer any email he gets.
      c. Pick an apple, any apple.

But whether *even* and *any* are indeed ambiguous is controversial and an issue that would lead us too far afield.

Despite the similarities between *ever/ever* doublets and Excluded Middle constructions there are also some differences. Under ellipsis the NPI *ever* retains its existential interpretation even if there is no licensor in the vicinity of the ellipsis site (e.g. Sag 1976):[22]

(10) Michael didn't ever say anything but Adam did [say something]

In contrast, Excluded Middle examples have the reading that is determined by the local environment of the ellipsis. This has been observed for plural definite descriptions (e.g. Bar-Lev 2016; Bassi and Bar-Lev 2016; Schein 2016) and also holds true of the other types of examples listed above in (5)–(9). Thus the second conjunct in (11a) negates that Adam read any papers, in (11b) it negates that Adam knows of anyone being at the party, and in (11c) it negates that Kate saw Bill or Mary.

(11) a. Michael read the papers but Adam didn't.
      b. Michael knows who was at the party but Adam doesn't.
      c. John saw Bill and Mary but Kate didn't.

Interestingly, bare conditionals pattern with the Excluded Middle examples in this respect rather than with *any* and *ever* in that the quantificational force is locally determined at the ellipsis site. This holds of conditionals under nominal quantifiers, as noted in Bassi and Bar-Lev (2016). It also holds true of negated conditionals:

(12) a. Every boy calls his mother if he gets a good grade, but no girl does.
      b. No girl calls her mother if she gets a good grade, but every boy does.

(13) a. Alex calls his mother if he gets a good grade but Kit doesn't.
      b. Kit doesn't call her mother if she gets a good grade but Alex does.

Perhaps then the duality of bare conditionals is not so much like the one we find with *ever* after all but more like the one that seems to characterize the Excluded Middle data.

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[22] With NPIs other than *any* and *ever* matters may be less clear. Thus, Sag (1976) notes that for a third of the speakers he consulted (i), which features the NPI *until*, is ungrammatical:

(i) % John won't leave until midnight, but Bill will.

A theory of (Conditional) Duality?

Homogeneity and Strongest Meaning hypothesis

The affinities between Excluded Middle phenomena and bare conditionals have inspired attempts to extend accounts of the former to the latter. As we already saw, von Fintel (1997) posits a Homogeneity Presupposition for bare conditionals under *only* and, in a similar vein, von Fintel and Iatridou (2002) invoke a Homogeneity Presupposition for bare conditionals under nominal quantifiers. These analyses are clearly aimed to draw a parallel with the presuppositional analysis of the Excluded Middle behavior of plural definite descriptions and bare plurals given in Fodor (1970) and Löbner (1985).[23]

Rather than relying on a Homogeneity Presupposition, Krifka (1996) espouses the Strongest Meaning Hypothesis to explain some Excluded Middle patterns. On this kind of view the silent operator of bare conditionals is ambiguous (or perhaps underspecified) in terms of its quantificational force and is interpreted as having the reading that is stronger in the relevant context, that is as existential in a downward entailing context and universal in an upward entailing one.

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[23] The situation with plural definite description is considerably more complex than I have represented. The Excluded Middle behavior ascribed to plural definite descriptions (Fodor 1970; Löbner 1985) is not automatic in downward entailing contexts nor is it restricted to such contexts (e.g. Krifka 1996; Malamud 2012, Schein 2016). It also depends on the nature of the predicate the plurals combine with, in particular it depends on the distinction between what Yoon (1994) calls 'total' predicates, such as *clean*, *closed*, *healthy*, and 'partial' ones like *dirty*, *open* and *sick*. When closed predicates combine with plural definite descriptions the resulting interpretation is normally universal in force, cf. (i), but when they combine with partial predicates it is easy to interpret the sentence in a way where not all the things picked out by the definite description have to satisfy the predicates, cf. (ii):

(i)   The windows are closed.
(ii) The windows are open.

But perspectival matters can override this (Krifka 1996, Malamud 2012, Schein 2016). Though (iii) is normally taken to say that all doors are closed, under particular circumstances it can also be used to describe a circumstance where just one of them is, for instance when the doors are viewed as an assemblage of doors where the opening of one amounts to a breach of the barrier they represent. Conversely, (iv) can be true when at least one door be open (when the open jointly present a barrier), but when we are worried about allowing any possible entry ('open door') it matters that each is open:

(iii) The doors are closed.
(iv)   The doors are not closed/open.

Schein (2016) argues that the semantics of *the* is actually invariant and the differences in the 'all' or 'some' interpretation result from whether or not the plural definite description functions as a framing adverbial, in which case we get the assemblage interpretation, or not. While I have, following others, listed plural definite descriptions as showing Excluded Middle behavior, suggesting duality, if Schein (2016) is correct, no duality is involved in the interpretation of plural definite descriptions.

Double exhaustification and Conditional Duality

A recent school of thought has aimed to go beyond the Strongest Meaning Hypothesis and analyze Excluded Middle examples through 'double exhaustification' (e.g. Spector 2007; Magri 2013). This process assumes that the relevant expressions have but one meaning, typically the existential(-like) one, and that the other, universal(-like) interpretation is derived. Essential to the double exhaustification approach is the assumption that exhaustification—the addition of a silent *only*-like operator (EXH)—does not apply just to (parts of) the sentence but also recursively to the relevant alternatives of (parts of) the sentence. Rather specific suppositions concerning the alternatives are needed in order to derive the duality we observe in Excluded Middle phenomena. To keep constant the example, we can again consider plural definite descriptions.

According to Magri (2013), *the* and *some* are both existential determiners and the difference between them resides solely in their alternatives (cf. also Spector 2007). While *many* is an alternative to *some,* and *all* an alternative to *many,* crucially neither *many* nor *all* are alternatives to *the*. When *the* and *some* appear in downward entailing contexts, no implicatures are generated since they represent the strongest alternatives. The observed existential force of plural definite descriptions in these contexts follows. It is in upward entailing contexts that the differences in alternatives between *some* and *the* become relevant: the recursive application of EXH derives a 'some but not many (all)' implicature for *some*, cf. (13), but a 'not only some, but in fact all' interpretation for *the*, cf. (14). This outputs the universal force of *the* in upward entailing contexts and the mere existential force of *some* in these environments: [24]

(14) a. EXH(EXH SOME))
      b. EXH (SOME) ∧ ¬EXH (MANY)
      c. SOME ∧¬ MANY ∧ ¬(MANY ∧¬ ALL)
      d. SOME ∧¬ MANY

(15) a. EXH(EXH THE))
      b. EXH THE ∧ ¬EXH (SOME)
      c. THE ∧ ¬(SOME ∧¬ ALL)

To use double exhaustification to derive the duality of bare conditionals requires finding a suitable alternative for the existential reading in order to derive the universal one (or vice versa). We could posit that the bare conditional's silent operator has a meaning similar to 'at some time', but crucially differs from it in lacking as alternatives 'at many times', 'at all times', in analogy with Magri's analysis of *the* summarized above. A somewhat different route is taken in Bar-Lev (2016) and Bassi and Bar-Lev (2016). Taking the duality claim of Herburger (2015a) as a point of departure, they define the alternatives over the existential

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[24] As far as I can see, *many* can actually only count as an alternative for *some* when *some* appears in the sentence itself. If *some* is part of an implicature the alternative to it must be *all*, see (15c), or else the universal reading would not be derived but only a 'many' reading, which would be too weak.

operator's quantificational domain. These alternatives involve proper subsets of the regular domain of the determiner. Since upward entailing environments require double exhaustification, the result mimics universal quantification, deriving the observed pattern; in a domain consisting of {a, b} what is effectively derived by the iterated application of EXH is 'a or b is F', 'not only a is F', 'not only b is F'. The net result is that every element in the domain is among the things that are F.

An argument from ellipsis?

To someone committed to double exhaustification extending this type of analysis to bare conditionals to capture the pattern described by Conditional Duality is the logical next step. To those less sanguine about double exhaustification and the numerous suppositions necessary regarding the scalar alternatives, double exhaustification may seem stipulative. Is there an empirical reason that justifies the cost?

Bar-Lev (2016) and Bassi and Bar-Lev (2016) point to the ellipsis datum in (12)-(13). On their view, (12a) features a double occurrence of EXH between the universal quantifier and the bare conditional. This makes it possible for *calls his mother if he gets an A* to have existential force in both the antecedent and in the elliptical site, preserving a version of 'deletion under identity':

(16) Every boy EXH EXH [calls his mother if he gets an A] but (EXH) no girl does <call her mother if she gets an A>

The identity is of course only temporary, because once the double occurrence of EXH is cashed out it will effectively convert the existential force of the elliptical operator into one with universal force. So if semantic identity is required for ellipsis resolution, ellipsis resolution crucially has to take place before the semantic impact of EXH is calculated.

Despite years of careful and intense research, what kind of identity is required to resolve ellipsis, structural or semantic, still seems to be under debate (e.g. van Craenenbroeck and Merchant 2013). In light of this it seems reasonable to settle for the following descriptive generalization:

(17) Conditional Duality applies also in elliptical contexts.

To the extent that the patterns discussed under the Excluded Middle heading constitute a natural class, a more general version of this generalization could be stated:

(18) Duality/Excluded Middle patterns persist under ellipsis (except for NPIs like *any* and *ever*.)

This generalization might have bearing on the analysis of ellipsis but this is a topic that goes far beyond the scope of this paper.[25] What I hope to have shown is that Conditional Duality may not be the only instance of duality where we have a universal and an existential-like reading and where the latter is restricted to downward entailing contexts. Whether Conditional Duality can or should be derived in terms of the Strongest Meaning Hypothesis and the double exhaustification that has recently been used to analyze Excluded Middle data is an intriguing question, but one whose further consideration has to be left for another occasion.

References

Adams, E. (1975). *The logic of conditionals*. Dordrecht: Reidel.

Atlas, J. D. (1993). The importance of being *only*: Testing the neo-Gricean versus neo entailment paradigms. *Journal of Semantics, 10,* 301–318.

Barker, S. J. (1994). Conditional excluded middle, conditional assertion, and *only if*. *Analysis, 53,* 254–261.

Barker, S. J. (1997). E-type pronouns, DRT, dynamic semantics and the quantifier/variable binding model. *Linguistics and Philosophy, 20,* 195–228.

Bar-Lev, M. (2016). Homogeneity phenomena and free choice disjunction. Handout, talk Hebrew University Jerusalem.

Bartsch, R. (1973). 'Negative Transportation' gibt es nicht. *Linguistische Berichte, 27,* 1–7.

Bassi, I., & Bar-Lev, M. (2016). Existential semantics for bare conditionals. Handout, MIT LF Reading Group meeting.

Cohen, A. (2004). Existential generics. Linguistics and Philosophy, 27, 137–168.

Deal, A. R. (2011). Modals without scales. *Language, 87*(3), 559–585.

Dekker, P. (2001). On *if* and *only*. In R. Hastings, B. Jackson, & Z. Zvolensky (Eds.), *Proceedings from SALT XI* (pp. 114–133). Ithaca, NY: CLC Publications.

Dowty, D. (1994). The role of negative polarity and concord marking in natural language reasoning. In *Proceedings from SALT IV.*

Dummett, M. (1973). *Frege. Philosophy of language*. New York: Harper & Row Publishers.

Egré, P. & Politzer, G. (2013). On the negation of indicative conditionals. In M. Aloni, M. Franke, & F. Roelofsen (Eds.), Proceedings of the 19th Amsterdam Colloquium (pp. 10–18), University of Amsterdam.

Fodor, J. D. (1970). The linguistic description of opaque contexts. Dissertation, MIT.

Gajewski, J. (2005). On the excluded middle. Paper presented at the 36th Meeting of the North Eastern Linguistics Society, University of Massachusetts Amherst.

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[25] What we observe for bare conditionals (and Excluded Middle phenomena under ellipsis) recalls to some extent what we find for gender features. To derive the 'sloppy' reading of (i), where *his* and the elliptical pronoun are interpreted as variables bound by *every boy* and *no girl,* respectively, the gender features must be absent at the moment ellipsis is resolved. While this is typically taken to suggest that the gender features of the elliptical *her* are present only on the phonological side (cf. e.g. Heim and Kratzer 1998), it could also indicate that gender features are semantically present and that the agreement is determined after the ellipsis is resolved:

(i) Every boy called his mother but no girl did <called her mother>.

One could then say that the quantificational force of bare conditionals (and perhaps Excluded Middle phenomena) is an agreement process and takes place after the resolution of ellipsis, as with gender marking. This would require downward and upward entailing environments are marked as such through features. While this is certainly not a mainstream view, it has been proposed in connection with negation and the licensing of NPIs (e.g. Dowty 1994; Ludlow 2002; Herburger and Mauck 2013).

Geis, M. (1973). If and unless. In B. B. Kachru, R. B. Lees, Y. Malkiel, A. Pietrangeli, & S. Saporta (Eds.), *Issues in linguistics (Papers in Honor of Henry and Reneé Kahane)* (pp. 231–253). Urbana-Champaign, IL: University of Illinois Press.

Heim, I., & Kratzer, A. (1998). *Semantics in generative grammar*. New York: Wiley.

Herburger, E. (2000). *What counts*. Cambridge, Massachusetts: MIT Press.

Herburger, E. (2015a). *Only if*: If only we understood it. In: E. Csipak, & H. Zeijlstra (Eds.), *Proceedings of Sinn und Bedeutung 19* (pp. 284–301), published online and hosted by the German Semantic Society.

Herburger, E. (2015b). Conditional perfection: The truth and the whole truth. In: S. D'Antonio, M. Moroney, & C. R. Little (Eds.) *Proceedings of Salt 25* (pp. 615–635), published online and hosted by Linguistic Society of America.

Herburger, E., & Mauck, S. (2013). The chance of being an NPI. In E. Csipak, R. Eckardt, M. Li, & M. Sailer (Eds.), *Beyond 'any' and 'ever'. New explorations in negative polarity sensitivity* (pp. 213–240). Berlin: Mouton DeGrutyer.

Higginbotham, J. (1986). Linguistic theory and Davidson's program in semantics. In E. LePore (Ed.), *Truth and interpretation: Perspectives on the philosophy of Donald Davidson* (pp. 29–48). Oxford: Basil Blackwell.

Higginbotham, J. (2003). Conditionals and compositionality. In J. Hawthorne & D. Zimmerman (Eds.), *Language and philosophical linguistics, Volume 17: Philosophical perspectives* (pp. 181–194). Oxford: Blackwell.

Horn, L. (1989). *A natural history of negation*. Chicago: Chicago University Press.

Horn, L. (1996). Exclusive company: Only and the semantics of vertical inference. *Journal of Semantics, 13,* 11–40.

Horn, L. (2002). Assertoric inertia and NPI licensing. In M. Andronis, E. Debenport, A. Pycha, & K. Yoshimura (Eds.), *Proceedings from the Chicago linguistics society: The panels* (pp. 55–82). Chicago: Chicago Linguistic Society.

Huitink, J. (2010). Quantified conditionals and compositionality. *Language and Linguistics Compass, 4,* 42–53.

Kadmon, N. (1989). On unique and non-unique reference and asymmetric quantification. Dissertation, University of Massachusetts, Amherst, published 1993. New York: Garland.

Klinedinst, N. (2010). Quantified conditionals and Conditional Excluded Middle. *Journal of Semantics, 28,* 149–170.

Kratzer, A. (1986). Conditionals. In A. M. Farley, P. Farley, & K. E. McCollough (Eds.), *Papers from the Parasession pragmatics and grammatical theory* (pp. 115–135). Chicago: Chicago Linguistics Society.

Kratzer, A. (2012). *Modals and conditionals*. Oxford: Oxford University Press.

Kratzer, A. (in press). Chasing hook: Quantified indicative conditionals. In W. Lee & J. Hawthorne (Eds.), *Conditionals, probability and paradox: Themes from the philosophy of Dorothy Edgington*. Oxford: Oxford University Press.

Krifka, M. (1996). Pragmatic strengthening in plural predications and donkey sentences. In T. Galloway & J. Spence (Eds.), *Proceedings of SALT IV*. (pp. 136–153) Ithaca, NY: CLC Publications.

Lasersohn, P. (1999). Pragmatic halos. Language, 75, 522–551.

Leslie, S. J. (2009). If, unless and quantification. In R. J. Stainton & C. Viger (Eds.), *Compositionality, context and semantic values: Essays in honour of Ernie Lepore, Volume 85: Studies in linguistics and philosophy* (pp. 3–30). Dordrecht: Springer.

Lewis, C. I. (1918). *Survey of symbolic logic*. Berkeley: University of California Press.

Lewis, D. (1973). *Counterfactuals*. Oxford: Blackwell.

Lewis, D. (1975). Adverbs of quantification. In E. Keenan (Ed.), *Formal semantics of natural language* (pp. 178–188). Cambridge: Cambridge University Press.

Löbner, S. (1985). Definites. *Journal of Semantics, 4,* 275–326.

Ludlow, P. (2002). LF and natural logic. In G. Preyer & G. Peter (Eds.), *Logical form and language* (pp. 132–168). Oxford: Oxford University Press.

Magri, G. (2013). An account for the homogeneity effects triggered by plural definites and conjunction based on double strengthening. *Ms.* CNRS, Paris 8.

Malamud, S. A. (2012). The meaning of plural definites: A decision theoretic approach. *Semantics and Pragmatics, 5*(3). 1–58.

Matthewson, L. (2013). Gitskan modals. *International Journal of American Linguistics, 79,* 349–394.

McCawley, J. (1974). If and only if. *Linguistic Inquiry, 5,* 632–635.

McCawley, J. (1993). *Everything linguists always wanted to know about semantics but were ashamed to ask*. Chicago: University of Chicago Press.

Peterson, T. (2010). Epistemic modality and evidentiality in Gitskan at the semantics-pragmatics interface. Doctoral dissertation, University of British Columbia.

Pizzi, C., & Williamson, T. (2005). Conditional excluded middle in systems of consequential implication. *Journal of Philosophical Logic, 34,* 333–362.

Rooth, M. (1985). Association with focus. Dissertation, University of Massachussetts.

Rullmann, H., Matthewson, L., & Davis, H. (2008). Modals as distributive indefinites. *Natural Language Semantics, 20,* 317–357.

Sag, I. (1976). Deletion and logical form. Dissertation, MIT.

Schein, B. (2003). Adverbial, descriptive reciprocals. In J. Hawthorne (Ed.), *Philosophical perspectives 17* (pp 333–367).

Schein, B. (2016). Noughty bits. *Linguistics and Philosophy, 39,* 459–540.

Schlenker, P. (2004). Conditionals as definite descriptions. (A referential analysis). *Research on Language and Computation, 2*(3), 417–162.

Schubert, L., & Pelletier, F. (1989). Generically speaking, or, using discourse representation theory to interpret generics. In G. Chierchia, B. Partee, & R. Turner (Eds.), *Properties, types and meaning. Vol II: Semantic issues* (pp. 193–268). Dordrecht: Kluwer.

Sommers, F. (1982). *The logic of natural language.* Oxford: Oxford University Press.

Spector, B. (2007). Aspects of the pragmatics of plural morphology: On higher order implicatures. In U. Sauerland & P. Stateva (Eds.), *Presupposition and implicature in compositional semantics* 243–281. Basingstoke: Palgrave Macmillan.

Stalnaker, R. (1968). A theory of conditionals. In N. Rescher (Ed.), *Studies in logical theory, volume 2: American philosophical quarterly monograph series* (pp. 98–112). Oxford: Blackwell.

Stalnaker, R. (1975). Indicative conditionals. *Philosophia, 5,* 269–286.

Stalnaker, R. (1981). A defense of conditional excluded middle. In W. L. Harper, R. Stalnaker, & B. Pearce (Eds.), *IFS: conditionals, belief, decision, chance, and time* 87–104. Dordrecht: Reidel.

Szabolcsi, A., & Haddican, B. (2004). Conjunction meets negation: A study of cross-linguistic variation. *Journal of Semantics, 21,* 219–250.

van Craenenbroeck, J., & Merchant, J. (2013). Ellipsis phenomena. In M. den Dikken (Ed.), *The Cambridge handbook of generative syntax* (pp. 701–745). Cambridge: Cambridge University Press.

von Fintel, K. (1997). Bare plurals, bare conditionals, and *only*. *Journal of Pragmatics, 14,* 1–56.

von Fintel, K. (1998). Quantifiers and 'if'-clauses. *Philosophical Quarterly, 48,* 209–214.

von Fintel, K. (1999). NPI licensing, Strawson entailment, and context dependency. *Journal of Semantics, 16,* 97–148.

von Fintel, L. (2001). Counterfactuals in a dynamic context. In M. Kenstowicz (Ed.), *Ken Hale: A life in language* (pp. 123–152). Cambridge: MIT Press.

von Fintel, K., & Iatridou, S. (2002). If and when 'if'-clauses can restrict quantifiers. Ms. MIT.

Wallis, J. (1687). *Institutio logicae.* Oxford: Prostant abud J. Fletcher.

Williams, J. R. G. (2010). Defending conditional excluded middle. *Nous, 44,* 650–668.

Yanovic, I. (2016). Old English *motan, variable force modality, and the presupposition of inevitable actualization. *Language, 93*(3), 489–521.

Yoon, Y. (1994). Weak and strong interpretations of quantifiers and definite NPs in Englsih and Korean, Dissertation, University of Texas at Austin.