# Against Yagisawa's Modal Realism

MARK JAGO

## 1 Introduction

In his book *Worlds and Individuals, Possible and Otherwise* (2010), Takashi Yagisawa presents and argues for a novel and imaginative version of modal realism. It differs both from Lewis's modal realism (Lewis 1986) and from actualists' *ersatz* accounts (Adams 1974; Sider 2002). Yagisawa draws interesting parallels between tense and modality, and gives a metaphysics of modality which comes close to what the four-dimensionalist says about temporal persistence. He accepts both possible and impossible worlds, arguing that actual entities, mere possibilia and impossibilia are all equally real. Yagisawa argues that the addition of impossibilia to a modal realist account results in fine-grained *hyperintensional* theories of properties, counterfactuals, intensional attitudes and propositions, on which logical equivalence does not imply identity. Yagisawa argues, Lewis-style, that the theoretical payoff of this account is worth the high ontological cost. Yagisawa's ontology goes far beyond Lewis's, but Yagisawa's modal realism purports to deliver far more. The promise of an extensional, quantificational analysis of intensional *and* hyperintensional notions is certainly highly appealing.

In this paper, I'll present two arguments, each of which shows that Yagisawa's metaphysics is incoherent. The first argument shows that the combination of Yagisawa's metaphysics with impossibilia leads to triviality: every sentence whatsoever comes out true. This is so even if Yagisawa accepts a paraconsistent notion of logical consequence, on which contradictions do not entail arbitrary conclusions. The second argument is independent of Yagisawa's acceptance of impossibilia. It shows that Yagisawa's metaphysics of *possible* worlds is incoherent. Using ordinary modal reasoning, I derive a contradiction from Yagisawa's account of possible worlds.

I describe Yagisawa's modal realism in §2. I present the first problem for Yagisawa in §3 and consider potential responses on behalf of Yagisawa in §4. The second problem appears in §5. §6 is a brief conclusion.

## 2 Yagisawa's Modal Realism

In this section, I describe Yagisawa's modal realist metaphysics. Its key theoretical notion is of a *metaphysical index*. Worlds, times and places are all types of metaphysical index, and are all equally real. Metaphysical space is thus structured by modal, temporal and spatial axes. Concrete entities – everyday things such as cats, trees and macbooks – extend across these axes, in virtue of having *stages* (or parts) which exist at particular indices. Ordinary entities thus comprise spatial, temporal and modal stages, all of which are equally real. Metaphysically, modal

stages (and the worlds at which they exist) are on a par with temporal and spatial stages (and the times and places at which they exist).

It is helpful to compare Yagisawa's view to *four-dimensionalism* about persistence, that is, about how objects extend through time.[1] Characteristic of four-dimensionalism is the view that objects persist (extend in time) by *perduring* (Lewis 1986): that is, by having temporal parts, the sum of which is the persisting entity. Entities exist and have properties at a time $t$ by having temporal stages at time $t$ which have those properties. Bertie is beagle-shaped this Monday in virtue of having a beagle-shaped this-Monday-stage; he was once a puppy in virtue of having a past puppy-stage; and he is always adorable in virtue of all his temporal states being adorable.

For Yagisawa, worlds are in a fundamentally like times and places. Entities exist and have properties at a world $w$ by having modal stages at world $w$ which have those properties. Modal stages stand to modality and modal truth as temporal states stand to time and temporal truth. Bertie is actually beagle-shaped in virtue of having a beagle-shaped actual-stage; he could have been portly in virtue of having a (merely) possible portly world-stage; and he is necessarily canine because all of his world-stages are canine. Yagisawa's worlds (like times) are not fusions of concrete entities, as they are for Lewis, nor do they have concrete entities as parts. But neither are they abstract ersatz worlds, as actualists often take worlds to be. For Yagisawa, worlds are primitive and fundamental entities: they are the modal species of the fundamental category *metaphysical index*.

Yagisawa accepts *impossible* as well as possible worlds (2010, chapter 8). The argument in favour of including impossibilia is, Yagisawa says, an extension of the argument in favour of possibilia. Lewis's set-of-possible-worlds approach results in coarse-grained semantic entities: necessary equivalence implies numerical identity for propositions, intensional states and properties, and counterfactuals with impossible antecedents are deemed trivially true.[2] Both results are counterintuitive. By including impossible worlds, Yagisawa delivers finer-grained *hyperintensional* semantic entities (which can distinguish between logically equivalent contents) whilst retaining the quantificational approach. I have no quarrel with impossible worlds or impossible entities, or with Yagisawa's arguments in their favour. My worry is that Yagisawa cannot accommodate impossible entities, given his metaphysics. I develop the worry in the next section.

## 3   Problem 1: Impossibilia

In this section, I develop my first worry for Yagisawa's approach. To see the worry, let's return once more to the familiar temporal case. Some temporally extended entity such as Bertie has properties-at-time-$t$ in virtue of having $t$-stages

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1. Four-dimensionalism is not itself a view about what time is, or about whether non-present entities exist. But it does presuppose the *eternalist* ontology of time, on which past, present and future entities genuinely exist. *Presentists* deny this. Sider (2003) discusses these theories.
2. Lewis (1986, chapter 1) also suggest a finer-grained approach to content which adds syntactic structure to sets of possible worlds.

with those properties. Bertie is beagle-shaped on Monday iff he has a beagle-shaped Monday-stage. If he is beagle-shaped on Monday, then he is so in virtue of having a beagle-shaped Monday-stage. His Monday-stage is beagle-shaped, *simpliciter*; that stage is *intrinsically* beagle-shaped. This theory reduces Bertie's properties-at-a-time to properties had (*simpliciter*) by his temporal stages.

Similarly in the modal case, Bertie has properties-at-world-$w$ in virtue of having a $w$-stage with those properties. His $w$-stage is portly, *simpliciter*; that stage is *intrinsically* portly. This isn't to say Bertie is portly: for Yagisawa, it is a confusion to say that Bertie – the collection of world-stages – is portly, slim, or whatever.[3] We have to say he's portly-at-$w$, but slim-at-$u$. To say that Bertie is possibly portly is to say that, for some world $w$, Bertie is portly-at-$w$ (equivalently, that there's some modal stage of Bertie that is portly, *simpliciter*).

The possibility of Bertie's being a portly beagle entails that there is a portly beagle stage, perhaps not actually, but out there somewhere in modal space. That stage is *intrinsically* portly, and not merely portly-at-$w$ (for some world $w$ or other). By the same token, the *impossibility* of Bertie's being a portly-and-not-portly beagle entails that there is an *intrinsically* portly-and-not-portly beagle stage, certainly not actually, but out there somewhere in impossible modal space. That stage of Bertie is (impossibly) both portly and not portly. Crucially, it is both portly and not portly *simpliciter*, not merely portly-and-not-portly-at-$w$.[4]

Recall that such modal stages are legitimate objects of quantification: they are as real as any other modal stage, including actual modal stages. And modal stages themselves are just as real as temporal stages, themselves just as real as a thing's spatial parts. In the most literal sense, Yagisawa is committed to the reality of entities – modal stages – with contradictory properties. Such entities are not merely $F$-and-not-$F$-at-$w$; they are $F$-and-not-$F$ *simpliciter*.

Logic alone forbids such entities. If there is an entity with contradictory properties, then some contradiction is true; and a contradiction classically entails every sentence $A$. Bertie's impossible portly-and-not-portly world-stage $b$ is real; it is portly (*simpliciter*) but also is not portly (*simpliciter*). So '$b$ is portly $\land \neg b$ is portly' is true (*simpliciter*); and so (given classical logic) any '$A$' whatsoever is true, which is absurd.

## 4  Potential Responses

In this section, I discuss two potential responses to the argument just given. The first is that, by Yagisawa's lights, I have confused *existence* with *reality*:

> When I say that possible worlds and mere *possibilia* are real, I do not mean that possible worlds and mere *possibilia* exist. Reality and existence are not

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3. Bertie must have *some* properties, such as *being a collection of stages*, intrinsically. Yagisawa's point is that he doesn't possess 'ordinary' properties (such as *being portly* or *being slim*) intrinsically, but only in relation to some world or other.

4. Being portly-and-not-portly-at-$w$ is not in itself a problem, if $w$ is an impossible world, since it does not entail both being portly-at-$w$ and simultaneously being not-portly-at-$w$. But something that is portly-and-not-portly *simpliciter* is both portly and not portly, which we cannot allow.

> the same; the former is absolute, while the latter is relative. (Yagisawa 2010, 49)

Given this usage of 'exists', I would be wrong to infer from 'Bertie-stage $b$ exists at world $w$' to 'Bertie-stage $b$ exists *simpliciter*', and thus wrong to infer that there exists, *simpliciter*, a Bertie-stage that is both portly and not portly.

This response is besides the point, for two reasons. Firstly, it doesn't matter at all if Yagisawa calls 'reality' what others call 'existence'. For Yagisawa, reality is 'is the comprehensive ultimate subject matter of metaphysics' (2010, 40) and 'is absolute and irreducible' (2010, 49). By 'is real' and 'reality', Yagisawa means exactly what I (and many others) mean by 'exists' and 'existence'. So any quibbles over uses of 'is real' (as Yagisawa uses it) and 'exists' (as most others use it) are purely terminological. Secondly, even if the worry were substantial, the argument to absurdity can be run by deriving the *reality* (as opposed to the existence) of an entity with contradictory properties. Bertie's impossible portly-and-not-portly world-stage $b$ exists relative to some impossible world $w$. So $b$ is real, and is portly-and-not-portly *simpliciter*. The reality of $b$ is sufficient for the truth of a contradiction, and Yagisawa does not avoid absurdity.

A second potential line of resistance to the above argument is to bite the bullet and accept that there are true contradictions (but deny that they are problematic). This is the attitude Yagisawa seems to have taken in earlier work (Yagisawa 1988, 203). Curiously, Yagisawa doesn't revisit this key issue in Yagisawa 2010. On a charitable interpretation, he must deny the (classically valid) inference *ex falso quodlibet*, from a true contradiction to arbitrary '$A$'. In other words, he must adopt a *paraconsistent* notion of logical consequence, on which contradictions do not entail arbitrary conclusions (see, e.g., Priest 1987).

In Yagisawa's case, however, rejecting *ex falso quodlibet* does not avoid the absurd conclusion that every '$A$' is true. Yagisawa accepts a plenitude principle for impossibilia: if it's impossible that $x$ is $F$, then there's an impossible world $w$ and a $w$-stage of $x$ which is $F$.[5] The argument to arbitrary '$A$' is then as follows. For any $x$ (possible or otherwise), it is impossible that $x$ is such that $A \land \neg A$. Hence there is an impossible world $w$ such that $x$ is such that $(A \land \neg A)$-at-$w$. Then $x$ has a $w$-stage such that $A \land \neg A$ *simpliciter*. Hence something is such that $A \land \neg A$ (*simpliciter*), which paraconsistently entails that $A$. We have derived an arbitrary '$A$', which is absurd. Notice that *ex falso quodlibet* plays no role in this argument, which relies on paraconsistent inferences only.

Here is a further argument to the same conclusion. Paraconsistent logic defines a special atomic sentence, '⊥', the *Church false constant*, which entails '$A$' for arbitrary '$A$' (see, e.g. Restall 2004). '⊥' cannot be true: there can be no $x$ such that ⊥. So there is an impossible world $w$ according to which there is an $x$ such that ⊥. Reasoning as before, $x$ has a $w$-stage which is such that ⊥ (*simpliciter*).

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5. This principle is unavoidable, given Yagisawa's aim to account (non-trivially) for counterfactuals with impossible antecedents. The requirement is: for any impossible '$A$', there is some '$B$' such that '$A \,\square\!\!\rightarrow B$' is false. This requires worlds which represent that $A$, for arbitrary impossible '$A$', just as the plenitude principle says.

This entails that ⊥, *simpliciter*, which entails any '*A*'. It follows that '*A*' is true, for arbitrary '*A*'.

To avoid the absurd conclusion that every sentence is true, a defender of impossible worlds must be able to block the inference from 'at $w$: $x$ is $F$' to 'something is $F$'. Ersatz worlds (which might represent linguistically or pictorially, for example) block the inference. But Yagisawa is clear that his worlds are genuine, not ersatz, and so this is not a move available to him. The other way to block the inference is to hold that properties are ultimately relations to worlds, so that 'at $w$: $x$ is $F$' is *ultimately* analysed as: $x$ is $F$-at-$w$. It is not analysed further in terms of $x$ having a $w$-stage that is $F$. McDaniel (2004) defends a view along these lines. The resulting view is quite different from Yagisawa's. It abandons all talk of world-stages. Transposed to the temporal case, the view is precisely what the *three*-dimensionalist says. On the modal analogue, each object is wholly present at each world in which it exists. But Yagisawa explicitly denies this view (2010, 53).

Moreover, the latter view is incompatible with impossible worlds, on quite independent grounds. Richard Routley is Richard Sylvan; it is metaphysically impossible that Sylvan is not Routley. So there is an impossible world $w$ according to which Sylvan, but not Routley, is identical to Sylvan. On the latter view, this is analysed as: Sylvan but not Routley bears the relation is-identical-to-Sylvan to $w$. But then Sylvan and Routley bear different relations to $w$, and so are non-identical, which is absurd.[6]

## 5   Problem 2: Possible Worlds

I have so far been arguing that Yagisawa's brand of modal realism is incompatible with his acceptance of impossibilia. But Yagisawa's modal realism has another serious problem, which does not concern his acceptance of impossibilia. The problem purports to show that Yagisawa's theory of modality is incoherent, and would remain incoherent even if impossibilia and impossible worlds were removed from the account.

The argument runs as follows. It is a necessary truth that any possible entity whatsoever that's $F$ is either *necessarily $F$* or *contingently $F$*.[7] Bertie, although actually thin, could have been portly ($\neg Pb \wedge \Diamond Pb$). So, according to Yagisawa's analysis of possibility, there's a possible world $w$ at which there exists a portly modal stage of Bertie. Call this stage $b_w$. Is $b_w$ necessarily or contingently portly? Suppose the former. This entails that Bertie is possibly necessarily portly, $\Diamond \Box Pb$ (for by assumption, $b_w$ is necessarily portly and so Bertie has a necessarily portly modal stage). But '$\Diamond \Box A \rightarrow \Box A$' is a theorem of the most plausible alethic modal logic, KT5 (i.e., S5). Hence (assuming KT5), it follows that Bertie is necessarily portly, and hence in fact portly. Contradiction: Bertie is in fact thin, and not at all portly.

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6. Ripley (2012) endorses the conclusion: if it is possible to separate $a$ from $b$ in thought, then $a \neq b$.
7. All classical modal logics have $\vdash \Box Fx \vee \Diamond \neg Fx$ as a theorem, hence $Fx \vdash \Box Fx \vee (Fx \wedge \Diamond \neg Fx)$: an $F$ is either necessarily $F$ or contingently $F$.

To block this argument (given the assumption that Bertie's portly $w$-stage is necessarily portly), Yagisawa must reject $KT5$ as the correct logic of metaphysical modality, which is a highly questionable move.[8] But even this move is not sufficient to avoid the worry. Bertie is actually thin in virtue of his thin actual-world-stage, $b_@$. If that stage is necessarily thin, then Bertie is actually necessarily thin. On anyone's view, if actually $A$ then $A$, and hence Bertie is necessarily thin. But this is false, since Bertie could have been non-thin (as Bertie's portly $w$-stage attests).

So Yagisawa *must* assume that world-stages do not have all their properties of necessity: Bertie's actual-stage $b_@$ is contingently thin (and so could have been portly), and his $w$-stage $b_w$ is contingently portly (and so could have been thin). These possibilities cannot be analysed as possibilities for ordinary objects (such as Bertie) are analysed: $b_w$ itself does not have modal stages (other than itself), and *a fortiori* does not have a thin world-stage. But $b_w$ is related, in an important way, to other world-stages, namely those other world-stages that (together with $b_w$) comprise Bertie as a whole. We can think of all of Bertie's world-stages as counterparts of each other, and analyse the contingent properties of a world-stage in terms of the properties of its counterparts (much as on Lewis's analysis of possibility). World-stage $s$ could have been $F$ iff there is a world $w$ and a $w$-stage $s_w$ which is both $F$ and a counterpart of $s$.

This makes sense of our saying (as Yagisawa must) that Bertie's thin $w$-stage is contingently thin. But the view quickly runs into absurdity. Say that world-stages $s$ and $s'$ are *worldmates* ($Wss'$) when they both exist at the same world-index (i.e., iff they are both $w$-stages, for some $w$). Now consider any two world-stages $s$ and $t$ which are not worldmates: $\neg Wst$. Since what is true is possibly true, it's possible that they are not worldmates: $\Diamond\neg Wst$.[9] By the analysis of possibility for stages just given, there is a world $u$ and there are $u$-stages $s_u$ and $t_u$ such that $s_u$ is a counterpart of $s$, $t_u$ is a counterpart of $t$ and $\neg Ws_ut_u$. But since $s_u$ and $t_u$ are both $u$-stages, by definition they are worldmates: $Ws_ut_u$. Contradiction.

The situation is this. To make sense of world-stages having properties contingently, Yagisawa must accept an analogue of counterpart theory for world-stages. But the combination of counterpart theory, Yagisawa's metaphysics and regular modal reasoning is inconsistent. Yagisawa's metaphysics leads to absurdity (regardless of whether an $F$ world-stage is necessarily $F$ or contingently $F$). This conclusion was reached independently of impossibilia and impossible worlds. Even considered as an account of *possible* worlds only, Yagisawa's approach is untenable.

8. Yagisawa does suggest that metaphysical accessibility is not an equivalence relation (Yagisawa 2010, 156). Accessibility seems to be reflexive, transitive but non-euclidean, on Yagisawa's approach; hence Yagisawa must accept $KT4$ but not $KT5$ as the correct logic of metaphysical modality.
9. The inference here is from '$A$' to '$\Diamond A$', which holds in all normal modal logics. It is equivalent to the factivity of necessity, from '$\Box A$' to '$A$'. Yagisawa, in accepting $KT4$ as his modal logic (see footnote 8), must accept this inference.

# 6 Conclusion

Yagisawa's version of modal realism (§2) faces two objections. First, the combination of his treatment of modality with impossibilia leads to triviality: every sentence whatsoever comes out true (§3). This is so regardless of whether logical consequence is classical or paraconsistent (§4). Second, quite aside from the issue of possibilia, Yagisawa's account of possible worlds is inconsistent with ordinary modal reasoning (§5). Both problems render his version of modal realism untenable.

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