# Modal Fictionalism and Modal Instrumentalism

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ABSTRACT: Fictionalism is a strategy for retaining a theory without committing to its truth. This paper considers two kinds of fictionalism about possible worlds: modal fictionalism or "story operator" fictionalism, and modal instrumentalism. Difficulties for modal fictionalism are used to motivate endorsing modal instrumentalism.

KEYWORDS: Brock-Rosen – fictionalism – instrumentalism – modal fictionalism – possible worlds.

## 1. Introduction

Fictionalism is a strategy for accepting and using a theory we think is false or seriously dubitable (cf. Rosen 2005). Osiander couldn't believe that the earth moved but he wanted to use Copernicus' account of the revolution of the spheres. Hume argued that there is no such thing as causation but saw that we would not leave off talking about causes. We may be dubious that there are numbers or possible worlds, but we have overwhelmingly good reason to keep on talking about them. Fictionalism in each case tells us to count the theory as a fiction, and keep on using it.

There are many ways to do this. This paper discusses two recent versions of fictionalism about possible worlds, and uses a set of difficulties for one as a reason to endorse the other. The first is modal fictionalism or

"story operator fictionalism" (Rosen 1990).[1] We count the relevant theory (for example Lewis 1986) as a fiction, and then say true things by reporting what the fiction says, by way of equivalences:

> There could have been talking donkeys iff According to PW, there is a possible world that has talking donkeys as parts

(where "According to PW" is the story operator and PW is the fiction of possible worlds).

The other sort of fictionalism is instrumentalism. Instrumentalism treats PW as an instrument, an object for reasoning. It pairs sentences in natural language with sentences about possible worlds: for example, "there could have been talking donkeys" with "there is a possible world that has talking donkeys as parts". But it does not count the pairing as any kind of meaning equivalence.

This paper will describe the "Brock-Rosen" argument that modal fictionalism is committed to possible worlds anyway, and a variety of ways to respond to it.[2] The Brock-Rosen argument is remarkably resilient. The problem, I will argue, is the biconditional equivalence schema. Since modal instrumentalism does not use that schema it is not exposed to the Brock-Rosen argument. The paper ends by comparing modal instrumentalism with some other nearby fictionalist proposals about possible worlds. There are several further fictionalisms with which modal instrumentalism ought to be compared but will not for reasons of space. The conclusion is therefore limited: modal instrumentalism is a better view than modal fictionalism.

## 2. The Brock-Rosen argument

Modal fictionalism is designed for anyone who wishes to talk about possible worlds but doesn't believe there are any, and has no other strategy

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[1]    Since Rosen (1990), "modal fictionalism" is the standard expression for story operator fictionalism, even though there are other ways to be a fictionalist about modality.

[2]    The Brock-Rosen argument is, of course, only one of the problems modal fictionalism faces: see Nolan (2011).

for avoiding commitment to their existence.[3] Possible worlds theory provides "translations" from sentences in natural language and quantified modal logic into sentences about possible worlds (cf. Lewis 1968, 117). For example:

> There could be talking donkeys iff $\Diamond\exists x(Tx \wedge Dx)$ iff there is a possible world that has talking donkeys as parts.
> Necessarily there are talking donkeys iff $\Box\exists x(Tx \wedge Dx)$ iff all possible worlds have talking donkeys as parts.

Modal fictionalism adds a layer of translation. It treats possible worlds theory as a fiction, and then reports what the fiction says the translation is:

> There could be talking donkeys iff According to PW, there is a possible world that has talking donkeys as parts.
> Necessarily there are talking donkeys iff According to PW, all worlds have talking donkeys as parts.

Brock and Rosen independently published an argument that modal fictionalism so understood does not do what it is supposed to do (see Brock 1993; Rosen 1993). The Brock-Rosen argument goes like this:

(1)    According to PW, at all possible worlds there is a plurality of worlds.
(2)    Necessarily, there is a plurality of worlds iff According to PW, at all possible worlds there is a plurality of worlds.
(3)    Therefore, necessarily, there is a plurality of worlds.
(4)    Therefore, there is a plurality of worlds.

(2) is the translation offered by modal fictionalism; (3) comes from (1) and (2) by biconditional elimination. (4) follows from (3) in some but not all modal logics; for example it does follow in S5.

About (1): It is clear that possible worlds theory does say that there are worlds. In Lewis (1968) this follows from Lewis's Postulates 7 and 8, plus

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[3]    The usual foil for discussions of modal fictionalism is Lewis's account of possible worlds, on which they are concrete spatio-temporal objects just like the actual world. Modal fictionalism and modal instrumentalism work equally to defuse ontological commitment for other realist accounts of possible worlds as well.

the assumption that things could have been other than they are. (The argument of Rosen (1993) starts with the assumption that things could have been other than they are: "It is contingent whether kangaroos exist.") That there are worlds is not a world-bound truth, so, apparently, it is true at every world. Hence, apparently, it is true that according to PW, at all possible worlds there is a plurality of worlds.

## 2.1. Reflexive fictionalism

Despite the clarity of the objection, it is difficult to be confident about what's really going on. One index of the difficulty is the fairly wide variety of responses that have been made to the Brock-Rosen argument. I think what may be the clearest diagnosis comes from Nolan – O'Leary-Hawthorne (1996); the diagnosis does not, however, indicate what the right treatment should be.

They argue that the issue is what they call "reflexive fictionalism". Possible worlds theory models reasoning about possibility and necessity, that is, about modality. The theory itself has some modal status.[4] Applying the theory to itself to express that modal status, we get the Brock-Rosen argument. We get the same result for any fictional account that applies to itself. The parallel argument for the fiction of properties (PT) for example, goes like this:

(1)    According to PT the property of being red has the property of being monadic.
(2)    The property of being red is monadic iff According to PT the property of being red has the property of being monadic.
(3)    Therefore, the property of being red is monadic.

So the fictionalist about properties is committed to properties after all.

## 2.2. Denying (1): no worlds at worlds

Noonan, Divers and Kim in different ways argue that possible worlds theory doesn't underwrite (1).

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[4]    See §4 below for a brief discussion of how amodalism (Cowling 2011), the view that some sentences lack modal status, interacts with modal fictionalism and modal instrumentalism.

## 2.2.1. The letter of fictionalism

Despite the intuitive plausibility of (1), Lewis's (1968) counterpart theory renders it as a falsehood. Rosen expressed the argument in the terms I used above: according to PW, at all worlds, there is a plurality of worlds. Noonan (1994) reminds us that the expressions "at all worlds" and "there is a world at which" are used in counterpart theory to restrict quantifiers. "There is a world at which there are talking donkeys" is translated as "There is a world $w$ and there are things $x$ such that the $x$'s are in $w$ and the $x$'s are talking donkeys". Understood this way, the claim that at all worlds there is a plurality of worlds says that all worlds have worlds as parts. But there are not worlds *in* worlds. So any sentence of the form "at all worlds there are worlds" or "there is a world at which there is a world" is false.

Saving the letter of modal fictionalism leaves the spirit troubled. For surely it remains true that counterpart theory does say that there are worlds. Since counterpart theory talks about all worlds, the truth of the claim that there are worlds doesn't vary from world to world. So it is necessary if it is true. The modal fictionalist wants to say that there are no worlds other than the actual world. She may want to say that this claim is contingent, or necessary. So there are things we want to say about the modal status of possible worlds theory. That canonical possible worlds theory cannot say them seems more like a problem than a solution.

## 2.2.2. Advanced modalizing

Divers (1999a) calls modal claims that are about individuals in more than one world, and claims that are about more than one possible world, "advanced modalizing". Among the former are claims about properties (understood as sets of actual and possible individuals), sets, numbers, and cross-world modal comparisons ("my car could have been the same color as yours is"). Among the latter are the claims of interest to the modal fictionalist concerned about the Brock-Rosen argument: possibly there is a plurality of worlds, and necessarily there is a plurality of worlds. The problem for Lewis is that he is clearly committed to advanced modal claims, but counterpart theory has no means of expressing them.

Divers's solution is a "redundancy interpretation" of advanced modal claims. Counterpart theory adds a world quantifier to modal claims. Its

function is to restrict quantification inside the scope of the quantifier to worlds. The redundancy interpretation says that for the advanced modal claims, the possibility operator has no such effect:

> The simplest and best semantic story is this. Whenever the possibility operator expresses a *non-trivial* semantic function on quantificational sentences, it is, indeed, always that of altering the scope of formerly world-restricted quantifiers. So in cases where the quantifiers were not formerly world-restricted, the possibility operator has no semantic effect on the content of the sentences within its scope. The possibility operator is semantically redundant in such a context, a semantically vacuous expression on a par with "It is the case that". (Divers 1999a, 229)

We treat the necessity operator in the same way, either by defining it classically in terms of possibility and negation, or just by stipulating that, when it governs a sentence containing quantifiers that are not world-restricted, it is semantically redundant. Then the claim "Necessarily, there is a plurality of worlds" comes out saying only "There is a plurality of worlds."

The redundancy interpretation provides a solution to the Brock-Rosen problem. PW does say that there are possible worlds. That is an advanced modal claim, so it isn't handled as a quantification over worlds. Instead, it is a claim that can be directly translated into modal English, as "Possibly, there is a plurality of worlds". The fictionalist then says: and in fact there is not a plurality of worlds.

Divers – Hagen (2006) argue that this is not going to work. The problem, roughly, is that the redundancy interpretation treats all three of the following in exactly the same way (for A a sentence of advanced modalizing): It is possible that A; it is necessary that A; it is contingent that A. In all three cases, the modal operator drops off. So we have the consequence that

> it is possible that A iff it is necessary that A.

So we cannot simply endorse the contingency of PW and then say it is false; having endorsed the contingency of PW, we are also committed to its necessity.

### 2.2.3. Plural evaluation

Kim (2002) argues for a proposal about how any possible worlds theory should interpret "for all worlds" and "there is a world" claims. The proposal solves a variety of problems for counterpart theory, and so for modal fictionalism, including the Brock-Rosen problem. The core idea is to look at tuples (pairs, triples, etc.) of worlds in addition to looking at single worlds (see Bricker 2001). Kim's preferred version of the theory uses mereological sums of worlds – multiverses – rather than tuples. Then the modal fictionalist offers translations like these:

| | |
|---|---|
| Possibly P iff Acc to PW | there is a one-world multiverse at which P or |
| | there is 2-world multiverse at which P or ..., or |
| | P is true unrestrictedly |
| Necessarily P iff Acc to PW | at all one-world multiverses, P and |
| | at all 2-world-multiverses, P and ..., and |
| | P is true unrestrictedly |

Consider "Necessarily there is a plurality of worlds". This is translated as a conjunction of claims about multiverses. The first is: at all one-world multiverses there is a plurality of worlds. Kim holds that this conjunct fails, since there are no worlds at worlds. Hence (1) in the Brock-Rosen argument comes out false.

The structure of this response is the same as the structure of Noonan's response. "According to PW at all worlds there is a plurality of worlds" comes out false, and so "Necessarily there is a plurality of worlds" comes out false as well. But by the informal argument I gave above, it is *not* false that according to PW at all worlds there is a plurality of worlds. Hence I think Kim's system has the same difficulty that Noonan's defence of the letter of fictionalism has. There are modal claims we want to make. But the system will not let us do that.

### 2.3. "Strong" fictionalism

There are, of course, indefinitely many ways to develop possible worlds theory, so we don't know at this point that some variation can't work. But so far the prospects are not encouraging.

Rosen (1990, 353-354) contrasts "timid" fictionalism, that is, a theory that aspires to no more than linking modal claims with a fiction, with "strong" fictionalism, which provides truth conditions – meanings – for modal statements in terms of the fiction. Nolan – O'Leary-Hawthorne (1996) argue that a version of the Brock-Rosen argument tells against any "strong reflexive" fictionalism. They recommend that a fictionalist should develop a "timid" rather than a "strong" fictionalism.

Woodward (2008) and Liggins (2008), in slightly different ways, argue for "strong" fictionalism. They propose that we should construe the fictionalist biconditionals as a translation scheme, and, in particular, that we should interpret modal statements in natural language ("Possibly there are blue swans") as meaning the equivalent claims about the fiction ("According to PW, there is a possible world at which there are blue swans"). Liggins proposes additionally a way of treating sentences using the distinctive vocabulary of possible worlds theory that occur in "ordinary" (mainly philosophical) discourse. Modal fictionalism offers

$MF$    $p$ iff Acc to PW, $p^*$

where $p$ is a modal sentence (containing "possibly", "necessarily", etc.) and $p^*$ is the possible worlds translation. Where $p$ isn't a modal sentence but does contain possible worlds vocabulary Liggins proposes

$MF2$   $p$ iff Acc to PW, $p$

Thus "there is a possible world at which there are blue swans" means that Acc to PW, there is a possible world at which there are blue swans, which is true. *MF* together with *MF2* give us "reinforced modal fictionalism". (Woodward (2008, 274) endorses a similar idea.)

Woodward's strategy is to construe the fictionalist theory as metalinguistic: the biconditionals state a truth condition for a mentioned sentence by using a sentence in the metalanguage, namely, one about the fiction, thus:

'There could have been talking donkeys' is true iff according to PW, there is a possible world at which there are talking donkeys.

Liggins's proposal is simpler and more direct. Biconditionals are symmetrical: there's nothing special about the left-to-right direction as op-

posed to the right-to-left direction. Hence to capture the idea of fictional-ism, a stipulation must be made: which side "has semantic priority". So we stipulate that the story operator side of the biconditional is the one that has semantic priority.[5] There is no need for the metalinguistic formulation.

The upshot for the Brock-Rosen argument is either: (a) The interme-diate step in the argument has this syntactic shape: "Necessarily, there is a plurality of worlds". But the conclusion, that there is a plurality of worlds, does not follow, since the proposition this sentence expresses is that ac-cording to PW, at all worlds there is a plurality of worlds. Or else (b) the conclusion does follow, but what it means is that according to PW, there is a plurality of worlds, which is unproblematically true.

The upshot for the Nolan/Hawthorne recommendation in favor of "ti-mid" fictionalism is simply that they made a mistake: they didn't notice that, since the strong fictionalist version of the Brock-Rosen argument doesn't mean what it appears to mean, it doesn't conclude validly with the damaging conclusion.

I think there are two serious problems for "strong" modal fictionalism.

*Wrong meanings?* Does "Possibly there are blue swans" mean that ac-cording to PW, there is a possible world at which there are blue swans? I think the answer is fairly clearly "no". We can talk about possibility and necessity without talking at all either about possible worlds or about a fic-tion about possible worlds (cf. Nolan – O'Leary-Hawthorne 1996, 29-30).

Rosen (1990) may already have been conceiving modal fictionalism as a "strong" modal fictionalism, so this concern about wrong meanings is not specific to Woodward and Liggins. Liggins points out (personal communi-cation) that we could also imagine a position on which the modal fictional-ist is offering a new meaning for modal English claims, the meaning ex-

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[5]    Woodward (2008, 278) complains that Liggins has merely stipulated that the priori-ty is as he says. Indeed, that is just what Liggins says (cf. Liggins 2008, 153). Two comments: (1) Liggins is free to stipulate what he likes. Just as biconditionals are sym-metrical, there is nothing about them that prohibits saying that we intend to use them in one way rather than some other. (2) Woodward says that his metalinguistic approach gets around this objection. But his approach is equally stipulative: we could, however implausibly, take the truth-attribution (left hand) side of his biconditionals to have se-mantic priority: to present the meaning of the fiction attribution on the right hand side.

pressed on the right hand side of the biconditionals, and so there would be no concern about not capturing the old meaning. I think the difficulties facing such a position are substantial, but discussing them would take me outside the scope of this paper.

*Loss of problem?* The anti-realist about possible worlds wants to say that there are no possible worlds. But given these translation schemes, the sentence, "There are no possible worlds" means that according to PW there are no possible worlds. And that's false. So if we were somehow to manage exceptionlessly to endorse the translation scheme, the anti-realist's signature claim would be false, and false for a reason that isn't relevant to the problem that originally motivated her. Sentences about possible worlds mean something about the fiction of possible worlds, and are more or less unproblematically true (or false). The problem has vanished.

Woodward (2008, 282-286) has two responses to this problem. The first is agnosticism. Ontological commitment, as he sees it, is incurred by assertions (that is, particular speech acts). Given his conception of commitment, "the fictionalist will succeed in [avoiding ontological commitment] just in case she never assents to a sentence, which on that occasion of use expresses a proposition that entails a plurality of worlds" (Woodward 2008, 283). So all she needs to do is make sure never to assert or assent to sentences like "there is exactly one world" or "there is not a plurality of worlds". She should remain agnostic. (Woodward's suggestion here is related to Divers' agnosticism (see Divers 2004). I'll have more to say about Divers' view below, §4.)

Woodward thinks "it would be a mark against paraphrastic fictionalism if it committed the fictionalist to agnosticism" (Woodward 2008, 283). The second response is to bring back a way to state the problem. We can hold that the translations are not always in effect. Instead, whether they are in effect or not depends on context. When we are engaging in modal reasoning without any special concerns about ontology, the translations are in effect. When the fictionalist wishes to express her ontological commitments, the context has changed, and there, the sentence "There are no possible worlds" means exactly what it appears to mean.

But then can't we express the original Brock-Rosen argument in a context in which the sentences get no special semantic treatment? Woodward offers an intriguing argument that there is no single context in which (2),

"Necessarily, there is a plurality of worlds iff according to PW, at all possible worlds, there is a plurality of worlds," gets the interpretation it needs for the Brock-Rosen argument (cf. Woodward 2008, 286). I think this is incorrect. The "standard" context for evaluating (2) is the one in which all the words mean what they appear to mean. In that context, (2) gets a stable interpretation, precisely the one it needs for the Brock-Rosen argument.

Liggins has a different response. Again, the anti-realist wants to assert "There is not a plurality of worlds". She now confronts this argument (157):

> There is not a plurality of worlds.
> Possibly, there is not a plurality of worlds. (Standard modal logic)
> Possibly, there is not a plurality of worlds iff according to PW, there is a possible world at which there is not a plurality of worlds. (Instance of *MF*)
> Therefore, according to PW, there is a possible world at which there is not a plurality of worlds. (Modus ponens)

and that conclusion is false.

Liggins offers two replies for the anti-realist. First, she does not have to assert the premise of this argument; she can "sit on the fence", that is, not say anything positive or negative about the existence of possible worlds. Second, she can use Divers's proposal about what "Possibly ... worlds ..." should mean (see above, §2.2.2.). This takes such sentences to their unmodalized versions. So the argument collapses: "Possibly, there is not a plurality of worlds" only entails the starting point, "There is not a plurality of worlds".

I have already registered my doubts about Divers's proposal for handling "advanced modalizing" (§2.2.2. above). "Sitting on the fence" doesn't allow the anti-realist to preserve the problem, since she's required to not assert just those sentences that articulate it. It would be preferable to have a position on which we get to say what we think is true, and problematic.

### 2.4. Pragmatic modal fictionalism

Liggins (2008) outlines another way out of the Brock-Rosen argument, suggested by a remark Rosen makes about fictionalism in mathematics. Liggins calls this "pragmatic modal fictionalism".

Pragmatic modal fictionalism suggests that we shouldn't decide what someone's ontology is by looking at the literal meaning of the things she says. We should look instead to her considered beliefs. The pragmatic modal fictionalist denies that there is a world at which there are zombies, because she denies that there are worlds: she thinks the truth is that there is not a plurality of worlds. But she uses this sentence to express a different belief: plausibly, the belief that according to PW, there is a possible world at which there are zombies.

Consider a pragmatic account of truth in fiction. We might be inclined to say that "Sherlock Holmes lived at 221B Baker Street" is true. The obvious story operator account would say that this sentence means "According to the Sherlock Holmes stories, Sherlock Holmes lived at 221B Baker Street" and so it comes out true. But we might for various reasons want to resist this account. We could hold that in fact "Sherlock Holmes lived at 221B Baker Street" is false. There is no such person, and there is no such place. When someone utters this sentence we can understand them to be expressing the proposition about the fiction, even though the sentence does not mean anything about the fiction. The context and the speaker's communicative intentions together determine that the proposition the speaker communicates is not the proposition that is literally expressed by the utterance.

The pragmatic modal fictionalist holds that "Necessarily, there is a plurality of worlds" is false. Sometimes she uses it to express the proposition that according to PW, at all possible worlds there is a plurality of worlds. Her evaluation of the critical premise in the Brock-Rosen argument

(2)     Necessarily, there is a plurality of worlds iff according to PW, at all possible worlds there is a plurality of worlds

is that the left hand side is false, the right hand side is true, and hence (2) is false. So the Brock-Rosen argument is unsound.

This is not something the "strong" modal fictionalist can say. Saying that (2) is false is saying that it does not state a translation. That is abandoning the whole idea of "strong" modal fictionalism. Similarly, *no* modal fictionalist who thinks of (2) as an instance of the translation schema can deny (2) on the ground that one side is true and the other false.

Pragmatic modal fictionalism denies what I am considering to be a hallmark of modal fictionalism or story operator fictionalism: the biconditional schema provides equivalences or translations between sentences in

natural language or quantified modal logic and possible worlds theory. The reason for denying it is that there doesn't seem to be a good way to hold on to it and avoid commitment to the Brock-Rosen argument.

There are, however, two worrying things about pragmatic modal fictionalism. First: both Rosen and Liggins express the idea in the context of modal fictionalism and the biconditional equivalence schema. Although it is clear enough that they aren't using it as the original modal fictionalist uses it, it is not completely clear in their presentations how far away from the original they have moved. Second: the distinction between semantics and pragmatics in philosophy of language and linguistics is rich, complex and controversial. So far, the pragmatic modal fictionalist has only said that we can say things about possible worlds and mean something else. We will need pragmatic modal fictionalism to say more than "interpret the fictionalist in such a way that she isn't committed to the ontology she appears to be committed to." So a great deal remains to be spelled out.

## 3. Instrumentalism

Instrumentalism is an alternative to modal fictionalism, and to pragmatic modal fictionalism. It construes the relation between what we say about modality and counterpart theory in a different way than they do, and provides, I think, a clearer account of what we are doing when we use possible worlds talk.

An *instrument* is an object that is used for some purpose or goal, a tool or an implement, a device, utensil, apparatus, contrivance, a gadget. Since being an instrument is a functional characteristic, pretty much anything can be an instrument. A theory can be an instrument. For my purposes here it shouldn't matter a great deal exactly what kind of object a theory is: a set of sentences, a set of models, something more vague like "a story". Theories taken literally are truth-apt: they say something about the world that may be true or false. For a theory to be used as an instrument we have to somehow ignore that truth-aptness. The theory is used in some way to do something, but that use ignores, and is not sensitive to, the truth or reference of the sentences in the theory.

There are several ways we could use a theory without regard to its truth. The most drastic would be to treat the theory as an uninterpreted

calculus of symbols. Less drastic, we could count the symbols as carrying their standard meanings, but hold that the theory is entirely false: its domain of quantification is empty, its predicates have no extensions. We could hold that the ontology of the theory is unproblematic but that much of what the theory says about it, or certain important things the theory says about that ontology, are false. We could also be more cautious and say that we don't know (or don't care) whether the theory is true or not (whether its subject matter is real or not). For all we know it may be, but our purposes are served whether it is true or not.

Let me call these four kinds of instrumentalism "syntactic," "metaphysical," "ideological" and "epistemic" respectively. Here are some traditional examples.

Hume's skepticism about causation is a version of metaphysical instrumentalism. He argued that we have no impression or experience of necessary connection, and that therefore causation is not real. But experience of certain kinds of regularity in the world leads the mind to connect experience of one of the correlated events with the other. We experience this connection (in the mind) as the connection in the world. In this case the ontology of the causation theory is entirely false. But there is a point to talking about causes: it codifies information about what has gone together with what, and hence serves as a guide to what to do next.

Hume *could* be construed as a syntactic instrumentalist. Since we have no impression of necessary connection, Hume thinks we also have no idea of necessary connection. If we think of the meanings of our words as grounded in the ideas we express using them, then our word "cause" has no meaning. We do find ourselves using it in a definite and constrained way in a way important to our lives.

Osiander wrote in his preface to Copernicus' *De Revolutionibus*:

> Since he cannot in any way attain to the true causes, he will adopt whatever suppositions enable the motions to be computed correctly from the principles of geometry for the future as well as for the past. (Copernicus 1992, xvi)

Copernicus' ontology was traditional and conservative: there is a sun, and there are seven planets, and there are celestial spheres connected with the various astronomical objects. His radical proposal was to switch the places of the sun and the Earth. Taken literally, Osiander's recommenda-

tion is to be an epistemic instrumentalist, since he says the true causes cannot be known at all. It is at least as plausible to read him as an ideological instrumentalist: for various reasons, including political ones, it was very difficult to believe in 1543 that the earth moves.

van Fraassen's "constructive empiricism" is an epistemic instrumentalism (see van Fraassen 1980). van Fraassen argued that (a) the only reason we have for belief in unobservables is inference to the best explanation, and that (b) inference to the best explanation is not a truth-guaranteeing form of reasoning, and hence not rationally compelling. We do not have rationally compelling reason to *believe* in unobservables like subatomic particles. But we do have reason to *accept* theories that talk about them, since those are the best theories we have about how the world works.

What, then, should instrumentalism about modality (or modal instrumentalism) look like?

First, it should not be a syntactic instrumentalism. I argued against Woodward above (§2.3.) that in order to articulate the philosophical problems, and to motivate any kind of fictionalism, we need to be able to say what it is that we are finding problematic. So we need to hang on to the distinctive vocabulary of possible worlds theory. The modal instrumentalist can "calculate" with PW as if it were an uninterpreted calculus, but it does still carry its standard meaning.

Second, it shouldn't be an "ideological" instrumentalism. The metaphysical worry about possible worlds isn't that we're confident that there are some and that what we say about them is false. It's rather that we have serious doubts about whether there are possible worlds.

So we want either a metaphysical instrumentalism on which there are no possible worlds at all, or an epistemic instrumentalism, according to which we do not or cannot know whether there are possible worlds. We don't need to make this choice here: either version works as well as an alternative to modal fictionalism.

The modal instrumentalist thinks that "there could have been talking donkeys" is clearly true and that "there is a possible world that has talking donkeys as parts" is either obviously false or there is real doubt about whether it is true. So there is good reason to think those two sentences are not equivalent. It would be misleading to express the modal instrumentalist's idea as a biconditional schema linking them.

Lewis provides detailed guidance for how to "translate" sentences of quantified modal logic into counterpart theory. Instead of thinking of this process as translation, let us think of it as pairing. Lewis gives us an algorithm for a pairing procedure. In this case the algorithm just gives us the pair ⟨"there could have been talking donkeys", "there is a possible world that has talking donkeys as parts"⟩.

How do we use the instrument? It can serve to validate modal reasoning. We might think that

(A) Necessarily $p$
therefore, (B) Possibly $p$

is a valid argument. The pairing procedure gives us

(A*) At all worlds $p$
therefore, (B*) there is a world at which $p$

which is clearly valid by universal instantiation. Generally, we can use Divers' "safety result" (cf. Divers 1999b): assuming that A* and B* are the possible worlds translations of A and B, then, necessarily, if B* is a consequence of A*, then B is a consequence of A. We can clearly use the instrument to reason: start with some premises A, A', ..., use the pairing procedure to generate their possible worlds images A*, A'*, ..., reason using counterpart theory to various conclusions B*, B'*, ..., then conclude B, B', ....

In the course of a discussion of physicalism and the philosophy of mind we might find ourselves saying "There is a possible world at which there are zombies". This sentence uses the distinctive vocabulary of PW and so (according to the modal instrumentalist) is a part of the instrument. If her instrumentalism is metaphysical, she will claim that it is false; if she is more cautious, she will say that she doesn't know whether it is true or false. The pairing procedure pairs this sentence with the sentence of modal English "zombies are possible". It doesn't mean the same as the possible worlds version, but for various purposes the possible worlds version may be more useful to reason with.

Let's assemble the ingredients for responding to the Brock-Rosen argument. The original argument went like this:

(1)     According to PW, at all possible worlds there is a plurality of worlds

(2)    Necessarily, there is a plurality of worlds iff according to PW, at all possible worlds there is a plurality of worlds

(3)    Therefore, necessarily, there is a plurality of worlds

(4)    Therefore, there is a plurality of worlds

Since the modal instrumentalist expresses her commitment to the falsity (or dubiety) of PW "outside" of her use of PW, there is no need for the story operator. She denies that natural language modal sentences are equivalent to PW sentences. She will write down the results of the pairing procedure rather than a biconditional like (2). So she has:

(1)    At all possible worlds there is a plurality of worlds

(2$_i$)    ⟨Necessarily, there is a plurality of worlds, at all possible worlds there is a plurality of worlds⟩

(3)    Therefore, necessarily, there is a plurality of worlds

(4)    Therefore, there is a plurality of worlds

According to modal instrumentalism, sentences (1), (3), (4) and the two members of (2$_i$) are all part of the instrument, since they make positive assertions about possible worlds. They may be false, or their truth may be unknown or unknowable; at any rate, they are not known to be true. (1)-(4) is not an argument at all, since (2$_i$) is not a sentence. So it is not a valid argument. So the modal instrumentalist has nothing left that would commit her to the truth of (4).

## 4. Some nearby views

In this section I discuss four views that are particularly near to modal instrumentalism.

*Other versions of instrumentalism.* Forbes (1983, 271) holds that according to instrumentalism "sentences of [the instrumental theory] are said not to have literal meaning". Forbes thus conceives of at least an important part of the instrumental theory as syntactic in my sense and hence not truth-apt. According to Rosen (2005, 14) and Nolan (2002, 26-27) instrumentalism is a version of noncognitivism: claims about possible worlds are not truth-apt.

The instrumentalism I am proposing here is not syntactic and it is not a version of noncognitivism. I am proposing that possible worlds theory is truth-apt and that its truth conditions are "realist" in the sense that they are about a mind-independent reality.

Nolan's instrumentalist has a device for turning "acceptable" claims in possible worlds theory into truths, much as the modal fictionalist has the story operator to turn acceptable claims in the fiction into truths about the fiction. My version of instrumentalism does not do this. It only provides a mechanism (the pairing procedure) for connecting claims in modal natural language or quantified modal logic with sentences in possible worlds theory.

*Pragmatic modal fictionalism.* Instrumentalism and pragmatic modal fictionalism are similar in important respects: both assess the truth and falsity of claims about possible worlds independently of the biconditional equivalence schema, and both reject the Brock-Rosen argument as (at least) unsound. They agree on what Rosen counts as the critical fictionalist move: they count PW as acceptable but they do not count it as true.

They differ most clearly in what they say about the biconditional equivalence schema: pragmatic modal fictionalism accepts it and then holds that the instances of the schema are mostly false. Instrumentalism holds that this is just the wrong way to use the false theory: it shouldn't be thought of as providing equivalences at all.

We can capture the difference in a more general way by asking for their answers to the following "structural" question: if PW is in some broad sense to be thought of as a fiction, how is it related to our serious modal discourse? (Compare the question: if there are no numbers, how is talk of number theory related to our serious numerical discourse?) Modal fictionalism (story operator fictionalism) says: our serious discourse is about a fiction. Strong modal fictionalism says our serious discourse literally means claims about a fiction. Pragmatic modal fictionalism expresses what we accept in the same way the modal fictionalist does, in terms of the biconditional equivalence schema using the story operator. Pragmatic modal fictionalism then says that pragmatic factors (as well as semantics) settle what proposition someone expresses when she uses a sentence like "There is a possible world at which there are zombies". Since she believes it is false, she should be taken to be expressing a proposition about the

fiction: that according to PW there is a possible world at which there are zombies.

Instrumentalism suggests that there is a simpler and clearer way here. Let us take PW, and sentences in English using the vocabulary of PW, as instruments. The sentences mean what they appear to mean, and we judge their truth and falsity (or their knowability) by our prior assessment of the truth of the basic claim that there are possible worlds other than the actual world. We don't have to say that they are fictional in order to express how we use them in English. We don't need to make any claims that sentences outside of PW mean the same as sentences in PW. We don't need to interpret what someone says as meaning something other than what it appears to mean.

*Agnosticism.* An agnostic about possible worlds (the "worldly agnostic") withholds belief in them. (Divers 2004) shows that the agnostic can endorse a surprising number of claims from possible worlds theory. For example, she can assent to sentences of the form "there are no possible worlds ..." and these can give her necessity claims, since "all possible worlds are such that $\varphi$" is equivalent to "there is no possible world at which not-$\varphi$". There are some modal beliefs she cannot share with the realist about possible worlds ("there might have been no donkeys"; cf. Divers 2004, 675). But it may turn out that these are rationally dispensable: in the cases where the realist reasons with a belief that the worldly agnostic cannot hold, there may be a plausible substitute that the worldly agnostic can hold.

One of Divers' motivations for articulating agnosticism is that the main anti-realist alternatives (story operator fictionalism, Forbes's fictionalism, Blackburn's expressivism) have serious problems (see Divers 2004, 662-667): they "harbour unanalysed modal content", they have the Brock-Rosen problem, they are not adequate to our inferential practice with modality. Divers thinks agnosticism is the best remaining alternative.

My suggestion is that instrumentalism is at least as good an alternative. *One* way unanalysed modal content finds its way into modal fictionalism is through the story operator, since there doesn't seem to be any way to understand "According to PW" except in terms of a strong conditional (cf. Hale 1995a; Divers – Hagen 2006). Instrumentalism doesn't use the story operator, so it does not inherit that set of problems for modal fictionalism. Instrumentalism does not, as I've argued, have the Brock-Rosen problem.

Modal reasoning according to instrumentalism is exactly what possible worlds theory says it is. Finally, even epistemic (or agnostic) instrumentalism continues to reason with all of what the modal realist reasons with, and so does not need to wrestle with what the worldly agnostic can consistently believe about possible worlds.

*Amodalism.* Cowling (2011) discusses *amodalism*: denying "modal ubiquity", the claim that every proposition has a modal status (cf. Divers 1999a). Some truths are just true *simpliciter*, neither contingent nor necessary. Amodalism has some striking benefits. Some of the arguments *against* possible worlds depend on modal ubiquity as a premise. Cowling recommends that "defenders of possible-worlds theory ought to accept amodalism" (Cowling 2011, 473).

Amodalism would help with the Brock-Rosen argument. It would provide a reason to reject the equivalence "Necessarily there is a plurality of worlds iff Acc to PW at every world there is a plurality of worlds". It would also help with "Hale's dilemma" for modal fictionalism (Hale 1995b), since that dilemma starts by asking whether PW, according to the fictionalist, is contingently or necessarily false. In both cases amodalism denies that PW has any modal status.

Amodalism shares with instrumentalism a non-standard treatment of truth and modality: amodalism says some theories have no modal status, instrumentalism says that the truth of some theories is irrelevant. Amodalism is consistent with instrumentalism but it is not entailed by it. (Amodalism is also consistent with realism about possible worlds.) It seems like a natural addition to instrumentalism: if PW is simply an instrument, then the question of its modal status seems misguided. I think amodalism and instrumentalism could go well together, but the details will have to wait for a different paper than this one.

## 5. Conclusion

Modal fictionalism (story operator fictionalism) is an appealing way to use possible worlds theory without commitment to its extraordinarily counterintuitive ontology. But the Brock-Rosen argument against modal fictionalism is resilient. There are several strategies for responding to it; I've argued that none works particularly well. I think the core difficulty

comes from the biconditional equivalence schema. Instrumentalism, which does not use that schema, has the resources to respond to the Brock-Rosen argument. So I think the agnostic or anti-realist would be better off being an instrumentalist about possible worlds theory.[6]

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