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ARTICLE

# A Note on the Epistemological Value of Pretense Imagination

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**Abstract**

Pretense imagination is imagination understood as the ability to recreate rational belief revision. This kind of imagination is used in pretend-play, risk-assessment, etc. Some even claim that this kind of hypothetical belief revision can be grounds to justify new beliefs in conditionals, in particular conditionals that play a foundational role in the epistemology of modality. In this paper, I will argue that it cannot. I will first provide a very general theory of pretense imagination, which I formalise using tools from dynamic epistemic logic. As a result, we can clearly see that pretense imagination episodes are build up out of two kinds of imaginative stages, so I will present an argument by cases. This argument shows that pretense imagination might indeed provide us with justification for believing certain conditionals. Despite this, I will argue that these are *not* the kind of conditionals that allow pretense imagination to play a foundational role in the epistemology of modality.

**Keywords:** Pretense; imagination; epistemology of conditionals; hypothetical belief revision; epistemology of modality

Evaluating non-actual possibilities is crucial for our decision making and general survival when going around the world (Byrne 2005). It is an interesting and pressing question how we come to know whether such non-actual possibilities are true. Many have suggested that imagination plays a crucial role here (e.g., Byrne 2005; Williamson 2007, 2016; Kind and Kung 2016). The question thus arises, under what conditions can imagination justify beliefs in non-actual possibilities? These kinds of questions are at the centre of recent debates in the epistemology of imagination. One thing that most agree on is that in order for imagination to be epistemically useful in this way, it has to be restricted (cf. Kind 2016; Kind and Kung 2016; Williamson 2016).[1] However, it also has been argued that not all kinds of restrictions work (Balcerak Jackson 2018). In order for imagination to be epistemically useful, the

[1]See Stuart (2020) for an opposing view. He argues that it is sometimes the *lack* of restrictions that makes imagination epistemically useful. However, what he considers as 'epistemically useful' is significantly different from what we are considering. On his account, it is the *exploratory* role of imagination that is important, whereas we are concerned with the providing of justification for certain beliefs.

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restrictions should (i) not be 'up to us' and (ii) not rely on prior justifications that beg the question. One account of imagination that seems to be inherently restricted in the right way is *imagination as recreation*: imagination understood as the 'off-line counterpart' of certain cognitive functions (cf. Goldman 2006).

In this paper, I will evaluate the claim that imagination understood as a recreative capacity can provide us with justification for beliefs in non-actual possibilities. In particular, I argue that imagination, *understood as the recreation of rational belief revision*, cannot do so. I provide a general account of such imagination and formalise this in order to carefully evaluate the claim that this kind of imagination can be epistemically useful.[2]

## 1. Epistemology of imagination

Intuitively, imagination can be a guide to what is possible. When deciding to move a heavy couch through the door, we might first imagine how to rotate the couch in order to get it through, before coming to believe that it possibly fits. Similarly, when giving feedback to colleagues, I might imagine how my comments would affect their feelings. However, this seems to clash with another intuitive feature of imagination: it is both under our voluntary control and not restricted by what is actually the case. So, how can it be that if we decide what to imagine, that we gain justification from it?

One way out of this problem, researchers agree, is to restrict imagination (cf. Kind 2016; Kind and Kung 2016; Balcerak Jackson 2018). The rough idea is that when we are concerned with epistemically useful imagination (in the sense that it is a guide to what is possible), we focus on the restricted instances, whereas when we want to account for our ability to imagine impossibilities, we consider the unrestricted instances.

Recently, Balcerak Jackson (2018) has forcefully argued that we should focus on a *recreativist* account of imagination in order to explain the justification we get from imagination.[3] Imagination, on such a recreativist account, "is a matter of creating or trying to create in one's own mind a selected mental state, or at least a rough facsimile of such a state" (Goldman 2006: 42). That is, imagination simulates the having of mental states without the, otherwise needed, external input or stimuli. This means that imagination is inherently restricted by whatever (neuro)physiological (or other) restrictions constrain the 'online' cognitive faculty that imagination is recreating.

In this paper, I focus on one particular kind of recreativist account of imagination, namely imagination as the recreation of *rational belief revision*. This is the kind of imagination that we use when we engage with pretense (e.g., Leslie 1994; Nichols and Stich 2003; Langland-Hassan 2012), but also when we engage in planning and risk assessment (e.g., Byrne 2005). Call it *pretense imagination*.

In what follows, I will first spell out what I take pretense imagination to be (section 2), after which I will present a formal account of it in section 3. This is all meant to give a very general, yet precise account of pretense imagination that we can evaluate for its epistemological merits. As it has been argued recently that one can present an epistemology of modality based on imagination's ability to justify our beliefs in certain conditionals, I will evaluate the claim that this kind of imagination can justify our beliefs in conditionals throughout sections 4–6. Even though pretense imagination can justify our beliefs in certain conditions, I argue in section 7 that it cannot play a foundational role in the epistemology of possibility.

[2]Note that I am not claiming that imagination as the recreation of rational belief revision is the only or correct way of thinking about what imagination is. Here, I am interested in which ways of thinking about what imagination is, might explain the epistemic value of imagination.

[3]I follow Balcerak Jackson in using the term 'recreativist' instead of 'simulationist' as the latter has too many connotations (e.g., simulation of theory of mind).

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## 2. Pretense imagination

Consider the following famous example of a pretense tea-party:

> The child is encouraged to 'fill' two toy cups with 'juice' or 'tea' or whatever the child designated the pretend contents of the bottle to be. The experimenter then says, 'Watch this!', picks up one of the cups, turns it upside down, shakes it for a second, then replaces it alongside the other cup. The child is then asked to point at the 'full cup' and at the 'empty cup' (both cups are, of course, really empty throughout). (Leslie 1994: 223)

Children from a very young age already consistently point to the cup *that has been turned upside down* when asked to point at the 'empty cup' (cf. Leslie 1994; Nichols and Stich 2003). This indicates that children are able to engage in pretense even if it goes against what they believe the world to actually be like. Yet, they imagine this non-actual scenario in a *reality-oriented* way. For example, when asked, *in the pretense*, where there is a puddle of tea after a full cup is held upside-down, we take it to be odd if the subject answers 'the ceiling', whereas it seems very natural to answer that there is a puddle on the floor.

This example illustrates that pretense imagination is *restricted* in important ways by *belief*: pretense imagination seems to follow *belief-like* patterns, which explains the rational, reality-oriented behaviour with respect to which cups are full, and *background beliefs* seem to be imported into the imaginative episode, which explains the beliefs about the workings of gravity in the pretense.[4] Let's elaborate on both these relations between pretense and belief in turn.

The most prominent theories of pretense – e.g., that of Nichols and Stich (2003) and Langland-Hassan (2012) – suggest that pretense reasoning is a cognitive capacity closely related to rational belief revisions. To capture this in our formalisation, we focus on belief and belief revision, where the latter is of *hypothetical* nature hinting at real belief changes were the pretend scenario to be actual. In this sense, it is sufficient to use models and operators that describe a situation where the objective facts of the world do not change, but only the belief state of the imagining agent changes. This belief revision process follows, roughly, Ramsey's (1929 [2013]) famous pattern:

> First, add the antecedent (hypothetically) to your stock of beliefs; second, make whatever adjustments are required to maintain consistency (without modifying the hypothetical belief in the antecedent).
>
> (Stalnaker 1968: 44)

Another important factor that restricts pretense imagination is the agent's *background beliefs* about the actual world. Or, as Williamson notes, "[o]ne's imagination should not be completely independent of one's knowledge of what the world is like" (2016: 114). For example, in the above pretense scenario, the subjects continue the pretense with the imagining that tea falls downwards as opposed to upwards because they *import* their background beliefs about gravitational forces – that unsupported objects fall towards the centre of the Earth – into the pretense.

In section 3, we will resort to the rich literature in (dynamic) epistemic logic and belief revision theory to model these features.

[4]It has to be noted here that there is a way in which one can imagine recalcitrant situations with respect to both of these restrictions, namely if the agent *explicitly intervenes*. I address this in detail below.

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### 2.1. Pretense imagination: a theory

The imagination involved in pretense is strictly *propositional imagination*. That is, imagining *that* such and so is the case (Langland-Hassan 2016) – e.g., I imagine *that* there is a tiger behind the curtain. This is opposed to, e.g., sensory imagination or objectual imagination (Balcerak Jackson 2018) – e.g., I imagine what it is like to see a tiger or I imagine a tiger.[5] In pretense, e.g., in the tea-party example, the entire episode is made up out of a number of (temporally) shorter instances: the pretending that the tea is being poured, that the tea falls towards the ground. These are all 'part' of the entire tea-party pretense. It seems obvious that some of these are explicitly 'intended' by the agent, while others, e.g., the tea falling to the floor after the cup being held upside-down, develop without any intentions from the agent. Also, it seems that pretense is full of choices from the agents that might go beyond what usually happens at a tea-party; the agent might, for example, say: 'Oh, a butler comes in to join the party'. I discuss these features in turn.[6]

#### 2.1.1. Explicit input

Let's consider an *imaginative episode* – e.g., the pretend tea-party – as a sequence of individual *imaginative stages* – e.g., that the tea is poured; that the cup is kept upside down; etc.[7] Such an imaginative episode always starts with a particular input. Langland-Hassan (2016) argues that imaginative episodes start with an *intention* of the agent. The intention provides the proposition that starts the imaginative episode. This is the proposition that makes up the first stage in the sequence of imaginative stages. As Langland-Hassan puts it, "our intentions may be relevant in *initiating an imagining*" (2016: 65, emphasis added).[8]

#### 2.1.2. Internal development

Given an explicit input, the imaginative episode develops. As Langland-Hassan puts it: "imagination … has its own norms, logic, or algorithm that shapes the sequence of $i_x$ after the initiation of an imagining by a top-down intention" (Langland-Hassan 2016: 67). In the case of pretense, the development of this kind of imagination seems to follow a pattern that is very similar to that of rational belief revision. The development of the imaginative episode is governed by the very same mechanisms that guide the inferences we make in rational belief updates (cf. Byrne 2005; Nichols 2006; Williamson 2007; Langland-Hassan 2016; Williamson 2016). For example, Langland-Hassan notes that the things that "govern how [an imaginative episode] then unfolds" are the "inference mechanisms [that] are the same ones that shape and govern the inferences we draw within our ordinary beliefs" (2016: 67–8). I call this kind of development the *internal development* of the imaginative episode. In terms of the tea-party example, this development makes the agent *automatically* imagine that the tea falls towards the ground when the cup is turned upside down. For when an agent revises their pretense-beliefs

[5]I am not claiming that propositional imagination is *all there is* to pretense. For example, a crucial aspect is the resulting behaviour and interaction with props. I just focus on the propositional imagination aspect of pretense.

[6]This characterisation is general enough that it would be accepted by almost everyone who works on pretense, even if they disagree on the details of pretense imagination (e.g., by both Nichols and Stich (2003) and Langland-Hassan (2012); see Langland-Hassan 2016 for a discussion).

[7]I will use 'imaginative episode' and 'imagination', 'pretense', 'pretense imagination', and verbs such as 'imagining' as synonymous for the purposes of this paper.

[8]Even though I discuss Langland-Hassan (2016) quite a lot, there is much more subtlety in his full account.

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with 'the cup is turned upside down', they would come to believe that its contents will fall downwards.

Relying on the inference mechanisms that we use for our ordinary belief updates nicely allows us to explain some of the features relating to the *reality-oriented* development of imagination (cf. Williamson 2016, 2020). Moreover, the involuntariness of this step explains the non-arbitrary nature of imagination: we are not free to imagine whatever we want given a certain input, which is supposed to render such mental exercises cognitively valuable (cf. Byrne 2005; Kind 2016; Williamson 2016; Balcerak Jackson 2018).

#### *2.1.3. Cyclical interventions*

Imagination, it is thought, is likely to have evolved in order to test a variety of actions to determine which one would be best to perform without having to actually perform the action and undergo all the risks that come with it (cf. Nichols 2006; Langland-Hassan 2016; Williamson 2016). Yet this feature of imagination requires something more than merely internal development. For, given an input $p$ in a situation $s$, we would expect the outcome always to be the same with internal development, namely whatever the result of a rational belief revision with $p$ in $s$ is. This way, we can never test the variety of options given $p$ in $s$ through imagination.

One way to think about how these variations occur is that the agent actively *intervenes* into the imaginative episode. They forcefully add additional content and this content can go beyond what the agent otherwise would have imagined (in that it does not necessarily follow from the previous imaginative stage). So, when testing the variety of potential outcomes given $p$ in $s$, the agent actively intervenes somewhere in the imaginative episode with additional contents (e.g., $q_1$, $q_2$, etc.). In Langland-Hassan's phrasing, imagination allows us to test a variety of actions "because we have *intentionally intervened in that processing*. To intentionally intervene is to stop the [internal development] where it is and to insert a new initial premise … into the [imaginative episode] for more processing" (2016: 74, emphasis added).[9]

This framework describes the essential features of pretense imagination and captures all its relevant features: (i) it is a form of *propositional* (as opposed to objectual) imagination; (ii) imagination has an explicit starting point; (iii) imagination is independent of what one takes the world to be like; (iv) imagination develops as it would in normal belief revision from its starting point; and (v) imagination "is full of choices that are not dictated by the [explicit input]" (Nichols and Stich 2003: 35).

Next, I will provide a formal model of the development of such imagination over time, in order to then precisely and critically evaluate the claim (amongst others of Langland-Hassan 2016; Williamson 2016, 2020) that pretense imagination can provide us with justification for certain beliefs. Note that the model presented in the next section is a *single agent* model with certain idealisations, however, these idealisations are immaterial to our purposes.[10]

[9]For those who worry about phenomenology of an imaginative episode and the lack of 'active choice' that seems to be involved, note that most of this intervening happens sub- or unconsciously. "What we might pre-theoretically think of as a single imaginative episode could in fact involve many such top-down 'interventions.' These interventions would allow for the overall imagining to proceed in ways that stray from what would be generated if one never so intervened" (Langland-Hassan 2016: 74–5).

[10]This model is developed in more detail in Özgün and Schoonen (Ms). For example, there the model is more general and complemented with an additional *topic-model*, to overcome the idealisations of the model sketched here.

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## 3. Branching-time belief revision model

As imagination follows 'belief-like' inference patterns and develops in stages, we use a simplified version of *branching-time belief revision models* introduced by Bonanno (2007). These models "provide a way of modeling the evolution of an agent's beliefs over time in response to informational inputs" (Bonanno 2012: 206).

Let Prop = $\{p_1, \ldots, p_n\}$ be a finite set of propositional variables and $\mathcal{L}$ be the language of classical propositional logic defined on *Prop*. The language $\mathcal{L}_{\mathrm{BI}}$ of the logic of belief and imagination is then defined by the grammar:

$$\varphi := p|\neg\varphi|\varphi \wedge \varphi|B\psi|I\psi$$

where $p \in$ Prop and $\psi \in \mathcal{L}$. Read '$B\varphi$' as 'the agent believes that $\varphi$' and '$I\varphi$' as 'the agent imagines that $\varphi$'. It is important that we allow $B$ and $I$ to range only over Booleans. That is, our language $\mathcal{L}_{\mathrm{BI}}$ of belief and imagination follows the cognitive science and philosophy literature on imagination in focusing on *first-order* attitudes (cf. Nichols and Stich 2003; Byrne 2005; Williamson 2007; Langland-Hassan 2012, 2016). We interpret this language on branching-time belief revision models:[11]

Definition 1. **Branching-time belief revision model**
A *branching-time belief revision model* (in short, *model*) is a tuple $\mathcal{M} = \langle S, \rightarrowtail, W, \preceq, V\rangle$, where

1. $(S, \rightarrowtail)$ is a *rooted next-time branching frame*;
2. $W$ is a finite set of *possible worlds* or *states*;
3. $\preceq$:$S \rightarrowtail W \times W$, is a function that assigns every stage in $s \in S$ a total preorder on $W$, called the *plausibility order at stage s* and denoted by $\preceq_s$;[12]
4. $V$:Prop $\rightarrow \wp(W)$, is a valuation function that maps every propositional variable in Prop to a set of possible worlds.

Since $W$ is finite, every non-empty subset of $W$ has a minimal element with respect to each $\preceq_s$. The set of minimal elements, $Min_{\preceq_s}(U)$, for any $U \subseteq W$ with respect to $\preceq_s$, is defined as

$$Min_{\preceq_s}(U) = \{w \in U{:}w \preceq_s v \text{ for all } v \in U\}$$

So, for each $s \in S$, $(W, \preceq_s, V)$ constitutes a standard plausibility model (cf. Baltag and Smets 2006; van Benthem 2007), where the order, $\preceq_s$, represents the arrangement of worlds to the degree that the agent considers them plausible at stage $s$ (you can read $w \preceq_s v$ as '$w$ is at least as plausible as $v$ at stage $s$'). This results in a model of the *hypothetical* beliefs of agents per stage of the branching model, where the stages change over time.

### 3.1. Histories, upgrades, and semantics

A branching-time belief revision model is intended to represent the evolution of an agent's belief and imagination over time, where imagination can be *read off* of the actual

[11]For more details on the next-branching time frames see Bonanno (2007, 2012).

[12]A total preorder $\preceq_s$ on $W$ is a reflexive and transitive binary relation such that either $w \preceq_s v$ or $v \preceq_s w$ for all $w, v \in W$.

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development of the pretense scenario. This is represented by a finite sequence of linear stages, called *history*, $h$ (where '$\rightarrowtail$' denotes the *immediate successor* relation):

$$h = (s_0, s_1, \ldots, s_n) \text{ such that } s_i \rightarrowtail s_{i+1},$$

where $s_0$ is the root of the underlying next-time branching frame. Let's call $s_0$ the *initial stage* and $s_n$ the *current stage*. History $h$ thus keeps track of the past stages, but does not tell us anything about the future. For an illustration of a branching-time belief revision model see Figure 1, where the nodes in the figure represent the stages of the imaginative episode with the plausibility ordering of that particular stage – i.e., $\preceq_i$ represents the plausibility ordering at stage $s_i$.

I suggest that the kind of hypothetical belief revision used by agents in pretense is a *lexicographic upgrade*, which allows us to explain some of the intuitive features of pretense imagination. This well-known lexicographic upgrade, for example with $p$, makes all $p$-worlds more plausible than all $\neg p$-worlds and keeps the ordering the same within those two zones (cf. van Benthem 2007: 141).[13] This is the final auxiliary definition in order to define the semantics for $\mathcal{L}_{\mathrm{BI}}$.

Definition 2. **Upgraded preorder**
Given a pre-ordered set $\langle W, \preceq_s \rangle$ and $P \subseteq W$, the upgraded pre-order by $P$ is the tuple $\langle W, \preceq_s^{\Uparrow P} \rangle$, where $\preceq_s^{\Uparrow P}$ is the new ordering such that $w \preceq_s^{\Uparrow P} v$ iff (1) $w \preceq_s v$ and $w \in P$, or (2) $w \preceq_s v$ and $v \in W \backslash P$, or (3) ($w \preceq_s v$ or $v \preceq_s w$) and $w \in P$ and $v \in W \backslash P$.

In the semantics, formulas of $\mathcal{L}_{\mathrm{BI}}$ are evaluated not only with respect to states, but with respect to state-history pairs of the form $\langle w, h \rangle$. The *intension of* $\varphi$ with respect to $h$ in $\mathcal{M}$ is $|\varphi|^h_{\mathcal{M}} := \{w \in W : \mathcal{M}, \langle w, h \rangle \Vdash \varphi\}$.

Definition 3. $\Vdash$**-Semantics for** $\mathcal{L}_{\mathrm{BI}}$
Given a model $\mathcal{M} = \langle S, \rightarrowtail, W, \preceq, V \rangle$ and a world-history pair $\langle w, h \rangle$ such that $h = (s_0, s_1, \ldots s_n)$, the semantics for $\mathcal{L}_{\mathrm{BI}}$ is defined recursively as follows:

$$\begin{array}{lll}
\mathcal{M}, \langle w, h \rangle \Vdash p & \text{iff} & w \in V(p) \\
\mathcal{M}, \langle w, h \rangle \Vdash \neg\varphi & \text{iff} & \text{not } \mathcal{M}, \langle w, h \rangle \Vdash \varphi \\
\mathcal{M}, \langle w, h \rangle \Vdash \varphi \wedge \psi & \text{iff} & \mathcal{M}, \langle w, h \rangle \Vdash \varphi \text{ and } \mathcal{M}, \langle w, h \rangle \Vdash \psi \\
\mathcal{M}, \langle w, h \rangle \Vdash B\varphi & \text{iff} & Min_{\preceq_{s_n}}(W) \subseteq |\varphi|^h_{\mathcal{M}} \\
\mathcal{M}, \langle w, h \rangle \Vdash I\varphi & \text{iff} & \exists k < n \left( \preceq_{s_{k+1}} = \preceq_{s_k}^{\varphi} \text{and } \mathcal{M}, \langle w, h[k+1] \rangle \Vdash B\varphi \right)
\end{array}$$

Imagination, here, is dependent on both $w$ and the whole history $h$. According to the proposed semantics, an agent imagines $\varphi$ if they have revised their hypothetical belief state with $\varphi$ at some stage in the history. In other words, we take what the agent imagines at the current stage to be the collection of propositions by which they have upgraded their pretend belief state at some stage before the current one. So, an appropriate reading of $I\varphi$, then, is that "the agent has taken $\varphi$ on board at some stage of the imaginative episode". In this sense, the imagination operator $I$ is a backward looking modality that keeps track of the informational input the agent uses through an imaginative episode. It is important to stress at this point that the belief modality represents the

[13] See Özgün and Schoonen (Ms), where we abstract away from the particular belief revision procedure.

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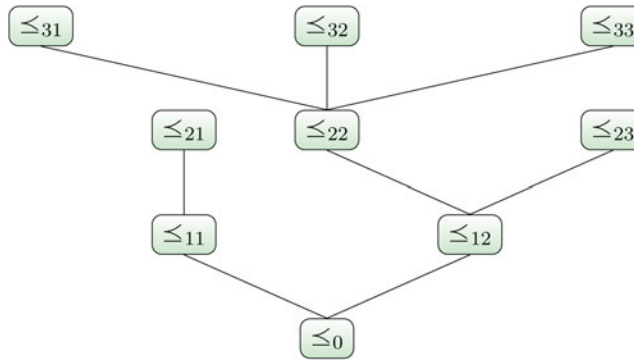


**Fig. 1.** A toy-example of a branching-time belief revision model: the nodes represent the stages of the imaginative episode with the plausibility ordering of that particular stage.

*simulated* or *pretense* beliefs of the agent, except when $h = (s_0)$. The agent's actual beliefs are given by the plausibility model in the initial stage $s_0$.[14]

So, how, if at all, does this model give a formal interpretation of the development of an imaginative episode? Given a history $h = (s_0, \ldots, s_n)$ and $k \leq n$, let $h[k] = (s_0, s_1, \ldots s_k)$ be the initial segment of $h$ of length $k + 1$. We then define the $k$th imaginative stage $i_k$, *the set of sentences the agent has imagined up to stage k*, as

$$i_k = \{\varphi \in \mathcal{L} : \langle w, h[k]\rangle \Vdash I\varphi\}.$$

This way we extract the imaginative stages through the actual history and define the corresponding imaginative episode $\mathcal{I} = (i_1, \ldots, i_n)$ as a sequence of sets of sentences in $\mathcal{L}$. It is not difficult to see that $i_0 = \emptyset$. An imaginative episode starts with input propositions forming the first imaginative stage $i_1$. We can distinguish between stages that follow through internal development and stages that are added through intervention by introducing two distinct operators into our language: $I_{i\varphi}$ and $I_{a\varphi}$. The former concerns *i*nternally developed stages and the latter concerns *a*dded content through intervention.[15] We interpret these two modalities as follows:

$$\begin{array}{lll} \langle w, h\rangle \Vdash I_i\varphi & \text{iff} & \exists k < n((\preceq_{s_{k+1}} = \preceq^{\varphi}_{s_k} \text{ and } \langle w, h[k+1]\rangle \Vdash B\varphi) \text{ and } \langle w, h[k]\rangle \Vdash B\varphi) \\ \langle w, h\rangle \Vdash I_a\varphi & \text{iff} & \exists k < n((\preceq_{s_{k+1}} = \preceq^{\varphi}_{s_k} \text{ and } \langle w, h[k+1]\rangle \Vdash B\varphi) \text{ and } \langle w, h[k]\rangle \nVdash B\varphi) \end{array}$$

Semantically, $I_i\varphi$ states that "the agent takes $\varphi$ on board at some stage of the actual history where she already hypothetically believes it". This is what we take internal development to be: the ordinary development of updating your hypothetical beliefs with what you find most plausible given a particular input. On the other hand, $I_a\varphi$ says that "the agent takes $\varphi$ on board at some stage of the actual history and $\varphi$ was not believed at that stage". This implies that $\varphi$ was imagined not as a result of the agent's belief revision process, but added "externally" to the imaginative episode.[16]

[14]One could thus add a specific modality that reflects the agents *actual* doxastic state as follows:

$$\mathcal{M}, \langle w, h\rangle \Vdash B_@\varphi \quad \text{iff} \quad Min_{\preceq_{s_0}}(W) \subseteq |\varphi|^h_{\mathcal{M}}.$$

[15]Note that the definition of $I_a\varphi$ only works as a *sufficient* condition for the content being added. It might still be that the content that is added by intervention is already believed.

[16]Let me stress that this does not explicitly capture the 'active' aspect of actively intervening. For logics that focus more on this action part of imagination see, e.g., Wansing (2017).

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## 4. Epistemology of pretense imagination

With this formal model of pretense imagination at hand, we now turn to the *epistemology* thereof. Langland-Hassan (2016) and Williamson (2007, 2016) both argue that pretense imagination might be central to conditional reasoning and the epistemology of conditionals. However, what we are interested in is the particular use of conditionals to gain knowledge of possibilities and whether pretense imagination plays a crucial role in the epistemology of these particular conditionals (Williamson 2007, 2016, 2020). So, we need to evaluate two claims: (i) can pretense imagination provide justification for believing conditionals and (ii) can pretense imagination, in virtue of (i), play a role in the epistemology of possibility?

The model presented in this paper allows us to very precisely evaluate these claims. We saw that imaginative episodes are sequences of imaginative stages; these stages are *either* explicitly intervened by the agent *or* developed through hypothetical belief revisions. So, we can evaluate the epistemic usefulness of pretense imagination through an argument by cases. First, I will argue that internally developed imagination cannot be used to gain justification for new beliefs in conditionals, after which I will argue that particular instances of intervened content do give rise to new beliefs in conditionals. Despite this, I will conclude by arguing that these conditionals (and thus pretense imagination) cannot explain our knowledge of *non-actual possibilities*.

### *4.1. Beliefs in conditionals and conditional beliefs*

The first thing to stress is that I will focus on our beliefs in *indicative conditionals* (represented with '$\rightarrow$').[17] However, the logic discussed above does not involve an indicative conditional. In this subsection, I will first argue that we have in fact all we need to evaluate the *epistemological* question whether pretense imagination can provide us with justification for new beliefs in indicative conditionals.

A venerable tradition of how to determine whether we should believe a conditional has it that we should believe a conditional if we believe the consequent after having (hypothetically) revised our beliefs with the antecedent. This traces back to, at least, Ramsey, who suggested that if we are to determine 'If $\varphi$, then $\psi$' and we are uncertain about the antecedent, then we should add $\varphi$ "hypothetically to [our] stock of knowledge" and then evaluate "on that basis" whether $\psi$ (1929: 247, fn. 1). Stalnaker (1968) and Williamson (2007: Ch. 5, 2020: Ch. 2) also suggest epistemologies of conditionals in this vein.[18] If such theories are correct, then if the agent has a rational *conditional belief*, then they are equally in a position to justifiably believe the corresponding *conditional*.

Even though we do not have an indicative conditional in our semantics, we do have everything we need to define *conditional beliefs* in our model. Given Definitions 1 and 2, we can define conditional beliefs in our models as follows:

[17]In the conclusion of this paper, we will explicitly consider whether Langland-Hassan and Williamson focus on the indicative conditional and whether the arguments of this paper carry over to *other* conditionals.

[18]For example, "one supposes the antecedent and develops the supposition. … To a first approximation: one asserts the counterfactual conditional if and only if the development eventually leads one to add the consequent" (Williamson 2007: 152–3). See also the quote cited earlier in the paper from Stalnaker (1968: 44).

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Definition 4. **Conditional belief**

$$\mathcal{M}, \langle w, h\rangle \Vdash B^{\varphi}\psi \text{ iff } Min \preceq_{s_n}^{\varphi}(W) \subseteq |\psi|^{h}_{\mathcal{M}}, \text{ where } h = (s_0, \ldots, s_n)$$

'$B^{\varphi}\psi$' is a *conditional belief*: the agent believes $\psi$ given (or conditional on) $\varphi$. Epistemologically speaking, if something like the Ramsey test is a correct epistemology of conditionals, a conditional belief is similar enough to a belief in the corresponding conditional for our purposes.[19]

#### *4.1.1. Some empirical support*

There is some empirical evidence that supports the epistemological relation between conditional beliefs and beliefs in conditionals, on which a Ramsey test epistemology for conditionals relies. That is, there is empirical evidence that suggests that people believe conditionals if they also have the corresponding conditional belief. In order to properly spell out the evidence and how it supports (something like) a Ramsey test epistemology for conditionals, we need to say a bit more about the relationship between beliefs, acceptability, and probability.

The empirical data we will use focuses on, what in the psychology of reasoning literature is known as, *the Equation* (EQ): the subjective probability (or the degree of belief) of a conditional 'if $\varphi$ then $\psi$' is the corresponding (subjective) conditional probability $\Pr(\psi|\varphi)$ (where '$\psi|\varphi$' means '$\psi$ given $\varphi$'). That is, where '$\Pr(\varphi)$' is the subjective probability or degree of belief in $\varphi$, $\Pr(\psi|\varphi) = \Pr(\varphi \rightarrow \psi)$. This suggests "that people evaluate the probability of conditionals as the conditional probability for a wide range of conditionals" (Elqayam and Over 2013: 253).[20] Importantly, this epistemological claim has,

> over the past decade, … been subjected to empirical testing by various experimental psychologists, and it has been found, time and again, that people's judged probabilities of conditionals do closely match their judgments of the corresponding conditional probabilities … Given these experimental results, rejecting (EQ) would amount to attributing massive error to people as far as their judgments of … conditionals are concerned.
>
> (Douven and Verbrugge 2013: 712)

All these empirical tests show that there is an epistemological equivalence in terms of *subjective probabilities* in conditionals and conditional subjective probabilities; in that "people do generally judge the probability of a conditional to be equal to the corresponding conditional probability" (Douven 2013: 11) (see Douven 2013: 11, fn. 10, 2015; Douven and Verbrugge 2013: 712; Elqayam and Over 2013 for references to this empirical literature).

These data concern the subjective probabilities of agents (i.e., it is *quantitative*), whereas our definition of conditional belief is defined as belief *tout court* (i.e., it is

[19]I say 'similar enough' here because, as we will see below, the conditional belief and belief in the conditional occur at *different* stages in the model.

[20]Note that we are *not* interested in the question of whether these things are the same *mental states* (see, e.g., Leitgeb 2007). Additionally, one might worry that this gives rise to the famous *triviality results* (Lewis 1976; Gärdenfors 1988). However, given that we allow our belief- and imagination-operators to range only over Booleans, these triviality worries do not seem to apply. See Douven (2013) for a discussion about the tension between the empirical findings and the formal triviality results.

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*qualitative*). So, in order for the data to support the use of Definition 4 in the epistemology of conditionals, we need to find a way to make the data on the quantitative epistemological equivalence relevant to the qualitative relationship between conditional beliefs and beliefs in conditionals. We do so by appeal to the *Lockean Thesis for Belief* (LTB):[21]

(LTB) A proposition $\varphi$ is rationally believable for a person iff $\Pr(\varphi) > \theta$, where '$\theta$' is some threshold.

In what follows, I will assume that the threshold is fixed and suppress any mention of it. We can now link subjective probabilities that agents assign to propositions to qualitative beliefs by using (LTB). Going back to the data of Douven and colleagues, we can replace the subjective probabilities with the corresponding beliefs in (EQ) – as per (LTB). For the purposes of this paper, this means that, instead of talking about 'judge' or 'evaluate', we can say the following:

If people conditionally believe $\psi$ given $\varphi$, they are also in the epistemological position to justifiably believe the conditional 'if $\varphi$, (then) $\psi$'.

This suggests, in line with any epistemology of conditionals that relies on something like the Ramsey test, that Definition 4 is enough to evaluate the claim that pretense imagination provides us with justification for new beliefs in conditionals.

Let me stress that these empirical findings are merely supposed to *support* the philosophical arguments. One should be careful in how to interpret findings pertaining to the similarity or difference of judgements based on the fact that no difference is shown in the empirical data.[22] There is, however, some abductive evidence that, despite the fact that we cannot statistically secure an equivalence, the empirical data (i.e., the high correlation) suggests that conditional probability contributes to (or is a determinant of) judgements about the corresponding conditional, which supports the epistemological relation needed for the philosophical argument used in this paper. In particular, there is the size and variety of the empirical findings: the Equation has been tested in many different ways, shapes, and forms and almost always the results are the same. The relation between judgements of the probability of the conditional and judgements of the conditional probability has been tested with both within and between subject designs and with many different kinds of stimuli (e.g., causal, counterfactual, inferential (deductive, inductive, abductive), and betting conditionals both concerning actual matters of fact or fictional affairs); graded and ungraded probability judgements have been tested as well as different methods of determining the conditional probability. In all these cases a high correlation (sometimes a "close-to-perfect" match (Douven and Verbrugge 2013: 718)) was found between the relevant judgements.[23] Importantly, studies have been done to verify that participants of these tests *do not* interpret the conditionals as material implications (Evans *et al.* 2003) nor as conjunctions (Douven and Verbrugge 2010).[24]

[21]See also Foley (1992), Hawthorne (2009) and Demey (2013) on something like (LTB).

[22]Thanks to an anonymous reviewer for urging me to stress this.

[23]To further strengthen these empirical results, we should look at the *statistical power* of these results in combination with their sample size. In order to overcome the limitations of individual studies, ideally a meta-analysis would be performed on the empirical data concerning the Equation. As far as I am aware, no such a meta-analysis has yet been done.

[24]There seem to be two main limitations to these findings. First of all, as Douven (2013: 14) points out, these findings are limited to conditionals "whose antecedents and consequents are not themselves conditional in form nor are compounds which have one or more conditionals among their components". Since

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Now that it is plausible that we can use Definition 4 to evaluate the claim that pretense imagination plays a role in the epistemology of conditionals and of possibility, let's turn to discuss the epistemic usefulness of the internal development and the intervened content in turn.

## 5. Epistemic usefulness of internal development

Both Langland-Hassan (2016) and Williamson (2016) defend the idea that after an imaginative episode with explicit input $\varphi$, if at some point you end up imagining $\psi$, the knowledge that you gain is of the (indicative) conditional $\varphi \rightarrow \psi$ (see also Nichols and Stich 2003; Byrne 2005; and a lot of the suppositional reasoning literature following the Ramsey test). "[T]he inferences drawn in imagination are imported back into one's beliefs as consequents to a *newly believed* conditional" (Langland-Hassan, 2016: 68, emphasis added). In this section, I will argue that *internally developed* conditionals that one might import back into one's beliefs are not *new*ly believed conditionals.

It is important to stress that at this point in the argument by cases, we focus only on *internal development*: an imaginative episode where we *only* rely on hypothetical belief revision with (hypothetically) believed propositions. That is, for any world-history pair that we consider here, the history, $h = (s_0, \ldots, s_n)$, is such that for any $i < n$, $\preceq_{s_{i+1}} = \preceq^{\varphi}_{s_i}$, for some $\varphi \in \mathcal{L}$ such that $\langle w, h[i]\rangle \Vdash B\varphi$. Let us call such a history an *internally developed history*.

The claim that the internal development of pretense imagination can provide us with justification for *new* conditional beliefs is as follows: it is possible to come to have a conditional belief somewhere in an internally developed history such that the agent *does not* have that conditional belief at the root stage – i.e., the conditional belief is new. For if revising one's beliefs with the antecedent results in believing the consequent *and* the conditional was not yet believed in the original state of the imaginer, then it can be said that the imaginative episode provided the justification for a *new* belief in the conditional. Call this the *target claim*.

I will argue that this is *false* – i.e., I will argue that the beliefs that are the result of such imaginative episodes are not *new* beliefs. To show that the target claim is false, I will prove that for any internally developed history, if there is a stage where revising one's beliefs at that stage with $\varphi$ results in believing $\psi$ at the next stage, then the agent *already* had a conditional belief in $\psi$ given $\varphi$ in the root stage – i.e., the conditional belief is not new.

**Show**: For all internally developed histories, $h = (s_0, \ldots s_n)$, and all formulas $\varphi$ and $\psi$, *if* there is an $i < n$ such that $\preceq_{s_{i+1}} = \preceq^{\varphi}_{s_i}$ and $\langle w, h[i+1]\rangle \Vdash B\psi$, *then* $\langle w, s_0\rangle \Vdash B^{\varphi}\psi$.

The first step is to note a consequence of our belief revision policy and the effects this has for an internally developed history. Remember that when we revise our beliefs with $\varphi$, the plausibility ordering *amongst* all the $\varphi$-worlds remains the same (see condition (1) of Definition 2).[25] Thus, upgrading our beliefs with a believed proposition – i.e.,

we only focus on simple conditionals in the epistemology of possibility, this issue does not affect the arguments made here. Secondly, Skovgaard-Olsen *et al.* (2016) suggest that the Equation does not seem to hold when the antecedent is *irrelevant* for the consequent (and the materials are natural, real life scenarios rather than abstract vignettes). This is an important limitation on the empirical findings, but one that we should only welcome. In general, we would want our pretense imagination only to justify the modal status of propositions that are relevantly related to the imaginative episode. See the models in Özgün and Schoonen (Ms), where *topic-models* are used in the models of pretense imagination to capture this aspect of relevance. We can ignore these complications for the philosophical arguments made in the remainder of the paper.

[25]In the conclusion, I will discuss the reliance of the argument on this particular belief revision policy.

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a proposition such that it is true at all the most plausible worlds – does *not* alter the set of most plausible worlds. Given that an internally developed history only involves updates with *believed* propositions, it follows that the set of most plausible worlds is the same at *all* stages of an internally developed history. That is, $Min \preceq_{s_0}(W)$ is identical to that of any state $s_i$ in $h = (s_0, \ldots, s_n)$ (of an internally developed history) – i.e., $Min \preceq_{s_i}(W) = Min \preceq_{s_0}(W)$ for any $i \leq n$. Let us call this '(NCP)', for *No Change in most Plausible worlds*.

Given that the set of most plausible worlds is constant for an internally developed history (NCP), it follows that all beliefs and conditional beliefs, which are based on revisions with believed propositions (see footnote 25), of the agent are also constant at all stages. This suggests that the target claim has to be false. To see this, take an arbitrary $s_i$, where $i < n$, from an internally developed history $h = (s_0, \ldots, s_n)$, such that (i) $\preceq_{s_{i+1}} = \preceq_{s_i}^{\varphi}$ and (ii) $\langle w, h[i+1]\rangle \Vdash B\psi$. Because we focus on *internally developed* histories, all belief revisions are with believed propositions. So, we can conclude from (i), plus Definition 2 and (NCP), that $\varphi$ is true in all the most plausible worlds of the agent at all stages of the internally developed history. From (ii), plus Definition 3 and (NCP), it follows that $\psi$ is true in all the most plausible worlds of the agent at all stages of the internally developed history. From this it follows that $\preceq_{s_1} = \preceq_{s_0}^{\varphi}$ and $\langle w, h[1]\rangle \Vdash B\psi$. So, by Definition 4, $\langle w, s_0\rangle \Vdash B^{\varphi}\psi$. Thus, the target claim is false.[26]

This suggests that the internal development of pretense imagination *cannot* provide justification for new beliefs in conditionals. Any conditional that might be imported back into our actual beliefs was *already* believed, for otherwise the internal development would never result in the consequent given the antecedent.

The above argument, one might worry, seems to assume that indicative conditionals express propositions, whereas not everyone might agree with this (e.g., Edgington 1986; Levi 1988; see Leitgeb 2007 for a clear discussion on these and related views). If you think that conditionals do *not* express propositions, they cannot, strictly speaking, be believed. As Leitgeb points out, "conditionals [on such a view are] accepted by the agent without being believed" (2007: 119). For these theorists, 'beliefs in conditionals' simply *are* conditional beliefs (or degrees of belief in the consequent conditional on the antecedent). Note that the argument against the epistemic usefulness of the internal development of pretense imagination was phrased completely in terms of conditional beliefs. So, the conclusion holds even for those who think that indicative conditionals do not express propositions.

[26]Interestingly, imagining something through internal development (i.e., imagining that you already (hypothetically) believe) does affect 'other' conditional beliefs at the different stages. That is, even though we might not gain beliefs in conditionals such that the antecedent is that which we imagine, we might gain conditional beliefs where the imagined proposition is not part of it. For example, consider a model where there are three worlds, such that $V(p) = \{w_2, w_3\}$, $V(q) = \{w_1, w_3\}$, and $V(r) = \{w_1, w_3\}$ and such that $\preceq_{s_0} = w_1 < w_2 < w_3$. If, in this model, we imagine $q$ (which qualifies as an internal development, given that $q$ is believed at $s_0$), then we have that at the resulting imaginative stage, $s_1$, the conditional belief $B^{p}r$ is true, even though this conditional belief is false in the original state, $s_0$.

This raises a number of interesting questions. For example, would we want to say that imagining $q$ could justify the belief in a (potentially unrelated) conditional $p \rightarrow r$? Whenever Williamson (2007) or Langland-Hassan (2016) talk about imagination, the imagined proposition always features as the antecedent of the corresponding conditional. The same holds for the literature surrounding the Ramsey test and the epistemology of indicative conditionals: we (hypothetically) update our beliefs *with the antecedent* in order to see if the consequent holds. It seems to me not straightforward to defend the position that imagining $q$ *justifies* accepting the new belief in the conditional $p \rightarrow r$, however, more needs to be said about this. Unfortunately, this is outside the scope of this paper.

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To sum up, despite the fact that it might *seem* as though our imaginative episode makes us believe certain conditionals, it is not the internal development of the imagination that *provides* the justification for the beliefs in these conditionals.

## 6. Epistemic usefulness of intervened content

When focusing on internally developed histories, we saw that we cannot gain knowledge of any *new* conditionals. Williamson (2020) points out that this is because we usually rely on conditionals *prospectively*: "[w]e need 'if $A$, $C$' most when we do *not* now that $A$" (p. 17, original emphasis). Correspondingly, the idea is that pretense imagination really comes into its own when we *intervene* some content and then look at the resulting hypothetical belief revisions. As we will see, it is indeed the case that we can come to gain conditional beliefs that we did not have at the root stage when we have actively intervened content in the imaginative episode.

To show this, let's construct a model where there is a conditional belief at a stage of the imaginative episode and that conditional belief is *not* true at $s_0$ – i.e., it is a *new* conditional belief. Consider a model such that $W = \{w_1, w_2, w_3\}$, $V(p) = \{w_2, w_3\}$, $V(q) = \{w_1, w_3\}$, and the plausibility orderings per stage are as represented in Figure 2 – i.e., $\preceq_{s_{12}} = \preceq^{p}_{s_0}$ and $\preceq_{s_{21}} = \preceq^{q}_{s_{12}}$ (only part of the model is represented). We take the actual history to be $h = (s_0, s_{12}, s_{21})$. Note that both developments are intervened content, as we assume that the explicit input is also intentionally added. For our argument, we focus on the second intervention (i.e., the one *within* the imaginative episode, not the one that starts it).[27] After the upgrade with $q$, the agent hypothetically believes $p$; that is, at stage $s_{12}$ the agent has a conditional belief: they believe $p$ conditional on $q$. However, it is easy to see that this is *not* the case at the initial stage: $\langle w, s_0\rangle \Vdash\!\!\!/ B^q\, p$. So, it seems that we are able to gain *new* beliefs in conditionals by upgrading our (hypothetical) beliefs with intervened content. In our toy example, we gain justification for the belief in $q \rightarrow p$, which we didn't believe before we engaged in the imaginative episode (i.e., at $s_0$).[28]

## 7. Pretense imagination and the epistemology of possibility

Section 5 showed that if the antecedent is already believed, we gain no *new* conditional beliefs, which is in line with Williamson's (2020: 17) comments on prospectivity. In section 6 we say that an imaginative episode with an intentionally intervened (believed to be) false proposition might indeed result in justification for a belief in a conditional. So, pretense imagination can justify us in believing prospective conditionals: conditionals of which we do not (yet) know whether the antecedent is true. The question thus becomes whether we can use this in a conditional-based epistemology of possibility. When considering the epistemological role of conditionals in the epistemology of possibility, we see that researchers often focus on providing us with justification for believing the possibility of the consequent.[29] How do pretense imagination and prospective conditionals

[27]One could also construct a model where the imaginative episode starts with internally developed content and still make the same argument. In such a case, the model would be as above, but with $\preceq_{s_{14}} = \preceq^{q}_{s_0}$ and $\preceq_{s_{22}} = \preceq^{p}_{s_{14}}$.

[28]This toy model is of course a simplification and there are probably a number of internally developed steps in between (which is what, e.g., Williamson seems to mean with 'develop the supposition'). However, as we saw with internally developed histories, the set of most plausible worlds after the last intervened upgrade is the same throughout the following internally developed upgrades. So, for simplicity, we ignore these potential intermediate internally developed upgrades.

[29]This is not a surprise. We just saw that the antecedent – i.e., the intervened content – can be anything and simply being a supposed proposition does not carry any epistemological weight. Furthermore, if it is

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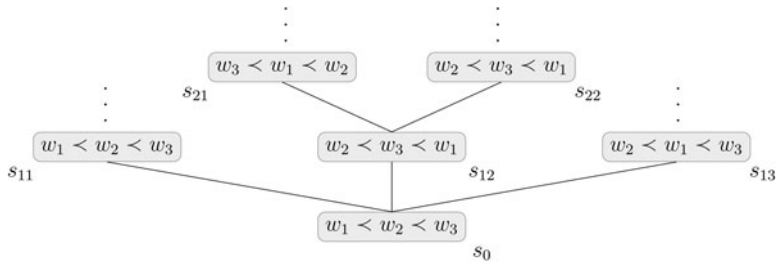


**Fig. 2.** New conditional beliefs from intervened content.

help us in determining the modal status of the consequent? That is, can they, and if so how do they, play a role in a conditional-based epistemology of possibility?

Given that we do not believe the antecedent to be true, there are two prominent options: the antecedent is 'merely actually false' (i.e., false in the actual world, though possibly true) or 'necessarily false' (i.e., impossible). This difference has a significant effect with regards to the role the conditionals in question play in an epistemology of possibility. Consider the following pairs of conditionals to see this:

(1) If Amy squared the circle, she becomes a famous logician. (Ripley 2012)
(2) If Lamyae works in her office, she is sitting in a comfortable chair.

Let's assume that we justifiably believe both conditionals based on our pretense imagination and we believe both antecedents to be false. If we are unaware of the modal status of the antecedents, what good does knowledge of these conditionals do us in the epistemology of possibility? So, the crucial issue is how we determine that the relevant hypothetical situation (i.e., the antecedent) is possible.

The fact that the antecedent is intervened does not help us here. Intervened content is just content transferred from the intention (to imagine something) to actually imagining it. Correspondingly, merely being the input for an imaginative episode does not allow us to distinguish between merely false or impossible antecedents: there are virtually no constraints on what we use as intervened content and we can intervene content that is true, false, impossible, etc.[30]

Considering the way most conditional-based epistemologies of possibility work, we can see that, in general, they rely on the *transfer of possibility* from the antecedent to the consequent. That is, they rely on the antecedent *being known* to be possible and the conditional being believed to be true, in order for you to be justified to believe that the consequent is possible (e.g., Williamson 2007: 156; Kment 2014: 4). This shows that in order for the beliefs in the conditional to be useful as a tool for the epistemology of possibility, we need to have *prior knowledge* of the modal status of the antecedent.

true that we end up believing the corresponding conditional, then we believe it to be actually true. So, the possibility of the conditional would be of the 'uninteresting' kind of knowledge of possibilities resulting from the actuality principle (Hanrahan 2017: 211).

[30]Note that in the model discussed in this paper, we can only imagine 'conjoined' impossibilities. That is, if we upgraded our simulated beliefs with $\varphi$ and at some later point with $\neg\varphi$, we can be said to have imagined $\varphi$ and, in the same episode, $\neg\varphi$. However, we cannot imagine 'atomic' impossibilities in this model (e.g., 'unicorns exist', 'there is a round square', etc.). A more faithful modelling of pretense imagination should ultimately allow for these, potentially with additional impossible worlds (see Berto 2017). The fact that the model does not allow for imagining impossibilities is a shortcoming of the model, which can be fixed by, e.g., the incorporation of impossible worlds, and not of the argument.

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So, once we have *independent evidence* for the possibility of the input proposition, we might use indicative conditionals (and the corresponding imaginative exercises) to *extend* our knowledge or beliefs in possibilities. But, prior knowledge of the modal status of the antecedent is crucial; without it pretense imagination is of no help in the epistemology of possibility.

### 7.1. Prior modal knowledge

Williamson (2007: Ch. 5) seems to suggest that (something like) pretense imagination is crucial for his conditional-based epistemology of modality. What this paper shows is that it can only play an *extending*-role. In order for such a condition-based epistemology of possibility to come off the ground, we need prior knowledge of the modal status of the antecedent and pretense imagination does not seem to be able to provide this.

These theorists might be right that the imagination involved in the epistemology of the relevant conditionals is such that if the input is possible, the consequences of the resulting conditionals will be possible. Yet this leaves the crucial question of how we should determine the modal status of the antecedent itself. As Gregory (2017: 834) puts it,[31]

> while the described method may well produce beliefs about possibility that tend to be right, our justification for holding that it does so depends upon our being entitled to assume the customary possibility of the propositions that serve as the starting-points of applications of the relevant process.

The moral of this story is that if we want to use conditionals to gain knowledge of possibilities, we need *prior modal knowledge*. The reliance on unexplained prior modal knowledge severely undercuts the prospects of the proposed epistemology of modality (Hale 2003; Hill 2006; Roca-Royes 2017; Schoonen 2020). In this case because the epistemology of possibility crucially leaves us without a story on how we gain knowledge of the possibility of the relevant antecedent.

## 8. Conclusion: potential objections

To sum up, it seems right that pretense imagination can provide us with justification for beliefs in indicative conditionals (as Langland-Hassan (2016) and Williamson (2016) suggest). This happens when we intervene content and then allow it to internally develop. However, this kind of conditional reasoning *cannot* play a fundamental role in the epistemology of possibility. The use of such conditionals might *expand* our modal knowledge, but it relies on having *prior* knowledge of the modal status of the antecedent, which can itself *not* be justified through pretense imagination. Leaving this prior modal knowledge unexplained means that pretense imagination cannot be the foundational method for determining whether something is possible and results in an unsatisfactory epistemology of possibility.

In this conclusion I want to discuss a number of objections to various parts of the epistemological discussions. I will discuss (i) the wrong formalism objection; (ii) the actuality worry; and finally (iii) the wrong conditional objection, in turn.

[31]Gregory (2017) argues against Williamson's epistemology more generally. For example, he argues that it is not obvious that our ordinary capacity to evaluate Williamson's conditionals are reliable when it comes to the cases relevant for the modal implications of such conditionals.

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### 8.1. The wrong formalism objection

One might worry that the reason why the internal development is not epistemically useful is because of the particular, idealised, formalism in which I chose to model pretense imagination. Perhaps wrong choices were made and the conclusions would be different if one were to use a different formalism.

In response, note that all we relied on from the formalism is the fact that revising one's beliefs with something that is currently believed does *not* change the set of most plausible worlds. This is a very minimal assumption and is not a particularity of the formalism used here. That is, the arguments of this paper hold for any belief revision policy that is such that updating one's beliefs with a proposition that is believed does not change the set of most plausible worlds.[32] Other than that, the argument relied on a venerable tradition on the epistemology of conditionals that links conditional beliefs with beliefs in conditionals. The epistemological and psychological relation that we relied on is supported by philosophical arguments and empirical data *independent* of the formalism used.

### 8.2. The actuality worry

The reason why we concluded that pretense imagination cannot provide a satisfactory epistemology of possibility is that it requires prior modal knowledge: knowledge that the antecedent is possible. One might respond as follows: if we use only propositions that we believe to be true as antecedents of the conditional, can we then not expand our knowledge of possibilities on the basis of this? Because whatever is actually the case is possible, so having the initial input believed to be true means that we believe it to be possible as well.

Note that if we use 'believed to be actual'-propositions as antecedents, then we would have to (hypothetically) revise our beliefs with a *believed* proposition. But, as we saw when discussing the epistemological value of the internal development (section 5), this does *not* result in new conditional beliefs. Phrased differently, the only way in which pretense imagination is epistemically useful, is if we do not believe the antecedent of the conditional in question to be true (Williamson 2020). Thus, we cannot use the actuality principle in combination with pretense imagination to expand our modal knowledge based on propositions that are believed to be actually true.

### 8.3. The wrong conditional objection

Throughout the discussion of pretense imagination providing justification for newly believed conditionals, we have focused on *indicative* conditionals. However, one may object, many who think that conditionals are involved in the epistemology of possibility rely on *counterfactual* conditionals. For example, Williamson (2007) seems to suggest that the epistemology of modality is a special case of the epistemology of counterfactuals and Kment (2014) argues for analysing modality based on something akin to similarity-spheres of counterfactuals. The worry is that the result that indicative conditionals cannot play a fundamental role in the epistemology of modality is neither here nor there.[33]

[32]Note that the arguments *do not* require that the plausibility order stays the same when revising our beliefs with a believed proposition. All that we need is that the *most plausible* worlds do not change – i.e., that $Min_{\leq_m}(W)$ stays the same.

[33]It seems that in more recent work, Williamson (2016) *is* talking about indicative conditionals.

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Williamson (2016: 118) is rather explicit in that he thinks that the cognitive capacities that underlie the justification of counterfactual and indicative conditionals are largely similar. Of course, he also acknowledges that there must be some difference between the two, due to the difference in truth-value of famous pairs of such conditionals. The way that Williamson talks about it makes it seem that the difference is insignificant to the epistemology of modality. The arguments here suggest that either this is not so (that is, pretense imagination as modelled here does not (solely) play a role in the epistemology of *counterfactual* conditionals), or, if it is, the use of pretense imagination in the evaluation of counterfactual conditionals that feature in the epistemology of possibility also requires problematic prior modal knowledge. In general, the main argument against the use of pretense imagination in the epistemology of possibility concerns the *problematic prior modal knowledge* required. This holds for *any* conditional for which pretense imagination plays a crucial role in its epistemology. For example, even though Williamson's epistemology of possibility relies on *counterfactual* conditionals, rather than indicative conditions, his theory does crucially rely on pretense imagination. The arguments of this paper affect any conditional for which the epistemology is taken to be one of hypothetical belief revision.[34]

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