# Fatalism and the Logic of Unconditionals*

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**Abstract**

In this paper, I consider a variant of the ancient Idle Argument involving so-called "unconditionals" with interrogative wh-antecedents. This new Idle Argument provides an ideal setting for probing the logic of these close relatives of *if*-conditionals, which has been comparatively underexplored. In the course of refuting the argument, I argue that contrary to received wisdom, many *wh*-conditionals are not properly speaking 'unconditional' in that they do not entail their main clauses, yet *modus ponens* remains valid for this class of expressions. I make these lessons formally precise in a semantic system that integrates recent decision-theoretic approaches to deliberative modals with ideas from inquisitive semantics. My larger aim is to challenge standard truth preservation views of logic and deductive argumentation.

## 1 The New Idle Argument

In this paper, I consider a new version of one of the oldest arguments in philosophy: the "Idle Argument" (also known as the "Lazy Argument").[1] This notorious argument survives in Cicero's *De Fato* (44BCE), where it is associated with the Stoic philosopher Chrysippus, and it also appears in Origen's *Contra Celsus* (248CE) (Bobzien 2001). In the modern era, the argument resurfaces in Dummett (1964) and is also discussed by Stalnaker (1975).

The new Idle Argument involves so-called "unconditionals" with interrogative wh-adjuncts; it is inspired by a structurally similar argument of Charlow (*ms.*) involving *if*-conditionals. The setting is London during WWII just as sirens sound warning of an approaching air raid. As you deliberate about whether to cut your supper short and go take shelter, the Fatalist (calm as ever) points out the following:

(1) If you are going to be killed in the raid, then you're better off staying where you are than taking precautions. (After all, if you *are* going to be killed, then you're going to be killed whether or not you take precautions.)

He then continues down the other fork:

(2) On the other hand, if you aren't going to be killed, then you're better off staying where you are than taking precautions. (After all, if you *aren't* going to be killed in the raid, then you aren't going to be killed even if you neglect to take precautions.)

Putting this together, the Fatalist infers this alternative unconditional:

(3) So, whether or not you are going to be killed, you're better off staying where you are than taking precautions.[2]

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[1] The "Idle/Lazy Argument" is best regarded as an umbrella term with a family of related arguments falling in its extension. I consider only one of these here.

[2] Note that the corresponding indicative conditional sounds terrible:

(i) ?? If you are going to be killed or not, you are better off staying where you are than taking precautions.

This violates what Ciardelli (2016b) calls "Zaefferer's rule": if the alternatives for the antecedent cover the context set, use the unconditional form; otherwise, the regular conditional form is required.

Detaching its consequent, he concludes:

(4) So look, you are better off staying where you are than taking precautions.

Not surprisingly, you sense something amiss with this argument, and so you set off towards the air-raid shelter. But why? What exactly is wrong with the new Idle/Lazy argument?

In §2-5, I consider several lines of response. I will be kind to the Fatalist—when ambiguity threatens, I will grant him readings necessary to make a premise hold or an inferential step go through. Running through the Idle Argument in this generous spirit, I want to see how far he can get. Spoiler alert: I ultimately conclude that the Fatalist can safely reach (3), but the final step of the argument is then problematic where he infers his conclusion (4) from this unconditional. I sharpen this diagnosis in §6, where I flesh out the context of the Idle Argument in more detail and present a formal semantics for *iffy better off* sentences that makes the essential features of my informal diagnosis formally precise. While the new Idle Argument reveals that many *wh*-conditionals do not entail their consequents, I conclude in §7 by arguing that *modus ponens* is nevertheless valid for these constructions.

# 2 Possible Escape Routes

Moving forward more carefully now, we can observe that the argument (1)-(4) relies on two prima facie plausible principles for unconditionals.

(5) **CA for *or not* unconditionals** **Consequent entailment (CE)**

$$\frac{\textit{If } \varphi, \psi \qquad \textit{If not-}\varphi, \psi}{\textit{Whether or not } \varphi, \psi} \qquad\qquad \frac{\textit{Whether or not } \varphi, \psi}{\psi}$$

Anyone looking to escape the Fatalist's conclusion must therefore respond in one of these ways:

(i) Reject one or both of the conditionals (1) and (2). I consider this option in §3.

(ii) Reject or restrict CA for *or not* unconditionals (this must be done only for readings of the indicative on which premises (1) and (2) both hold). More on this in §4.

(iii) Reject or restrict CE (for any reading of the unconditional (3) on which it follows from the Fatalist's premises). More on this in §5.

(iv) Play around with logic form. One might argue that we do not have a genuine instance of CA or CE on our hands.

(v) Take a desperate measure. For instance, one might deny the transitivity of entailment. I set options (iv) and (v) aside here.

# 3 On the Premises

In the half-century or so since the publication of Dummett's (1964) "Bringing About the Past", there has been an explosion of research on conditionals and modality. So there is now more room than ever to debate the Fatalist's premises. However, I'm willing to just grant the Fatalist his premises, for a couple of reasons.

First, there is at least one natural reading of the conditionals (1) and (2) on which they are difficult to deny. I submit that these premises have a "reflecting" reading (Cariani, Kaufmann & Kaufmann 2013) on which they are evaluated relative to the actual or potentially available information of some deliberating agent or agents (the natural choice: you) together with some representation of the agent's preferences and perhaps also a method for making decisions, and by the time we get around to evaluating the embedded claim of comparative *betterness*, the background information state has been updated with the information that you will be killed (in the case of (1)) or won't be (in the case of (2)). On this reading, how can the conditionals be rejected? In the first instance where it is provisionally taken for granted that you will be killed, the choice between staying where you are and taking precautions is one between death and death after cutting your dinner short and trudging outside. In the second instance, the choice is between life and life with this bother. Either way, isn't it clearly better to stay put?

Admittedly, there are additional readings on which (1) and (2) do not sound nearly as good (Cariani et al.'s 2013 "non-reflecting" reading, for example). But rather than trying to argue that one or both of these premises fail to hold on *any* reading, let me also point out that there are structurally parallel arguments to the Idle Argument in §1 with fairly innocuous premises but terrible conclusions. Arguments like Missing Cat suggest that we do well to venture downstream from the premises of the Idle Argument and focus on its inferential steps:

**Missing Cat.** Grandma Rose has two orange tabbies and one gray shorthair. Grandma Pearl has two gray shorthairs and one orange tabby. Unfortunately, one of these cats has gone missing. Each of the cats is as likely to have gone missing as any of the others.

(6) If Grandma Rose lost one of her cats, then it is not equally likely that an orange or a gray cat went missing.

(7) Likewise, if Grandma Pearl lost one of her cats, then it is also not equally likely that an orange or a gray cat went missing.

(8) So, whether it was Grandma Rose that lost one of her cats or Grandma Pearl, it is not equally likely that an orange or a gray cat went missing.

(9) So, it is not equally likely that an orange or a gray cat went missing.

## 4 CA for Unconditionals

Going forward, I follow much of the literature on the semantics of questions in assuming that interrogatives can be assigned *alternative sets* (Hamblin 1973; Groenendijk & Stokhof 1984; Ciardelli et al. 2018). Crucially, I assume this holds for embedded clauses with interrogative morphology as well—in particular, I take it that the wh-adjuncts of alternative unconditionals contribute the same alternative sets as the corresponding root questions (Rawlins 2013; Ciardelli 2016b). For example, the antecedent of (8) introduces the two possible answers to the question it expresses: that Rose lost a cat, and that Pearl lost a cat.

Now, a common reaction to Missing Cat is to pin the blame on the inference from (6) and (7) to (8) using CA. These CA-rejectors seem to be evaluating the likelihood claim embedded in the unconditional (8) against a domain where the missing cat might be any of the six cats. This suggests the following interpretation strategy:

(10) **Flattened interpretation of alternative *wh*-conditionals**
An alternative unconditional *Whether* $\varphi$ *or* $\psi$, $\chi$ is evaluated relative to an information state by first adjusting this state to support the information that at least one of the alternatives contributed by *Whether* $\varphi$ *or* $\psi$ holds and then evaluating $\chi$ with respect to the updated state.

In fact, alternative unconditionals are widely regarded to presuppose that one of the alternatives for their antecedent holds (more on this in §6). With felicitous uses, the initial update step in (10) is inert and we can evaluate *Whether* $\varphi$ *or* $\psi$, $\chi$ simply by considering $\chi$. The upshot: if unconditionals are interpreted along the lines of (10), then CA can fail but CE trivially holds.

However, the Fatalist might now argue that (10) isn't the right way to evaluate alternative unconditionals, or at least that (10) isn't the *only* way to evaluate them, and the "flattened" reading of (3) isn't what he had in mind regardless. Indeed, many semanticists working on unconditionals accept this alternative treatment (Rawlins 2013; a.m.o.):

(11) **Pointwise interpretation of alternative *wh*-conditionals**
*Whether $\varphi$ or $\psi$, $\chi$* is evaluated with respect to an information state by updating it with each of the alternatives for the antecedent in turn. If $\chi$ holds in each of the subordinate contexts induced by the different alternatives, then the unconditional holds.

So the idea is to evaluate (3) not by 'updating' with the tautology that you will be killed or not, but rather by first updating with the information that you will be killed and asking whether it is better to take precautions under this supposition, and then updating with the information that you will not be killed and asking about the precautions. If the value of (3) turns on whether both of these pointwise applications of the Ramsey Test pass, then (3) *does* seem to follow from (1) and (2). More generally, CA seems to fall directly out of (11) (as does its converse SDA).

The Fatalist can offer empirical considerations for thinking that alternative unconditionals are often (if not always) read pointwise. One kind of consideration is that *Whether $\varphi$ or $\psi$, $\chi$* is commonly used to send a stronger message than plain $\chi$ in a way predicted by (11) but not by (10), at least not straightforwardly. Compare the following:

(12) Whether Rodrigo or Brenda is making dinner, we might need to order takeout.

(13) We might need to order takeout.

Suppose the context is one in which it is taken for granted that Rodrigo or Brenda is making dinner (so the exhaustivity presupposition of (12) is met). In uttering (12), a speaker is arguably conveying that her current state of knowledge (or some other relevant body of information) leaves open both Rodrigo-makes-dinner possibilities and Brenda-makes-dinner possibilities in which disaster strikes and we need to order takeout. In contrast, one can utter (13) if Rodrigo or Brenda is an excellent cook, so long as the other is capable of ruining groceries.

The following examples further support the existence of pointwise readings:

(14) *Whether Julia is vacationing in Venezuela or Brazil, she might be in Caracas.

(15) *Whether or not Alfonso comes to the party, if Alfonso comes, you should come.

These sound not just false but absurd. However, this is surprising if the alternatives for the antecedents are flattened and both (14) and (15) are equivalent to their main clauses.

## 5 Consequent Entailment

I am suggesting that the Fatalist can get all the way to (3) by appealing to available readings for *if*-conditionals and *wh*-conditionals. Can he cross the final gap and reach his conclusion (4) using CE? No. This is, I think, where we should make our stand.

On what I have been calling the "reflecting" reading of (1), its value depends on what you're better off doing relative to information according to which you will die (together with a set of preferences, a decision rule, or whatever other structure is needed). The value of (2) likewise depends on information updated to support that you will survive. So, both premises presumably hold, as does (3) when interpreted pointwise, which rises or falls together with the conjunction of the Ramsey tests. However, the conclusion (4) presumably turns on what you're better off doing in your original non-updated information state, where you remain ignorant about whether you're going to killed and uncertain about what you're going to do, so this non-conditional claim doesnt hold. More generally, *betterness* claims are, like *likelihood* claims, highly sensitive to the information states against which they are evaluated. So CE can fail.

To be clear, I am *not* calling for a blanket rejection of the CE rule for *wh*-conditionals on their pointwise reading. Many (unflattened) *wh*-conditionals *do* entail their consequents:

(16) Whether it was Rose that lost one of her cats or Pearl, there's a fireman on the way.

(17) Whether Rodrigo or Brenda is making dinner, we're probably having pasta.

These sentences entail that there is a fireman coming and that we are probably having pasta for dinner. Unlike the consequents that have created trouble for CE, those of (16) and (17) are informationally 'well-behaved' (I sharpen the conditions under which CE is reliable in §6).

# 6 A Decision-Theoretic Semantics

Let us now assume that the logical forms of (1)-(4) can be represented at a suitable level of abstraction using a formal language $\mathcal{L}$ generated from a stock of atomic sentence letters $At_{\mathcal{L}}$, negation '$\neg$', conjunction '$\wedge$', and disjunction '$\vee$' in the usual way. The language $\mathcal{L}$ also includes a binary *better* operator '$\bigstar$' whose arguments are restricted to basic non-modal sentences built from the Boolean connectives, a question operator '?' whose single argument also takes only sentences in this basic fragment, and a conditional operator '$>$' whose first argument (antecedent) is restricted to basic sentences and basic sentences preceded by '?' but whose second argument (consequent) is unrestricted. Let $S_{\mathcal{L}}$ be the set of all sentences of $\mathcal{L}$.[3]

I interpret sentences in $S_{\mathcal{L}}$ with respect to *decision-theoretic* structures that encode (i) an agent's preferences over outcomes obtainable if she acts in certain ways and certain states of the world prevail, (ii) her information about these states, and (iii) her method of choosing between the options (see Carr 2012; Charlow 2016; Lassiter 2017 for related proposals). I call these structures "decision states". Their first component is a "decision problem":

(18) **Decision problems**

A *decision problem* $DP$ over $\mathcal{W}$ is a tuple $\langle A, S, U, C\rangle$ where

a. $A, S \subseteq \mathcal{P}(\mathcal{W})$ are partitions of propositions (the *action set* and *state space*)

b. $U : A \times S \to \mathbb{R}$ maps action-state pairs to real numbers (the *utility function*)

c. $C : \mathcal{P}(\mathcal{W}) \to \mathbb{R}[0, 1]$ maps propositions to the unit interval (the *credence function*) (I assume $C$ is a probability measure over a finite space $\mathcal{W}$ in what follows.)

Their second component is a "decision rule" that evaluates the actions of decision problems:

(19) **Decision rules**

A *decision rule* $R$ is a function that maps a decision problem $DP$ to a partial order $\leq_{R(DP)}$ over its action set $A$.

If $a_1 \leq_{R(DP)} a_2$ then performing $a_2$ is at least as good as performing $a_1$ according to the rule $R$. For instance, rational agents might implement the following rule **MaxEU**:

(20) $a_1 \leq_{\textbf{MaxEU}(\text{DP})} a_2$ iff $EU(a_1) \leq EU(a_2)$, where $EU(a) = \sum_{s \in S} C(s|a) \times U(a, s)$.[4]

But I don't want to insist that Expected Utility Theory has a monopoly on rational decision making, so I allow for other decision rules besides.

In the context of the Idle Argument, you face the dilemma of choosing between taking shelter or staying put. Suppose that the outcome of your decision depends on whether a bomb is dropped in your vicinity and, if so, its size. If a large bomb is dropped, you're dead either way. If no bomb is dropped, you survive either way. But if a small bomb is dropped, then you live iff you take cover. This DP—call it **Air Raid**—has the following action set/state space:

[3] '$K$', '$S$', and '$P$' abbreviate 'You are going to be killed', 'You stay where you are', and 'You take precautions' respectively, $\varphi_0$, $\psi_0$, ... range over sentences in the basic fragment of $\mathcal{L}$, and $\varphi$, $\psi$, ... range over all sentences.

[4] I work with this version of Expected Utility Theory for ease of exposition. I'm not looking to take a stand between causal vs. evidential decision theory.

(21) $A_{\mathbf{AR}} = \{\lambda w_s.\text{you take precautions in } w, \lambda w_s.\text{you stay where you are in } w\}$

(22) $S_{\mathbf{AR}} = \{\lambda w_s.\text{large bomb in } w, \lambda w_s.\text{small bomb in } w, \lambda w_s.\text{no bomb in } w\}$

To further fix ideas, suppose that the value of extended life is 100 utils, death is valued at -100 utils, and making efforts contributes a relatively minor loss of a single util:

(23) $U_{\mathbf{AR}}(\lambda w.\text{you take precautions in } w, \lambda w.\text{large bomb in } w) = -101$
$U_{\mathbf{AR}}(\lambda w.\text{you take precautions in } w, \lambda w.\text{small bomb in } w) = 99$ etcetera.

Furthermore, suppose you have these conditional credences:

(24) $C_{\mathbf{AR}}(s|a) = 1/3$ for each $a \in A$ and $s \in S$.

In this case, a simple calculation establishes that the expected utility of taking precautions is greater than that of staying where you are:

(25) $\mathcal{V}(S) <_{\mathbf{MaxEU}(\mathbf{Air\ Raid})} \mathcal{V}(P)$

So Expected Utility Theory recommends ignoring the Fatalist.

We can now simultaneously assign support $\models$ and reject $=\!\!|$ conditions to the sentences in $S_{\mathcal{L}}$ parametrized to the following structures:

(26) **Decision states**
A *decision state* $d = \langle DP_d, R_d \rangle$ consists of a decision problem and decision rule.

Sentence letters are supported by decision states whose DP-parameter includes a credence function all of whose mass is concentrated on the $\alpha$-worlds in $\mathcal{W}$ and rejected by states whose credal mass is spread entirely across not-$\alpha$-worlds:

(27) **Interpretation of atomic formulae**
$d \models \alpha$ iff $C_{DP_d}(\mathcal{V}(\alpha)) = 1$ $\quad d =\!\!| \, \alpha$ iff $C_{DP_d}(\mathcal{V}(\alpha)) = 0$

Negation flips between support and rejection (Hawke & Steinert-Threlkeld 2016):

(28) **Interpretation of negation**
$d \models \neg\varphi$ iff $d =\!\!| \, \varphi$ $\quad d =\!\!| \, \neg\varphi$ iff $d \models \varphi$

Conjunction and disjunction are defined as follows (cf. Ciardelli et al. 2018):

(29) **Interpretation of conjunction and disjunction**
$d \models \varphi \wedge \psi$ iff $d \models \varphi$ and $d \models \psi$ $\quad d =\!\!| \, \varphi \wedge \psi$ iff $d =\!\!| \, \varphi$ or $d =\!\!| \, \psi$
$d \models \varphi \vee \psi$ iff $d \models \varphi$ or $d \models \psi$ $\quad d =\!\!| \, \varphi \vee \psi$ iff $d =\!\!| \, \varphi$ and $d =\!\!| \, \psi$

To interpret *better*, we must first introduce another notion of *propositional support* for sentences in $S_{\mathcal{L}}$ relative to qualitative information states, modeled as sets of possible worlds. Every decision state $d$ determines such an information state consisting of the worlds in $\mathcal{W}$ assigned nonzero probability by its component credence function:

(30) $i_d = \{w \in \mathcal{W} : C_{DP_d}(\{w\}) > 0\}$.

Propositional support is defined in terms of these states:

(31) **Propositional support**
Given any information state $i \subseteq \mathcal{W}$ and $\varphi \in S_{\mathcal{L}}$, $i \models \varphi$ iff for any $d$ s.t. $i = i_d$, $d \models \varphi$.

Note for example that

(32)
$i \models P \vee S$ iff for any $d$ such that $i = i_d$, $d \models P \vee S$
iff for any..., $C_{DP}(\mathcal{V}(P)) = 1$ or $C_{DP}(\mathcal{V}(S)) = 1$
iff $i \subseteq \mathcal{V}(P)$ or $i \subseteq \mathcal{V}(S)$.[5]

[5] This is the support condition from the most basic system of inquisitive semantics, `InqB` (Ciardelli et al. 2018). The propositional support conditions in (31) coincide with those in `InqB` for basic sentences without negation, but they can diverge for negated sentences. For instance, $i \models \varphi_0$ iff $i \models \neg\neg\varphi_0$ in our system but this equivalence fails in `InqB`. The differences between the systems don't matter for present purposes.

As in inquisitive semantics, we next define the *alternatives* for $\varphi \in S_{\mathcal{L}}$ to be the maximal (qualitative) information states that support it (Ciardelli et al. 2018):

(33) $alt(\varphi) = \{i \subseteq \mathcal{W} : i \models \varphi$ and there is no $i \subset i'$ s.t. $i' \models \varphi\}$

For example, the set of alternatives for $P \vee S$ is $alt(P \vee S) = \{\mathcal{V}(P), \mathcal{V}(S)\}$.

The semantics for *better* is defined in terms of these alternative sets:

(34) **Interpretation of comparative betterness**
$d \models \bigstar(\varphi_0, \psi_0)$, $d \dashv \bigstar(\varphi_0, \psi_0)$ are defined only if $alt(\varphi_0), alt(\psi_0) \subseteq A_{DP_d}$.[6] If defined,

$d \models \bigstar(\varphi_0, \psi_0)$ iff for all $a \in alt(\varphi_0)$ and $a' \in alt(\psi_0)$, $a' <_{R_d(DP_d)} a$.
$d \dashv \bigstar(\varphi_0, \psi_0)$ iff for some $a \in alt(\varphi_0)$ and $a' \in alt(\psi_0)$, $a \leq_{R_d(DP_d)} a'$.

To get a feel for (34), consider the following argument (Lassiter's 2017 "Disjunctive Inference"):

(35) It is better to mail the letter than to burn it.

(36) It is better to mail the letter than to throw it in the trash.

(37) So, it is better to mail the letter than to either burn it or throw it in the trash.

Our semantics nicely predicts that this reasoning is impeccable. Translating the argument as $\bigstar(M, B)$, $\bigstar(M, T) \therefore \bigstar(M, B \vee T)$, (34) implies that $d$ supports (35) iff the set of $M$-worlds in which you mail the letter and the set of $B$-worlds in which you burn it are both actions of $DP_d$ and $R_d$ recommends the former over the latter. Similarly, $d$ supports (36) iff the set of $T$-worlds in which you throw the letter away is also an action of $DP_d$ and $R_d$ recommends mailing the letter over discarding it. But then $d$ must also support (37), as the alternatives for $M$ and the "inquisitive" $B \vee T$ are all actions and the former is preferred to each of the latter actions.[7]

To formalize the Fatalist's premises, we still need a semantics for '$>$'. The intuitive idea behind my proposal is that a decision state $d$ supports a conditional of the form $\varphi_0 > \psi$ or $?\varphi_0 > \psi$ iff every way of minimally updating $DP_d$ with one of the alternatives for $\varphi_0$ or $?\varphi_0$ delivers a decision state that supports the consequent $\psi$ (this semantics is inspired by related proposals in Yalcin 2007; Kolodny & MacFarlane 2010; Ciardelli 2016b; a.o.). This set of updated states $d \oplus \varphi_{?0}$ is determined as follows, where $\varphi_{?0}$ is a sentence of the form $\varphi_0$ or $?\varphi_0$:

(38) $DP + i = \langle A_{DP}, S_{DP}, U_{DP}, C_{DP}(\cdot|i)\rangle$
Defined only if $C_{DP}(i) > 0$.

(39) $d \oplus \varphi_{?0} = \{d' : d' = \langle DP_d + i, R_d\rangle$ for some $i \in alt(\varphi_{?0})\}$

With (39) in hand, conditional expressions can now be evaluated in this Ramseyian manner:

(40) **Interpretation of conditional operator**
$d \models \varphi_{?0} > \psi$, $d \dashv \varphi_{?0} > \psi$ are defined only if $d \models \varphi_{?0}$ is defined and for all $d' \in d \oplus \varphi_{?0}$, $d' \models \psi$ is defined. If defined,

$d \models \varphi_{?0} > \psi$ iff for all $d' \in d \oplus \varphi_{?0}$, $d' \models \psi$
$d \dashv \varphi_{?0} > \psi$ iff for some $d' \in d \oplus \varphi_{?0}$, $d' \not\models \psi$

The definability condition in (40) ensures that presuppositions project out of the antecedents of conditionals. This is important when proving various facts about the logic of *wh*-conditionals.

Applying (40) to premise (1) of the Idle Argument gives us:

(41) $d \models K > \bigstar(S, P)$ iff for all $d' \in d \oplus K$, $d' \models \bigstar(S, P)$
iff $\mathcal{V}(P) <_{R_d(DP_d + \mathcal{V}(K))} \mathcal{V}(S)$ (assuming presuppositions met)

[6] We take it to be a presupposition of an action-guiding sentence of the form $\bigstar(\varphi_0, \psi_0)$ that the alternatives for each argument are actions of the DP against which it is evaluated. When I say that "$d \models \varphi$ is (un)defined" or "$d \dashv \varphi$ is (un)defined", what I really mean to say is that the characteristic function for the relation $\models$ or $\dashv$ is (un)defined on $\langle d, \varphi\rangle$. With presuppositions around, these characteristic functions are partial.

[7] I assume here that valid (deductively good) inferences preserve support. More on this in a few paragraphs.

So if we assume that

(42) $C_{\mathbf{AR}+\mathcal{V}(K)}(\lambda w_s.\text{large bomb in } w|\lambda w_s.\text{precautions in } w) = 1$
$C_{\mathbf{AR}+\mathcal{V}(K)}(\lambda w_s.\text{large bomb in } w|\lambda w_s.\text{stay put in } w) = 1/2$
$C_{\mathbf{AR}+\mathcal{V}(K)}(\lambda w_s.\text{small bomb in } w|\lambda w_s.\text{stay put in } w) = 1/2$

this premise is supported by $\langle \mathbf{Air\ Raid}, \mathbf{MaxEU} \rangle$. Making similar assumptions, one can also establish that premise (2) is supported by this state. The semantics thus allows us to see how both of the Fatalist's premises can hold with respect to a single decision state—at least when these premises are understood "reflectively".

How does the rest of the Idle Argument play out? To evaluate the unconditional (3), we need to round the semantics off with an entry for '?'. I follow Rawlins (2013) in assuming that the sole function of the question operator is to contribute new presuppositions to the effect that one and only one alternative for the basic sentence it operates on holds:

(43) **Interpretation of question operator**
$d \models ?\varphi_0, d \dashv ?\varphi_0$ are defined only if (i) $C_{DP_d}(\bigcup alt(\varphi_0)) = 1$, and (ii) for all $i, i' \in alt(\varphi_0)$ where $i \neq i'$, there is no $w \in i \cap i'$ such that $C_{DP_d}(\{w\}) > 0$.

If defined, $d \models ?\varphi_0$ iff $d \models \varphi_0$ and $d \dashv ?\varphi_0$ iff $d \dashv \varphi_0$.[8]

The exhaustivity (i) and exclusivity (ii) constraints in (43) project out of the *wh*-adjunct of alternative unconditionals, which thereby presuppose that exactly one alternative for their antecedent holds. For the special case of *or not wh*-conditionals, these presuppositions are trivially satisfied. When evaluating (3), the question operator can be ignored:

(44) $d \models ?(K \vee \neg K) > \bigstar(S, P)$
iff for all $d' \in d \oplus (K \vee \neg K)$, $d' \models \bigstar(S, P)$
iff $\langle DP_d + \mathcal{V}(K), R_d \rangle \models \bigstar(S, P)$ and $\langle DP_d + \mathcal{W}\backslash\mathcal{V}(K), R_d \rangle \models \bigstar(S, P)$
iff $d \models K > \bigstar(S, P)$ and $d \models \neg K > \bigstar(S, P)$.

So relative to the **MaxEU** rule at least, the Fatalist's use of CA doesn't lead him astray. However, given the earlier result (25), his conclusion (4) is rejected by $\langle \mathbf{Air\ Raid}, \mathbf{MaxEU} \rangle$.

To assess the validity of the inference rules CA or CE themselves, we still need to define a formal notion of consequence over $\mathcal{L}$. Because we are working with both support and reject conditions, there are a number of different options. Leaving a more detailed exploration of these options for the future, we simply require that whenever support conditions are defined for the premises and conclusion of an argument, this argument preserves support (this is basically what you get by crossing a decision-theoretic upgrade of Yalcin's 2007 "informational consequence" (see also Veltman's 1996 '$\models_3$') with von Fintel's 1999 "Strawson-entailment"):

(45) **Strawsonian support-preserving consequence**
$\{\varphi_1, ..., \varphi_n\} \models \psi$ iff for any decision state $d$ such that $d \models \varphi_1, ..., d \models \varphi_n, d \models \psi$ are defined, if $d \models \varphi_1, ..., d \models \varphi_n$, then $d \models \psi$.

It can be shown that the general CA rule for alternative *wh*-conditionals is validated by (45):

(46) **CA is valid.** $\{\varphi_0 > \chi, \psi_0 > \chi\} \models ?(\varphi_0 \vee \psi_0) > \chi$.[9]

However, CE isn't unrestrictedly valid, as discussed above:

[8] This is another place where I diverge from inquisitive semanticists, who treat '?' as a kind of projection operator definable in terms of negation and disjunction: $?\varphi_0 := \varphi_0 \vee \neg\varphi_0$ (Ciardelli et al. 2018).

[9] It is crucial that support for the conclusion is defined; if not, CA needn't preserve support. To see this, consider a state $d$ such that $i_d = \{w_1, w_2, w_3\}$, where $w_1$ is the only $A$-world, $w_2$ is the only $B$-world, $w_3$ is the only $C$-world, and all three worlds are $D$-worlds. Although $d \models A > D$ and $d \models B > D$, $d \models ?(A \vee B) > D$ is undefined because the exhaustivity presupposition contributed by its '?'-adjunct isn't satisfied.

(47) **CE is invalid.** $\{?(\varphi_0 \vee \psi_0) > \chi\} \not\models \chi$.

As mentioned in §4, alternative *wh*-conditionals still entail their main clauses in a broad range of cases. Let us call a sentence $\varphi \in S_{\mathcal{L}}$ "coarsely distributive" iff it has the following property:

(48) **Coarse distributivity**
The sentence $\varphi \in S_{\mathcal{L}}$ is *coarsely distributive* iff for any partition $I = \{i_1, ..., i_n\}$ over $\mathcal{W}$ and state $d$, if $\langle DP_d + i_1, R_d\rangle \models \varphi$,..., and $\langle DP_d + i_n, R_d\rangle \models \varphi$, then $i \models \varphi$.[10]

CE is valid so long as we restrict our attention to such sentences:

(49) **CE is valid for coarsely distributive consequents.**
For any coarsely distributive $\chi$, $\{?(\varphi_0 \vee \psi_0) > \chi\} \models \chi$.

As also mentioned in §4, CE holds for alternative *wh*-unconditionals if these receive a flattened interpretation. We can recover this reading in our system by adding a 'flattening' operator '!' to $\mathcal{L}$ that can be inserted before basic sentences and basic sentences preceded by '?':[11]

(50) **Flattening operator**
$d \models !\varphi_{?0}, d \mathrel{=\!\!|} !\varphi_{?0}$ are defined only if $d \models \varphi_{?0}$ is defined. If defined,

$$d \models !\varphi_{?0} \quad \text{iff} \quad C_{DP_d}(\textstyle\bigcup alt(\varphi_{?0})) = 1$$
$$d \mathrel{=\!\!|} !\varphi_{?0} \quad \text{iff} \quad C_{DP_d}(\textstyle\bigcup alt(\varphi_{?0})) < 1$$

If (40) is extended in the natural way to accommodate conditionals with $!\varphi_{?0}$-antecedents, CE holds for the flattened case:

(51) **CE is valid for flattened *wh*-conditionals.**
$\{!?(\varphi_0 \vee \psi_0) > \chi\} \models \chi$.

# 7 Is *Modus Ponens* Valid for *Wh*-conditionals?

To conclude, I want to say a few words about how *not* to conclude. Charlow (*ms.*) argues on the basis of similar arguments to the Idle Argument in §1 that *modus ponens* (MP) is invalid. But while the adjunct of (3) might seem tautological, it is incorrect to think we have a failure of MP here. Crucially, the antecedent of (3) is the *interrogative* sentence 'Whether or not you are going to be killed'. More generally, MP for *or not wh*-conditionals takes the following form:

(52) **MP for *or not* unconditionals**

$$\frac{\textit{Whether or not } \varphi,\, \chi \qquad \textit{Whether or not } \varphi}{\psi}$$

In fact, if we grant the Fatalist the extra premise $?(K \vee \neg K)$, then his argument goes through. It can be shown that the following general MP rule for alternative *wh*-conditionals is valid:

(53) **MP is valid.** $\{?(\varphi_0 \vee \psi_0) > \chi, ?(\varphi_0 \vee \psi_0)\} \models \chi$.

So in particular $?(K \vee \neg K) > \bigstar(S, P)$, $?(K \vee \neg K) \therefore \bigstar(S, P)$. Note, however, that all the extended argument establishes is that a decision state that supports (3) and *settles* the question of whether or not you will be killed also supports that it is better to stay where you are than to take precautions (assuming that support is even defined; see Ciardelli 2016a for further helpful discussion about argumentation with questions). In other words, the extended fatalistic argument establishes only that you are better off staying put when it is known what will come to pass—hardly a result that will lead the youth to a life of idleness.

[10] Are all basic non-modal sentences coarsely distributive? No. Simple disjunctions like $A \vee B$ fail to distribute.

[11] A similar flattening operator appears in inquisitive semantics but it is there defined in terms of double negation: $!\varphi_0 := \neg\neg\varphi_0$ (Ciardelli et al. 2018). This clearly won't work in our system because—as mentioned in n. 5 above—negations cancel each other out.

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