# Import-Export and ‘And’*

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*Penultimate draft; to appear in* Philosophy and Phenomenological Research

**Abstract** *Import-Export* says that a conditional ⌜$p > (q > r)$⌝ is always equivalent to the conditional ⌜$(p \wedge q) > r$⌝. I argue that *Import-Export* does not sit well with a classical approach to conjunction: given some plausible and widely accepted principles about conditionals, *Import-Export* together with classical conjunction leads to absurd consequences. My main goal is to draw out these surprising connections. In concluding I argue that the right response is to reject *Import-Export* and adopt instead a limited version which better fits natural language data; accounts for all the intuitions that motivate *Import-Export* in the first place; and fits better with a classical conjunction.

## 1 Introduction

Gibbard (1981) showed that Modus Ponens (*MP*) and Import-Export (*IE*)—two *prima facie* plausible principles about natural language conditionals—do not happily co-exist: theorists of the conditional must pledge allegiance to at most one of these, if they do not want to commit to interpreting the natural language conditional as the material conditional. McGee (1985) showed that there is good reason to take seriously the possibility that *MP* is false and *IE* true. Essentially unnoticed in the subsequent literature has been the fact that adopting *IE* has striking consequences for a seemingly unrelated issue: the semantics of conjunction. I will show that adopting *IE* does not sit well with adopting a classical Boolean semantics for ‘and’: *IE* plus some anodyne assumptions about the conditional entail that the classical rules of ‘and’-introduction and ‘and’-elimination are not valid.

My main goal is to point out the surprising relation between *IE* and ‘and’. In concluding, however, I will suggest that the right conclusion to draw about the

* This paper owes its existence to Justin Khoo, who drew to my attention the surprising connection between *Import-Export* and ‘and’, for which I am very grateful. I also thank Daniel Rothschild, Ian Rumfitt, and an anonymous referee for this journal for very helpful comments and discussion.

conditional is that it does not validate *IE* in full generality, but rather validates a slightly weaker principle which better fits the natural language data; accounts for all the intuitions that motivate *IE* in the first place; and fits better with a classical conjunction.

## 2 Background

Let us work with a toy language $\mathscr{L}$ containing arbitrarily many atomic sentences $A, B, C\ldots$ and which is closed under the one-place operator $\neg$ and two-place connectives $\wedge$, $>$, and $\supset$. I will use lower-case italics $p, q, r\ldots$ to range over arbitrary sentences of the language and lower-case Greek letters to range over propositions (sets of possible worlds). $\wedge$ and $\neg$ correspond to 'and' and 'not', as usual; $\ulcorner p > q \urcorner$ corresponds to the natural language conditional $\ulcorner$If $p$, then $q\urcorner$ (on either its indicative or subjunctive reading; everything I say here goes for both kinds of conditional); and $\supset$ to the material conditional, given its standard semantics: $\ulcorner p \supset q \urcorner$ is true just in case $p$ is false or $q$ true.[1] Call the fragment of our language without $>$ the non-conditional fragment, $\mathscr{L}_{NC}$. We assume a stock of possible worlds $\mathscr{W}$ and a valuation function $\mathfrak{I}$ which assigns atomic sentences to subsets of $\mathscr{W}$. Let $[\![p]\!]^{c,w}$ be the truth-value of $p$ at $w$ relative to a context $c$ (a sequence of parameters, specified differently in the various theories we will explore),[2] and let $[\![p]\!]^{c}$ be the proposition $p$ expresses at $c$ (the set of possible worlds where $p$ is true relative to $c$, i.e. $\{w : [\![p]\!]^{c,w} = 1\}$). We assume that for all atoms $A$, $[\![A]\!]^{c} = \mathfrak{I}(A)$.

Our two key principles about the conditional run as follows:[3]

*Modus Ponens (MP):* $\forall c : \forall p, q \in \mathscr{L} : ([\![p]\!]^{c} \cap [\![p > q]\!]^{c}) \subseteq [\![q]\!]^{c}$

*Import-Export (IE):* $\forall c : \forall p, q, r \in \mathscr{L} : [\![p > (q > r)]\!]^{c} = [\![(p \wedge q) > r]\!]^{c}$

1 I'll leave disjunction out of the story here, for simplicity. We could define it as usual out of negation and conjunction. Or, if we opt for a non-classical conjunction, we could combine that with a classical disjunction, giving up de Morgan equivalences. I will not evaluate those options here.

2 I'll write $[\![p]\!]^{f_1, f_2, \ldots f_n, w}$ rather than $[\![p]\!]^{\langle f_1, f_2, \ldots f_n \rangle, w}$.

3 These can be equivalently stated using '$\vDash$', suitably relativized to a context parameter. Where $\Gamma \vDash_c p$ means that $p$ is true, relative to $c$, everywhere that all the elements of $\Gamma$ are true relative to $c$, *MP* says $\forall c : \{p, p > q\} \vDash_c q$, and *IE* says $\forall c : \{p > (q > r)\} \vDash_c (p \wedge q) > r$ and $\forall c : \{(p \wedge q) > r\} \vDash_c p > (q > r)$.

Thus *MP* says that, for instance, if both ‘It is raining’ and ‘If it is raining, the picnic is cancelled’ are true, then ‘The picnic is cancelled’ is also true; and likewise that if both ‘It rained yesterday’ and ‘If it had rained yesterday, the picnic would have been cancelled’ are true, then ‘The picnic was cancelled’ is also true. And *IE* says that, for instance, ‘If it is raining, then if Mark was excited for the picnic, he’ll be disappointed’ always expresses the same thing (in a given context) as ‘If it is raining and Mark was excited for the picnic, he’ll be disappointed’; likewise for ‘If it had rained, then if Mark had been excited for the picnic, he would have been disappointed’ and ‘If it had rained and Mark had been excited for the picnic, he would have been disappointed’.

Both these principles are *prima facie* very natural. But Gibbard (1981) showed that these two principles entail that the natural language conditional is the material conditional, provided we also assume that for any $c$, if $[\![p]\!]^c \subseteq [\![q]\!]^c$, then $[\![p > q]\!]^c = \mathscr{W}$; i.e. when $p$ entails $q$, $\ulcorner p > q \urcorner$ is a theorem. (This latter assumption, which we’ll call *Conditional Deduction*, seems beyond reproach, and has not to my knowledge been challenged.) Briefly (following presentation in Khoo 2013): for any $c, p, q$, under the assumption that our conjunction validates non-contradiction, i.e. that $\ulcorner \neg p \wedge p \urcorner$ is nowhere true,[4] it follows that $[\![\neg p \wedge p]\!]^c \subseteq [\![q]\!]^{c,w}$, and thus by *Conditional Deduction* that $[\![(\neg p \wedge p) > q]\!]^c = \mathscr{W}$, and thus, by *IE*, $[\![\neg p > (p > q)]\!]^c = \mathscr{W}$. By *MP*, it follows that $[\![\neg p]\!]^c \subseteq [\![p > q]\!]^c$. Next, under the innocuous assumption that our conjunction validates left conjunction elimination (we will question right conjunction elimination below, but not left), we know that $[\![q \wedge p]\!]^c \subseteq [\![q]\!]^c$, and thus (by *Conditional Deduction*) $[\![(q \wedge p) > q]\!]^c = \mathscr{W}$. By *IE*, $[\![q > (p > q)]\!]^c = \mathscr{W}$. By *MP*, $[\![q]\!]^c \subseteq [\![p > q]\!]^c$. Given the meaning of the material conditional $\supset$, on which, again, $[\![p \supset q]\!]^c = [\![\neg p]\!]^c \cup [\![q]\!]^c$, it follows that $[\![p \supset q]\!]^c \subseteq [\![p > q]\!]^c$. *MP* guarantees that $[\![p > q]\!]^c \subseteq [\![p \supset q]\!]^c$. Thus it follows that $\forall c, p, q : [\![p > q]\!]^c = [\![p \supset q]\!]^c$: that is, the natural language conditional $>$ is the material conditional $\supset$.

4 As we discuss below, this is not actually validated in full generality by the PK or KM semantics given below, in particular when $p$ is itself a conditional; even in those frameworks, though, we can prove a slightly weaker but still decisive version of Gibbard’s triviality result, on which $\ulcorner p > q \urcorner$ is equivalent to $\ulcorner p \supset q \urcorner$ whenever $p$ itself is not a conditional, if *MP* and *IE* are both valid.

The problem is that $>$ is *not* the material conditional. This is almost universally accepted by those who study conditionals.[5] A quick argument: if $>$ were the material conditional, then the negation of $\ulcorner p > q \urcorner$ would entail $p$. But it does not. For instance, (1) is true whether or not Patch is a rabbit:

(1) It's not the case that Patch is a rodent if she is a rabbit.

That is, (1) does not entail that Patch is a rabbit—contrary to the predictions of a theory which said that the 'if...then' in (1) were the material conditional. It is even clearer, for similar reasons, that the natural language subjunctive conditional is not the material conditional: again, (2) clearly does not entail that Patch is a rabbit.

(2) It's not the case that Patch would have been a rodent if she had been a rabbit.

Arguments like this can be easily multiplied, though I will stop here, since the point is well established. $>$ is not $\supset$, then. *Conditional Deduction*, again, seems beyond reproach, and so the consensus is that we must choose at most one of *MP* and *IE*.[6]

Again, both principles are *prima facie* plausible. There is much to say in favor of, and against, both. I will not go into the details of this debate here. My main goal in this paper is not to argue for either of these principles, but rather to point out some downstream consequences of one possible choice between them, namely the choice to go with *IE*. McGee (1985), as we will review in more detail below, argued that there is reason to take seriously the possibility that *MP* is invalid and *IE* is valid; and Khoo & Mandelkern (2018) argue that the subsequent literature has not produced a convincing counterexample to *IE*.[7] So it at least seems possible, given the present

5 Some, like Jackson (1979), Lewis (1976), Grice (1989), Rieger (2006), have argued that contrasts in assertability between material conditionals and indicative conditionals can be explained pragmatically. But these accounts, even if successful, will not explain embedding data like (1). Moreover, to my knowledge no one has defended the thesis that the subjunctive conditional is the material conditional; but Gibbard's proof is just as worrisome for the subjunctive conditional (which seems to validate *Conditional Deduction*, *MP*, and *IE* to the same extent).

6 Kratzer (1986) claims to evade Gibbard's proof by challenging an implicit premise—that $>$ is a two-place operator—but Khoo (2013) shows persuasively that Kratzer avoids Gibbard's result because, and only because, she invalidates *MP*.

7 A principle which Khoo and Mandelkern call 'Sentential Import-Export'.

state of the literature, that *IE* is valid (and *MP* invalid); and this suffices to give us motivation to explore the downstream consequences of validating *IE*.

I will begin by spelling out three different approaches in the literature which validate *IE*. The first theory is due to McGee 1985. McGee builds on Stalnaker (1968)'s theory of conditionals. Stalnaker's theory validates *MP*, not *IE*. McGee modifies the theory as follows, so that it validates *IE*, not *MP*. On McGee's theory, contexts are pairs comprising a set of sentences $\Gamma$ (call this a *premise set*), as well as a Stalnakerian *selection function* $f$ from propositions and worlds to worlds, which (i) takes any consistent proposition and world to a world where that proposition is true (intuitively, the 'closest' world where that proposition is true); (ii) takes the inconsistent proposition and any world to an absurd world where everything is true; (iii) takes $\langle\varphi, w\rangle$ and $\langle\psi, w\rangle$ to the same world as long as $f(\varphi, w) \in \psi$ and $f(\psi, w) \in \varphi$; and (iv) takes a world $w$ and proposition $\varphi$ to $w$ just in case $w \in \varphi$. Then we have the following semantic rules, assuming as above an atomic valuation function $\mathfrak{I}$:

- $[\![A]\!]^{f,\Gamma,w} = 1$ iff $f(\bigcap\limits_{p\in\Gamma} [\![p]\!]^{f,\varnothing}, w) \in \mathfrak{I}(A)$
- $[\![\neg p]\!]^{f,\Gamma,w} = 1$ iff $[\![p]\!]^{f,\Gamma,w} = 0$
- $[\![p \wedge q]\!]^{f,\Gamma,w} = 1$ iff $[\![p]\!]^{f,\Gamma,w} = 1$ and $[\![q]\!]^{f,\Gamma,w} = 1$
- $[\![p > q]\!]^{f,\Gamma,w} = [\![q]\!]^{f,\Gamma\cup\{p\},w}$

Relative to an empty premise set, atomic sentences, negation, and conjunction have their standard classical interpretations. The role of 'if'-clauses in conditionals is solely to add material to the premise set: their consequent is then evaluated relative to an updated premise set which includes their antecedent. The intersection of the interpreted premise set then serves as an argument for a Stalnakerian selection function. For simple conditionals—conditionals of the form $\ulcorner p > q \urcorner$ where $p, q \in \mathscr{L}_{NC}$, i.e. $p$ and $q$ are not conditionals—the result will be equivalent to Stalnaker's: $\ulcorner p > q \urcorner$ is true just in case the closest $p$ world is a $q$ world. But for complex conditionals, the accounts diverge: in McGee's system, a conditional of the form

$\ulcorner p > (q > r) \urcorner$ is true just in case $\ulcorner q > r \urcorner$ is true relative to a premise set to which $p$ has been added, just in case $r$ is true relative to a premise set to which $p$ and $q$ have both been added. This renders $\ulcorner p > (q > r) \urcorner$ equivalent to $\ulcorner (p \wedge q) > r \urcorner$, sufficing to validate *IE*. By contrast, *MP* will not be valid: an easy way to see this is that $\ulcorner p > (\neg p > r) \urcorner$ will always be true, for any $p$ and $r$; but there are worlds where $p$ is true and $\ulcorner \neg p > r \urcorner$ false.

The second theory is another close variant on Stalnaker's theory, given in Khoo & Mandelkern 2018 (I'll call this semantics *KM*). This theory has just Stalnaker's selection function as its context parameter, defined as above. Then:

- $[\![A]\!]^{f,w} = 1$ iff $w \in \mathfrak{I}(A)$
- $[\![\neg p]\!]^{f,w} = 1$ iff $[\![p]\!]^{f,w} = 0$
- $[\![p \wedge q]\!]^{f,w} = 1$ iff $[\![p]\!]^{f,w} = 1$ and $[\![q]\!]^{f^{p^f},w} = 1$, where $f^{p^f}$ is the selection function s.t. for all $\varphi, w : f^{p^f}(\varphi, w) = f([\![p]\!]^f \cap \varphi, w)$
- $[\![p > q]\!]^{f,w} = [\![q]\!]^{f^{p^f}, f([\![p]\!]^f, w)}$

Atomic sentences and negation are treated classically. Conditionals are treated exactly as in Stalnaker's semantics—the consequent is evaluated relative to the closest world where the antecedent is true—with one key difference: the selection function also records the information in the antecedent (in this respect, it is similar to McGee's premise sets, but the information is carried by updating the selection function, rather than an independent parameter). This means that $\ulcorner p > (q > r) \urcorner$ is true just in case $\ulcorner q > r \urcorner$ is true at the closest $p$ world *and relative to a selection function* whose image always makes $p$ true (provided $p$ is consistent), which in turn holds just in case $r$ is true at the closest world which makes both $p$ and $q$ true. This, in turn, suffices to ensure that $\ulcorner p > (q > r) \urcorner$ is equivalent to $\ulcorner (p \wedge q) > r \urcorner$, as long as $q$ is conditional-free. Our semantics for conjunction, finally, is classical except that, when $q$ is a conditional, $\ulcorner p \wedge q \urcorner$ is interpreted in such a way that $p$ is added to the selection function relative to which $q$ is evaluated. This suffices to ensure that *IE* is valid in full generality, even when $q$ is a conditional (more on this below). *MP* will be invalid; the same example which showed this for McGee will show this for KM.

The final theory is due to Kratzer (1981, 1986), augmented with the conjunction in Khoo & Mandelkern 2018; for brevity I'll call this theory *PK*, for Pseudo-Kratzer. This theory treats a context as a pair of, first, a modal base function $g$ from worlds to sets of propositions; and, second, a function $\preceq$ from worlds to well-founded partial pre-orders such that for any world $w$, $w$ is minimal in $\preceq(w)$.[8] Finally, this approach augments our language with an (unpronounced) modal $\textsc{m}$ with semantics as below. Then:

- $[\![A]\!]^{g,\preceq,w} = 1$ iff $w \in \mathfrak{I}(A)$
- $[\![\neg p]\!]^{g,\preceq,w} = 1$ iff $[\![p]\!]^{g,\preceq,w} = 0$.
- $[\![p \wedge q]\!]^{g,\preceq,w} = 1$ iff $[\![p]\!]^{g,\preceq,w} = 1$ and $[\![q]\!]^{g^{p^{g,\preceq}},\preceq,w} = 1$,
  where $\forall w : g^{p^{g,\preceq}}(w) = g(w) \cup \{[\![p]\!]^{g,\preceq}\}$
- $[\![p > q]\!]^{g,\preceq,w} = [\![q]\!]^{g^{p^{g,\preceq}},\preceq,w}$
- $[\![\textsc{m}p]\!]^{g,\preceq,w} = 1$ iff $\forall w' \in \bigcap g(w)$ : if $w'$ is minimal in $\preceq_g(w)$, then $[\![p]\!]^{g,\preceq,w'} = 1$,
  where $\preceq_g(w)$ is the limitation of $\preceq(w)$ to $\bigcap g(w)$.

Atoms and negation are treated classically here. The only role of a conditional antecedent is to add its information to the ordering source (this is much like as in McGee's theory). Crucially, Kratzer then assumes that conditionals without overt modals (i.e., all conditionals in our limited language, which does not contain overt modals) always contain a covert modal $\textsc{m}$ which takes scope over everything which follows the most deeply-embedded final $>$ in the conditional; thus e.g. where $r$ does not contain $\textsc{m}$ or $>$, instead of $\ulcorner p > r \urcorner$ we will have $\ulcorner p > \textsc{m}r \urcorner$; likewise, instead of $\ulcorner p > (q > r) \urcorner$ we will have $\ulcorner p > (q > \textsc{m}r) \urcorner$. $\ulcorner \textsc{m}p \urcorner$ evaluates $p$ at the minimal worlds in the intersection of the modal base, and is true just in case $p$ is true at all those worlds. Putting this all together, simple conditionals of the form $\ulcorner p > \textsc{m}q \urcorner$ will be true just in case all the minimal $p$ worlds consistent with the modal base are $q$ worlds (the resulting semantics is a slight generalization of the one given in Lewis

8 My presentation simplifies Kratzer's in moving directly to a pre-order rather than going by way of an ordering source, and in assuming that $\preceq(w)$ is well-founded for all $w$ (the limit assumption). Both of these are irrelevant for present purposes.

1973 for subjunctive conditionals). When it comes to complex conditionals, the clause for conditionals, together with the assumption about covert modals, suffices to ensure that we keep track of consecutive antecedents, just as for McGee and KM. So $\ulcorner p > (q > \textsc{m}r)\urcorner$ will be true just in case $\ulcorner q > \textsc{m}r\urcorner$ is true relative to a modal base which includes the information that $p$ is true, which holds just in case $r$ is true at all the minimal worlds where $p$ and $q$ are true. When $q$ is non-conditional, this suffices to guarantee that $\ulcorner p > (q > \textsc{m}r)\urcorner$ is equivalent to $\ulcorner (p \wedge q) > \textsc{m}r\urcorner$. And our clause for conjunction ensures that right conjuncts are evaluated relative to a modal base which includes the information in the left conjunct. This, in turn, suffices to validate *IE* in full generality, even when $q$ is a conditional (more below). *MP*, by contrast, will not be valid; the same example given above suffices to show this.

All three of these theories, then, validate *IE*. They differ in a variety of ways, but what I want to focus on here is their treatment of 'and'. McGee's theory has a classical 'and'. But KM and PK give 'and' a decidedly non-classical treatment. On both those theories, 'and' is fully classical for the non-conditional fragment. But not so when we have a conjunction whose right conjunct is a conditional. Then the conditional is evaluated, in PK, relative to a modal base which is updated with the left conjunct; and, in KM, relative to a selection function updated with the left conjunct. To illustrate this divergence in their treatment of 'and', consider the conjunction $\ulcorner p \wedge (\neg p > q)\urcorner$, and assume that $p$ is in the non-conditional fragment. In McGee's theory, this conjunction is true relative to $\langle f, \Gamma, w\rangle$ just in case both $p$ and $\ulcorner \neg p > q\urcorner$ are true relative to $\langle f, \Gamma, w\rangle$, just as we would expect. In PK, we assume that in a conjunction like this, $q$ has the form $\textsc{m}r$. The conjunction $\ulcorner p \wedge (\neg p > \textsc{m}r)\urcorner$ is then true relative to $\langle g, \preceq, w\rangle$ just in case $p$ is true relative to $\langle g, \preceq, w\rangle$ and $\ulcorner \neg p > \textsc{m}r\urcorner$ is true relative to *a different* point of evaluation, namely $\left\langle g^{p^{g,\preceq}}, \preceq, w\right\rangle$. And now notice something important: $\ulcorner \neg p > \textsc{m}r\urcorner$ is *always* true relative to *any* point of evaluation which contains $g^{p^{g,\preceq}}$ as its modal base parameter, *no matter what* $g$ is, and no matter what $\preceq$ and $w$ are. This is, a bit informally, because $[\![\neg p > \textsc{m}r]\!]^{g^{p^{g,\preceq}}, \preceq, w} = 1$ just in case all $\preceq(w)$-minimal worlds in a certain set make $r$ true—but what set? We get that set by taking the intersection of $g(w)$, then intersecting that with the intension of $p$, and then intersecting that with the intension of $\ulcorner \neg p\urcorner$. Whatever we started with, we'll end with the empty set. And so the quantification here ends up vacuous, and $\ulcorner \neg p > \text{M}r \urcorner$ is guaranteed to be true. That means that in PK, $\ulcorner p \wedge (\neg p > \text{M}r) \urcorner$ is true at any index just in case $p$ is! And that, of course, means that 'and' is highly non-classical in this system. In particular, right conjunction elimination will be invalid: the truth of $p$ at an index will suffice for the truth of $\ulcorner p \wedge (\neg p > \text{M}r) \urcorner$, but not for the truth of $\ulcorner \neg p > \text{M}r \urcorner$.[9] Conjunction introduction will also be invalid, for similar reasons: we can have $p$ and $\ulcorner q > \text{M}r \urcorner$ both true relative to some index, while $\ulcorner p \wedge (q > \text{M}r) \urcorner$ is false relative to that same index, since in the conjunction, the right conjunct is evaluated relative to a shifted modal base (I leave a more careful proof to the reader). Things are parallel for KM's theory. $\ulcorner p \wedge (\neg p > q) \urcorner$ will be true relative to any index just in case $p$ is: for the right conjunct will be evaluated relative to a selection function updated with $p$; which means that $q$ will be evaluated relative to the closest world which makes both $p$ and $\ulcorner \neg p \urcorner$ true; which means it will be evaluated relative to the absurd world, which makes everything true! So right conjunction elimination will be invalid. And conjunction introduction will likewise be invalid, for parallel reasons.

That a non-classical 'and' is required in order for theories like PK to validate *IE* was not, to my knowledge, observed in print until Khoo & Mandelkern 2018; it was first pointed out to me before then by Justin Khoo (p.c.). But why do PK and KM need a non-classical 'and' to validate *IE* in full generality? The intuition is the following. In both these theories, *IE* is validated because we keep track of the information in the antecedents of conditionals in our modal parameters as we process a conditional; when we have nested conditionals, we evaluate each successive antecedent relative to the information contained in the antecedents we have already processed. But that means that if we want to validate *IE* in full generality, conjunction must keep track of this information in exactly the same way. In other words, we evaluate $q$ in $\ulcorner p > (q > r) \urcorner$ relative to modal parameters that include the information that $p$ is true; if *IE* is to be valid for the case in which $q$ is itself a conditional, we must likewise evaluate $q$ in $\ulcorner (p \wedge q) > r \urcorner$ relative to modal parameters that are updated with $p$.

9 Left conjunction elimination remains valid.

In more detail, consider a conditional of the form $\ulcorner p > ((\neg p > q) > r)\urcorner$, with $p$ again non-conditional (in PK, we of course assume that $q$ and $r$ have the form $\ulcorner \text{M}s \urcorner$ and $\ulcorner \text{M}t \urcorner$ for some non-conditional and non-modal $s$ and $t$). The key point is that, for both KM and PK, the second embedded conditional here—$\ulcorner \neg p > q\urcorner$—is interpreted relative to modal parameters that include the information that $p$, and thus is trivially true. It follows that, in KM and PK, $\ulcorner p > ((\neg p > q) > r)\urcorner$ is equivalent to $\ulcorner p > r\urcorner$. Now *IE* tells us that $\ulcorner p > ((\neg p > q) > r)\urcorner$ is semantically equivalent to $\ulcorner (p \wedge (\neg p > q)) > r\urcorner$. *But*, if we were to adopt all the semantic entries in PK or KM together with a *classical* 'and', then the latter is *not* equivalent to $\ulcorner p > r\urcorner$. I leave a formal proof to readers, but the basic issue is that the right conjunct of the antecedent of $\ulcorner (p \wedge (\neg p > q)) > r\urcorner$ is not interpreted relative to modal parameters that are updated with $p$, and so the right conjunct of the antecedent is not at all trivial. This just follows from the fact that, if 'and' is classical, then $\ulcorner p \wedge (\neg p > q)\urcorner$ is obviously not equivalent to $p$. And so $\ulcorner (p \wedge (\neg p > q)) > r\urcorner$ will not, after all, be equivalent to $\ulcorner p > ((\neg p > q) > r)\urcorner$: PK or KM emended so that it has a classical conjunction will invalidate *IE*. By contrast, with the non-classical semantics for conjunction given above, both theories will avoid this problem, because $\ulcorner \neg p > q\urcorner$ *will* be trivial when it appears as a right conjunct in a conjunction of the form $\ulcorner p \wedge (\neg p > q)\urcorner$, and so $\ulcorner (p \wedge (\neg p > q)) > r\urcorner$ will be equivalent to $\ulcorner p > r\urcorner$, just as $\ulcorner p > ((\neg p > q) > r)\urcorner$ is.

This makes it clear why PK and KM need a non-classical conjunction to validate *IE*. It also raises the converse question: how does McGee validate *IE* with a classical conjunction? McGee, like PK and KM, validates *IE* by stipulating that when we process a conditional with multiple antecedents, we keep track of the information in all the antecedents as we go, evaluating the consequent in light of all that information. But crucially, in McGee's semantics, we *don't* evaluate that information *as we go*, taking into account earlier information. Rather, we just keep track of all the sentences which are antecedents of the conditional, and then evaluate each on its own, relative to the empty set of hypotheses, when we are ready to evaluate the most deeply embedded consequent. More concretely, consider $\ulcorner p > (q > r)\urcorner$. Rather than evaluating $q$ relative to a set of hypotheses which includes the information that $p$, and then evaluating $r$ relative to a set of hypotheses that includes the information that $p$ and that $q$, we evaluate both $p$ and $q$ relative to the empty set of hypotheses, and then evaluate $r$ relative to the information derived that way. This means that we *don't* take into account $p$ when evaluating $q$ in the above; $q$ is evaluated as it would be when unembedded. This means that, in $\ulcorner p > ((q > r) > s))\urcorner$, $\ulcorner q > r\urcorner$ is evaluated the same way as when unembedded—it is evaluated relative to an empty premise set—and thus it is evaluated in the same way as when it appears in $\ulcorner(p \wedge (q > r)) > s\urcorner$, where $\wedge$ has classical semantics. This means that McGee can validate *IE* in full generality with a classical conjunction. In particular, in $\ulcorner p > ((\neg p > q) > r)\urcorner$, the embedded conditional $\ulcorner\neg p > q\urcorner$ will not be trivial—because it won't be evaluated relative to a premise set updated with $p$—and so the whole conditional will not be equivalent to $\ulcorner p > r\urcorner$, but will be equivalent to $\ulcorner(p \wedge (\neg p > q)) > r\urcorner$, where $\wedge$ has classical semantics.

KM and PK thus need a non-classical conjunction to validate *IE*; McGee manages to validate *IE* with a classical conjunction. I note in closing that KM and PK are the rule, not the exception: as far as I know, McGee's theory is the *only* extant theory of conditionals which validates *IE* together with a classical conjunction. Every other theory I know of (e.g. that of Gillies 2009, another prominent alternative, as Khoo & Mandelkern (2018) discuss in more detail) requires a non-classical 'and' along the lines of the conjunction in KM and PK in order to validate *IE*.

## 3 Nothing Added

Good for McGee and bad for PK/KM, we might think. Classical conjunction has many things going for it, simplicity not the least. *If* we want to validate *IE*, then (it is natural to think) we should do so without introducing excessive weirdness elsewhere in our semantics.

But this response is overhasty. I will give two general arguments that show that, if we want to validate *IE* together with a classical conjunction, we will have to invalidate other plausible principles about the conditional. These arguments count against McGee's approach, but also against any other approach which validates *IE* while keeping conjunction classical. (In the end I will argue that the best response to these arguments is *not* to accept PK/KM's non-classical conjunction, but rather reject *IE* in favor of a more limited principle; but more on that to come.)

The first argument turns on a principle I call *Nothing Added*. (I use '$c$' again to range over contexts, which again differ across different theories. $\rightarrow$ is a meta-language material conditional.)

$$\textit{Nothing Added}\text{: } \forall c, p, q, r : [\![p > q]\!]^c = \mathscr{W} \rightarrow [\![p > (q > r)]\!]^c = [\![p > r]\!]^c.$$

*Nothing Added* says that, when $\ulcorner p > q \urcorner$ is a theorem, then $\ulcorner p > (q > r) \urcorner$ will always have the same truth value as $\ulcorner p > r \urcorner$. The principle is, I think, very intuitive. $\ulcorner p > q \urcorner$ will be a theorem just in case the truth of $p$ already guarantees the truth of $q$, no matter what the world is like. $\ulcorner p > r \urcorner$ will be true at a given world, intuitively, just in case the truth of $p$ at that world suffices to guarantee the truth of $r$ (in *some* sense of guarantee). But now adding in $\ulcorner > q \urcorner$ in the middle, so we get $\ulcorner p > (q > r) \urcorner$, should not result in a sentence with a different meaning, because the truth of $p$ guarantees the truth of $q$, *no matter what*.

But it turns out that, given some anodyne background assumptions, it is impossible to validate both *Nothing Added* and *IE* in a framework with classical conjunction, at least without arriving at absurd conclusions. As an illustration to begin, note that McGee does not validate *Nothing Added*. For McGee, $\ulcorner p > (\neg p > q) \urcorner$ is a theorem, since $q$ will be true relative to any premise set which includes both $p$ and $\ulcorner \neg p \urcorner$. *Nothing Added* would then say that, for any $r$, $\ulcorner p > ((\neg p > q) > r) \urcorner$ is equivalent to $\ulcorner p > r \urcorner$. But these are inequivalent in McGee's semantics. The easiest way to see this is by way of *IE*, which, again, McGee validates. Given *IE*, $\ulcorner p > ((\neg p > q) > r) \urcorner$ is equivalent to $\ulcorner (p \wedge (\neg p > q)) > r \urcorner$. For simplicity, let $p, q$, and $r$ be arbitrary different atoms. Suppose we evaluate $\ulcorner (p \wedge (\neg p > q)) > r \urcorner$ and $\ulcorner p > r \urcorner$ relative to an empty premise set, at a world $w$ where both $p$ and $r$ are true, and a selection function $f$. $\ulcorner p > r \urcorner$ will be true at this index no matter what, since $f$ will take $\langle [\![p]\!]^{\varnothing, f}, w \rangle$ to $w$, by the fourth constraint on selection functions above. But now suppose that $f([\![p]\!]^{\varnothing, f} \cap [\![\neg p > q]\!]^{\varnothing, f}, w) = w' \neq w$, and suppose that $w' \notin [\![r]\!]^{\{p, \neg p > q\}, f}$ (these assumptions are perfectly consistent). Then $\ulcorner (p \wedge (\neg p > q)) > r \urcorner$ will be false at

$\langle \varnothing, f, w \rangle$; but then, by *IE*, $\ulcorner p > ((\neg p > q) > r) \urcorner$ is false at $\langle \varnothing, f, w \rangle$. Since $\ulcorner p > r \urcorner$ is true at $\langle \varnothing, f, w \rangle$, it follows that $\ulcorner p > ((\neg p > q) > r) \urcorner$ is not equivalent to $\ulcorner p > r \urcorner$.

So *Nothing Added* is false in McGee's semantics—whereas, by contrast, *Nothing Added* is true in PK's and KM's semantics (I leave the proof to readers). This is not an accident of McGee's semantics: more generally, given two innocuous background assumptions, it's impossible to validate *IE and Nothing Added* while keeping conjunction classical, at least without arriving at absurd consequences. Those assumptions are, first, *Conditional Deduction*, the principle adverted to in Gibbard's proof which says that if $p$ entails $q$, then $\ulcorner p > q \urcorner$ is a theorem; and, second, a principle I'll call *Equivalence*:

$$\textit{Equivalence}: \forall p, q : (\forall c, r : [\![p > r]\!]^c = [\![q > r]\!]^c) \rightarrow \forall c : [\![p]\!]^c = [\![q]\!]^c$$

*Equivalence* says that, given two sentences $p$ and $q$, as long as $\ulcorner p > r \urcorner$ and $\ulcorner q > r \urcorner$ are semantically equivalent *no matter what r is*, then $p$ and $q$ must be semantically equivalent as well. This is a principle that is validated by every semantics I know for the conditional; its converse (that conditionals with logically equivalent antecedents are equivalent) has been challenged (see e.g. Santorio 2018 and citations therein), but I do not know of any challenges to *Equivalence*.

Now suppose we take on board *IE*, *Nothing Added*, *Conditional Deduction*, and *Equivalence*. We can then argue as follows. For any $c$, for any $q \in \mathscr{L}$ and $p \in \mathscr{L}_{NC}$:[10]

i. $[\![(p \wedge \neg p) > q]\!]^c = \mathscr{W}$ — *Conditional Deduction*

ii. $[\![p > (\neg p > q)]\!]^c = \mathscr{W}$ — *IE*, (i)

iii. $\forall r \in \mathscr{L} : [\![(p \wedge (\neg p > q)) > r]\!]^c =$
$[\![p > ((\neg p > q) > r)]\!]^c =$
$[\![p > r]\!]^c$ — *IE*, *Nothing Added*, (ii)

iv. $[\![p]\!]^c = [\![p \wedge (\neg p > q)]\!]^c$ — *Equivalence*, (iii)

10 We limit our attention to $p$ in the non-conditional fragment, because $\ulcorner (p \wedge \neg p) > q \urcorner$ will not always be a theorem when $p$ itself is a conditional, according to KM and PK, as I discuss further below (this seems to me a drawback of those theories, as I discuss). The same goes for the discussion of *Absurdum* below.

Now suppose that conjunction is classical. Then from (iv) we can conclude that whenever $p$ is true, so is $\ulcorner p \wedge (\neg p > q) \urcorner$. If conjunction is classical—in particular, if it validates right conjunction elimination—we can then conclude that $\ulcorner \neg p > q \urcorner$ is also true. In other words, we arrive at the conclusion that $p$ entails $\ulcorner \neg p > q \urcorner$; i.e. that $\forall c : \forall q \in \mathscr{L} : \forall p \in \mathscr{L}_{NC} : [\![p]\!]^c \subseteq [\![\neg p > q]\!]^c$. But this conclusion is clearly false: it is one of the least appealing consequences of the material conditional analysis of the conditional. For, given classical negation (which is not in dispute here), this conclusion immediately entails that, for any non-conditional $p$, the *falsity* of $\ulcorner \neg p > q \urcorner$ entails the falsity of $p$; or, more succinctly, the falsity of $\ulcorner p > q \urcorner$ entails the truth of $p$. Call this principle *Ex falso*:

*Ex falso*: $\forall c : \forall q \in \mathscr{L} : \forall p \in \mathscr{L}_{NC} : [\![\neg(p > q)]\!]^c \subseteq [\![p]\!]^c$

*Ex falso* is unacceptable. As we saw above, 'It's not the case that if Patch is a rabbit, she is a rodent' does *not* entail that Patch is a rabbit. The same goes for counterfactuals: 'It's not the case that if Patch had been a rabbit, she would have been a rodent' is certainly true; but this fact obviously does not entail that Patch is a rabbit.

In sum: *Nothing Added*, *Conditional Deduction*, and *Equivalence* entail *Ex Falso*, if 'and' is classical and *IE* is true. *Ex Falso* is clearly false, and *Conditional Deduction* and *Equivalence* look hard to challenge. So it looks like, if 'and' is classical, *IE* ends up in direct tension with a very appealing principle, namely *Nothing Added*. By contrast, with a non-classical 'and' like that of KP or KM, there is no such tension.

## 4 Absurdum

A similar tension shows up betweein *IE* and a different principle, given classical 'and'. I'll call the principle in question *Absurdum*:

*Absurdum*: $\forall c : [\![p > q]\!]^c = \varnothing \rightarrow [\![p > (q > \bot)]\!]^c = \mathscr{W}$.

*Absurdum* says that if $\ulcorner p > q \urcorner$ is inconsistent, then $\ulcorner p > (q > \bot) \urcorner$ is a theorem. *Absurdum* is quite attractive. If $\ulcorner p > q \urcorner$ is inconsistent, then $p$ must guarantee that

$q$ is false—otherwise there would be some model where $\ulcorner p > q \urcorner$ is true. So $p$ and $q$ are inconsistent. Under the assumption that $p$ and the assumption that $q$, then, anything at all will follow; in other words, $\ulcorner p > (q > \bot) \urcorner$ should be a theorem.

PK and KM both validate *Absurdum*. But it is quite hard to validate *Absurdum* while validating *IE* and keeping conjunction classical. To see this, note first that McGee invalidates *Absurdum*. For McGee, $\ulcorner p > (\neg p > q) \urcorner$ is a theorem; and so, as long as $p$ is consistent, $\ulcorner p > \neg(\neg p > q) \urcorner$ is *inconsistent* relative to the empty premise set and any selection function. Then *Absurdum* says that $\ulcorner p > (\neg(\neg p > q) > \bot) \urcorner$ should be a theorem, relative to the empty premise set and any selection function. But in McGee's framework, it's not. By *IE*, this will be equivalent to $\ulcorner (p \wedge \neg(\neg p > q)) > \bot \urcorner$. But since conjunction is classical for McGee, the antecedent of this will clearly be consistent, and so it follows that the whole conditional will be false at any world.

Thus McGee fails to validate *Absurdum*. More generally, suppose we take on board the following background principles:

*Taut1*: $\forall c : \forall p, q \in \mathscr{L} : (\llbracket p \rrbracket^c \neq \varnothing \wedge \llbracket p > q \rrbracket^c = \mathscr{W}) \rightarrow \llbracket p > \neg q \rrbracket^c = \varnothing$

*Taut2*: $\forall c : \forall p, q \in \mathscr{L} : \llbracket p > \bot \rrbracket^c = \mathscr{W} \rightarrow \llbracket \neg p \rrbracket^c = \mathscr{W}$

These principles are validated by every semantics for the conditional I know, and seem very plausible to me. *Taut1* says that, if $p$ is consistent and $\ulcorner p > q \urcorner$ is a theorem, then $\ulcorner p > \neg q \urcorner$ is inconsistent. If $p$ is consistent, then $\ulcorner p > q \urcorner$ will be a theorem only if, intuitively, the truth of $p$ absolutely guarantees the truth of $q$, no matter what the world is like; but then $\ulcorner p > \neg q \urcorner$ will always be false. *Taut2* says that if $\ulcorner p > \bot \urcorner$ is a theorem, then $p$ is inconsistent. This, again, seems very plausible: if $\ulcorner p > \bot \urcorner$ is a theorem, then this means that the truth of $p$ somehow guarantees the truth of $\bot$; but since $\bot$ is never true, this can only hold if $p$ is never true. Indeed, *Taut2* follows from *Taut1* given the very plausible assumption that $\ulcorner p > \top \urcorner$ is a theorem for any $p$ (a principle, again, which as far as I know everyone accepts). Suppose then that $\ulcorner p > \bot \urcorner$ is a theorem. If $p$ were consistent, then, by *Taut1*, it would follow that $\ulcorner p > \top \urcorner$ is inconsistent, contrary to our assumption. So it must be that $p$ is inconsistent, and so that $\ulcorner \neg p \urcorner$ is a theorem.

Now, taking these assumptions on board, consider any consistent $p \in \mathscr{L}_{NC}$ and any $c$ and any $q \in \mathscr{L}$:

i. $[\![p > (\neg p > q)]\!]^c = \mathscr{W}$ — *IE*, *Conditional Deduction*

ii. $[\![p > \neg(\neg p > q)]\!]^c = \varnothing$ — *Taut1*, (i)

iii. $[\![p > (\neg(\neg p > q) > \bot)]\!]^c = \mathscr{W}$ — *Absurdum*, (ii)

iv. $[\![(p \wedge \neg(\neg p > q)) > \bot]\!]^c = \mathscr{W}$ — *IE*, (iii)

v. $[\![\neg(p \wedge \neg(\neg p > q))]\!]^c = \mathscr{W}$ — *Taut2*, (iv)

Now, if 'and' is classical (in particular if 'and' validates conjunction introduction), and given our background classical negation (which is not in dispute here), then from (v) we can conclude that, whenever $p$ is consistent and in $\mathscr{L}_{NC}$, we have for any $c, q : [\![p]\!]^c \subseteq [\![\neg p > q]\!]^c$. The same of course holds whenever $p$ is inconsistent; and so we arrive again at *Ex falso*. Once more, then, classical conjunction puts *IE* in tension with a very intuitive principle, this time *Absurdum*, given background assumptions (*Taut1* and *Taut2*) which seem difficult to challenge.

## 5 Restricted Import-Export

*Import-Export* thus does not sit easily with a classical conjunction. Given some innocuous background assumptions, and assuming that *Ex Falso* is false, if we adopt classical conjunction, then *IE* is inconsistent with *Nothing Added*, and *IE* is inconsistent with *Absurdum*.

My main goal here has been to draw out the surprising, and to my knowledge unnoticed, connections between *Import-Export*—a principle about the logic of conditionals—and the semantics of 'and'. There are a variety of ways we could respond to these results. Accepting *Ex Falso* seems like a non-starter to me. So does rejecting one of the background assumptions (*Conditional Deduction, Equivalence, Taut1, Taut2*). It seems to me, then, that we must reject one of the following: (i) classical conjunction; (ii) *IE*; and (iii) *Nothing Added*; likewise we must reject one of the following: (i) classical conjunction; (ii) *IE*; and (iii) *Absurdum*.

So what are we to do? In concluding, I will, very briefly, argue that the right response to these results is to reject *IE*, in a very limited way. What I propose is, essentially, to split the difference between McGee's approach on the one hand—which has classical 'and', *IE*, and neither of *Nothing Added* nor *Absurdum*—and KM/PK's approach—which has *IE*, *Nothing Added*, and *Absurdum*, together with a non-classical 'and'. The best route, I will argue, is neither of these, but is instead to maintain a classical conjunction, along with *Nothing Added* and *Absurdum*, and therefore reject *IE* in favor of a slightly weaker principle.

Let me start with some negative remarks. Following McGee's route—validating *IE* with a classical conjunction, and therefore invalidating *Nothing Added* and *Absurdum*—is *prima facie* unattractive insofar as those latter principles are very natural, though I will not explore them more carefully here, and certainly further exploration is needed. Following KM/PK's route—adopting a non-classical conjunction, together with *IE* and *Absurdum*—is, likewise, at least *prima facie* unattractive. On the positive side, the non-classical conjunctions under discussion do behave classically except when a right conjunct is a conditional, and it does not seem implausible that intuitions that seem to support classical treatments of conjunctions really only support a classical treatment when the right conjunct is not a conditional. And, indeed, the non-classical conjunctions under consideration bears a close resemblance to non-classical conjunctions which have been motivated and defended in the dynamic semantics literature on the basis of facts about anaphora, presupposition, and—most closely related to present considerations—epistemic modality (see e.g. Heim 1982, 1983, Groenendijk et al. 1996).[11] But there are serious drawbacks to accepting this non-classical 'and'. The most important one, it seems to me, is that the non-classical 'and' advocated by PK and KM invalidates certain logical principles which seem very intuitive in natural language, even when 'and' conjoins conditionals. The most prominent of these is the principle of non-contradiction, which says that $\ulcorner p \wedge \neg p \urcorner$ is a contradiction. This principle is not valid in PK or KM; in particular, we will get

11 Indeed, in Mandelkern 2018, I defend a non-classical conjunction on the basis of considerations about epistemic modality. But it differs substantially from the one under discussion here, both in motivation and in its logical profile; in particular, unlike the one under consideration here, that conjunction Strawson-validates all classical logical laws.

countermodels when $p$ itself is a conditional. That is, some sentences of the form $\ulcorner(q > r) \wedge \neg(q > r)\urcorner$ are consistent in these frameworks (I leave the proof to the reader: the key point is that the second conditional is interpreted under the scope of the first, and thus can be false while the first is true). This seems like a bad result, one not borne out by natural language; (3) for instance seems just as contradictory as (4):

(3) If Bob is in his office, Sue is too; and, it's not the case that if Bob is in his office, Sue is too.

(4) Bob is in his office and it's not the case that Bob is in his office.

Both of these options thus have clear drawbacks. I believe there's an alternative option which is much more attractive, which consists, again, in maintaining a classical conjunction, along with *Nothing Added* and *Absurdum*, and therefore rejecting *IE* in favor of a slightly weaker principle.

To go through my argument, a bit of review is in order. The year is 1980: the Republican candidate Reagan is ahead in the polls, followed by the Democrat Carter. Well behind both is Anderson, a second Republican. McGee (1985) noted that the following conditional sounds clearly true in this situation:

(5) If a Republican wins the election, then if Reagan doesn't win, Anderson will.

McGee noted, however, that the following conditional sounds clearly false:

(6) If Reagan doesn't win the election, Anderson will.

Since we nonetheless leave open the possibility that a Republican will win the election, it seems as though it can't be that the truth of 'A Republican will win the election', together with the truth of (5), entails that (6) is true. This is McGee's famous counterexample to *MP*. At the same time, McGee noted that (5) sounds equivalent to (7):

(7) If a Republican wins the election and Reagan doesn't win, Anderson will.

That felt equivalence counts as evidence in favor of *IE*.

The conclusion that *IE* is valid, however, is not unavoidable. Other researchers have indeed explored *IE* and have found no convincing (to my mind) counterexamples to the principle (see Khoo & Mandelkern (2018) for a survey). But, as far as I know, none of those explorations has looked in particular at instances of *IE* where what is being imported and exported is itself a conditional, i.e. at pairs of the form $\ulcorner p > ((q > r) > s)\urcorner$ and $\ulcorner (p \wedge (q > r)) > s)\urcorner$. *IE*, of course, predicts pairs of this form to be equivalent; and readers may have noticed that both of the proofs above make crucial use of precisely this instance of *IE* (in step (iii) of the first, and step (iv) of the second). This means that those proofs would be blocked if we adopted a weaker version of *IE*, which says that the predicted equivalences of *IE* hold *except* when what is being imported and exported is itself a conditional:

*Restricted Import-Export (RIE)*:
$\forall c : \forall p, r \in \mathscr{L} : \forall q \in \mathscr{L}_{NC} : [\![p > (q > r)]\!]^c = [\![(p \wedge q) > r]\!]^c$

*RIE* says that *IE* holds *except* for sentences of the form $\ulcorner p > ((q > r) > s)\urcorner$ and $\ulcorner (p \wedge (q > r)) > s)\urcorner$; that is, $\ulcorner p > (q > r)\urcorner$ and $\ulcorner (p \wedge q) > r\urcorner$ will always be equivalent *unless* $q$ is itself a conditional, in which case these may come apart.

The first thing to note about *RIE* is that *RIE* lets us escape the results presented so far: that is, there is no difficulty validating *RIE* with a classical conjunction, together with *Nothing Added* and *Absurdum*. Indeed, if we take either the PK semantics or the KM semantics given above and replace the non-classical conjunctions there with classical conjunctions, we arrive precisely at semantic theories which validate *RIE* but not *IE*; which have classical conjunction; which validate *Nothing Added* and *Absurdum*, together with all the background principles assumed above; and which do not validate *Ex Falso*.

*RIE* thus lets us validate something close to *IE*, while avoiding the tensions pointed out above. *RIE* at first blush looks hopelessly *ad hoc*. But this appearance is somewhat misleading. First, the appearance of gerrymandering is much less when we look at *RIE* from a semantic rather than a syntactic point of view: as we will see, it is quite straightforward to give natural-looking semantics which validate *RIE*. And, more importantly, I will argue that intuitions about natural language actually match the predictions of *RIE*: conditionals $\ulcorner p > (q > r) \urcorner$ and $\ulcorner (p \wedge q) > r \urcorner$ are always felt to be equivalent, *unless* $q$ is itself a conditional. In that case, intuitions about their truth-values can diverge. For the first part of this claim, I refer readers to the existing literature. My contribution is to the second part: when $q$ is a conditional, $\ulcorner p > (q > r) \urcorner$ and $\ulcorner (p \wedge q) > r \urcorner$ do not strike speakers as equivalent. A variation of McGee's case provides a nice illustration of this. Suppose that we know that Reagan is well ahead of both Carter and Anderson in the polls, but we don't know the relative standing of Anderson and Carter. Now consider the following conditional:

(8) If a Republican will win the election, and if Anderson will win if Reagan doesn't win, then both Republicans are currently in a stronger position to win than Carter.

(8) strikes me as clearly true in the scenario as described. If a Republican will win the election, presumably it will be Reagan, since we know he is in the strongest position to win. But if it's *also* the case that Anderson will win if Reagan doesn't, then that must be because Anderson is in a stronger position than Carter at present. And so it follows that both Anderson and Reagan are in a stronger position to win than Carter: Reagan because we already know that he's ahead of Carter, and Anderson because the conditional fact that Anderson will win if Reagan doesn't, together with our background knowledge that Reagan is ahead, entails that Anderson is doing better than Reagan. (8), then, strikes me as clearly true.

But now consider (9):

(9) If a Republican will win the election, then if Anderson will win if Reagan doesn't, then both Republicans are currently in a stronger position to win than Carter.

(9), *unlike* (8), does not seem clearly true to me. After all, if a Republican wins the next election, then of course it already follows that Anderson will win if Reagan doesn't. And so *that* doesn't tell us anything more, beyond that a Republican will win the election. But a Republican winning the election doesn't show that both

Republicans are in a stronger position to win than Carter. In other words, the set-up described by 'If a Republican wins the election, then if Aderson will win if Reagan doesn't' seems clearly consistent with the following situation: Reagan is well ahead; then Carter; and then Anderson. And in this situation, it's not the case that both Republicans are ahead. Certainly (9) seems to be *consistent* with the scenario described, but it does not seem clearly true in that scenario; whereas (8) does. In short, my credence in (8) is very high; my credence in (9) is at best middling. If my credences in these can rationally come apart, then they cannot express the same proposition; they cannot be semantically equivalent.

I conclude that (8) and (9) are not semantically equivalent. But now note that (8) has the form $\ulcorner p > ((q > r) > s)\urcorner$, and (9) has the form $\ulcorner(p \wedge (q > r)) > s\urcorner$—with $p =$'a Republican will win the election', $q =$'Reagan doesn't win', $r =$'Anderson will win', and $s =$'both Republicans are currently in a stronger position to win than Carter'. That means that, if *IE* is valid, then (8) and (9) are semantically equivalent. And indeed, McGee, PK, and KM all predict this equivalence, by validating *IE*—though in different ways. McGee, by validating *IE* with a classical conjunction, predicts that both (8) and (9) have the truth conditions which, intuitively, only (8) has—i.e. that both conditionals are clearly true in the situation as described. PK and KM validate *IE* by generalizing in the opposite direction: they predict that (8) and (9) both have the truth conditions which, intuitively, only (9) has—i.e. that neither conditional is clearly true in the situation as described.

But, as we have seen, contrary to these predictions, (8) and (9) seem to mean different things. And so *IE* is not valid; for if *IE* were, then (8) and (9) would be semantically equivalent. In particular, this divergence shows that *IE* fails for pairs of the form $\ulcorner p > ((q > r) > s)\urcorner$ and $\ulcorner(p \wedge (q > r)) > s)\urcorner$, just as *RIE* predicts. Conditionals, it seems, cannot themselves be imported and exported *salva veritate*.

Thus I am inclined to think that the right way out of the tangle I have identified in this paper is the following. We should not take on *IE* in full generality; for doing so forces us to either give up a classical conjunction, or else to give up *Nothing Added* and *Absurdum*, all of which seem attractive. And indeed, all the intuitions that have been adduced in the literature in favor of *IE* are in fact consistent with

*IE* being invalid and just the weaker principle *RIE* being valid. Moreover, contrasts like that between (8) and (9) show that *IE* fails precisely where *RIE* predicts it to: when we import and export a sentence which is itself a conditional. So we should accept *RIE* instead of *IE*. Doing so lets us adopt a fully classical semantics for conjunction, while still validating *Nothing Added* and *Absurdum*. (There are, again, many ways we could spell out an approach like this; two options are obtained, again, by replacing the non-classical conjunctions in PK or KM with classical conjunction).

## 6 Conclusion

*IE* does not sit easily with classical 'and'. I have illustrated this by showing that, if we have classical 'and' and *IE*, there are two very natural principles which we cannot validate. I have argued that the best resolution to this puzzle is to reject *IE* in favor of a slightly weaker principle, *RIE*, which better fits the data, and which allows us to hold onto both of those principles and classical conjunction.

Others may prefer to find a different way out of this tangle; my main goal here has been to identify a mess which so far has been passed over in dignified silence.

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