Models and Fictions:
Not So Similar after All?

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A number of philosophers draw a close analogy between scientific modeling and fiction, often appealing to Kendall Walton's make-believe view. I assess the models-fictions analogy from a cognitive angle, suggesting that from this perspective it appears relatively weak. More specifically, I argue that, on the one hand, the appeal to Walton is appropriate inasmuch as his view fits well with how modelers employ the imagination. On the other hand, what makes Walton's view attractive as an account of the cognitive aspects of modeling makes it less attractive as an account of fiction.

1. Introduction. Recently, a number of philosophers have argued for a close relationship between scientific modeling and fiction. Claims to this effect take different forms and varying degrees of strength, but for the most part they stress metaphysical, especially ontological, similarities between models and fictions (Frigg 2010; Thomson-Jones 2010, 2020; Toon 2010; Levy 2015; Thomasson 2020; to an extent, Godfrey-Smith 2006). Connected to this is a tendency, at least among those who have developed the models-fictions comparison in detail, to appeal to Kendall Walton's theory, the so-called make-believe view of fiction (see esp. Frigg 2010; Toon 2012; Levy 2015). In this article I assess the models-fictions analogy from a more cognitive angle. My argument is that, seen from this point of view, the analogy appears weaker than from a metaphysical vantage point. More specifically, I will suggest that, on the one hand, the appeal to Walton is appropriate inasmuch as his view fits well with how modelers engage with models and

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with how they employ the imagination in this context. On the other hand, I will argue that the aspects that make Walton's view attractive in an account of modeling render it less appealing, from a cognitive standpoint, as an account of (ordinary) fiction, thus weakening the analogy between these two practices.

I begin by explaining the chief motivations for drawing a models-fictions analogy. In part, this serves as background for those less versed in the discussion. But it also contributes more directly to the current argument, since I will suggest that these motivations have contributed to an exaggerated sense of the similarity between models and fictions. I then outline two sorts of views of fiction—Walton's functionalist view and a rival family of accounts, often called intentionalism. I argue that the former is better suited for models rather than fictions, whereas the latter fits fictions better than models. I conclude by diagnosing the source of this situation and by offering some remarks about why it is worthwhile to sort out the precise relationship between modeling and fiction.

2. Motivating the Analogy. Why draw an analogy between models and fictions in the first place? Briefly, here are some central reasons. First and perhaps key among them is the "surface ontology" of modeling: scientific models often appear to be concrete hypotheticals—the sorts of things that would be concrete if they were actual (Godfrey-Smith 2006). In this they appear very similar to the places and characters populating works of fiction—Flatland, King's Landing, Sherlock Holmes. As Thomson-Jones puts it, models, like fictions, appear to be "missing systems": they have "the surface appearance of an accurate description of an actual, concrete system," and yet "there are no actual, concrete systems in the world around us which fit the description" (2010, 284). Note that this is a metaphysical motivation. It concerns how to account for the nature of "missing systems"; what sorts of things are they?

Closely related to this is a semantic issue: in modeling, as well as in (at least some cases of) fiction, there is often a clear right and wrong. In particular, there is a right and wrong with respect to *implied modeling/fictional propositions*. Sherlock Holmes—to take a standard, although I hope not trite, example—did not know Hercule Poirot. While nothing to this effect is explicitly stated in the Holmes stories, we can be quite confident that it would be wrong to say "Holmes knew Poirot." And similarly, while the Lotka-Volterra model—to pick the modeling equivalent of the Holmes example—does not state explicitly that if the number of prey falls to zero then so does the number of predators, but we can confidently assert this to be the case (indeed, in this instance, we can say so with certainty).

A further sort of motivation is this: modelers often call on consumers (of the model) to employ their imagination, instructing them to "consider

such-and-such a system" or to "imagine a system with such-and-such a structure." Such calls motivate a fiction-based approach to models inasmuch as employment of the imagination is, on a variety of views, closely tied to the consumption of fiction—although exactly how is a matter that will be discussed below. To this we can add a fourth (perhaps a third and a half) motivation: modeling, like fiction, appears to embody an internal-external distinction (Contessa 2010). There are claims that are true (or, at least appropriate) in, or "according to," the model/fiction and claims that are true about the model/fiction: Sherlock Holmes, according to the stories, had a brother called Mycroft (internal claim). Holmes is a character in "A Scandal in Bohemia" (external claim).[1]

An analogy between models and fictions can be developed along several dimensions. As noted, one can view models as *ontologically analogous* to fictions—as being things of the same, or a similar, sort (this is suggested by the first motivation above). The analogy can also be seen in a cognitive-epistemic light, that is, in terms of how we engage with fiction and what underlies our interpretation of fictional content, especially implied content. It is these latter matters that I focus on here.

So the current discussion will bracket the metaphysics of models. My assumption is that even if there are substantial ontological similarities between models and fictions, this leaves room for considerable divergence in other respects. In particular, I think there is a tendency to regard the application of Walton's view of fiction to models as indicating a fairly strong similarity between modeling and fiction. One way to look at the current article is as an attempt to correct this, although I think that getting clear on how and why models are unlike fictions is worthwhile in and of itself.

In the next two sections I discuss two views on the nature of fiction—Walton's game-of-make-believe view and the intentionalist view. I then argue that the former is applicable to modeling but not to fiction, while the latter, conversely, is applicable to fictions but not to models. This is because intentions and intentional interpretation are central to fiction while peripheral, I will suggest, in modeling. Before we go on, let me clarify that when I speak below of *interpretation*, I have in mind the attempt to figure out the implied content of a fiction/model—claims that are true in the model/fiction in virtue of following from claims stated in it explicitly. The word 'interpretation' designates other operations in connection with models, such as assigning senses to variables or providing a legend for a figure. These are not at issue here.

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1. Drawing this distinction is not meant to suggest that one cannot make claims that traverse the internal-external divide (e.g., "Sherlock Holmes is better looking than any detective in real life"). Such claims, sometimes called *cross-fictional* claims, are not my concern here.

3. Walton: Fictions as Rule-Governed Games. The first view of fiction I will describe is due to Walton (1990) and has become well known and much applied outside of its original domain. Walton's view is often termed the make-believe view. But it is noteworthy, and significant for our purposes in particular, that Walton is far from the only thinker to view fiction as closely connected with the imagination and with the attitude of make-believe.[2] Indeed, on this score, Walton's view is largely in agreement with intentionalist views to be discussed below. Instead, what distinguishes Walton's view is its functionalist, rule-based character. Let me explain.

We can roughly divide Walton's view—like other views on fiction—in two: an answer to the question "What is fiction?" and an answer to the question "What determines fictional content?" The second matters more here, but let me describe both. For Walton, what makes a text an instance of fiction (rather than nonfiction) is a functional matter: a text is fictional just in case it has the social function of serving as a means (a "prop" in Walton's terminology) for guiding the imagination. A novel is a work of fiction because in the relevant social context it serves the role of directing its readership to imagine such-and-such scenarios, places, and characters. The second question—what determines fictional content—is answered by Walton in terms of what he calls "rules of generation": principles that guide the reader as to what to imagine, by correlating bits of text (plus contextually relevant facts) with propositions that are to be imagined. So for Walton a fiction is rule-governed, functionally defined social activity, and correct interpretation of a work's content is a matter of following said rules, in a contextually appropriate manner. To illustrate, one such principle is the so-called Reality Principle, which states, roughly, that what is to be imagined, relative to fiction f, is what is explicitly stated in the text of f—assuming this is a case of literary fiction—plus what is true in reality, unless directly in conflict with what is stated explicitly. (Walton 1990, 144–51).

Now Walton's view, as noted, has been taken up in several philosophical contexts (Yablo 1996, 2005; Kalderon 2005), including with respect to models (Frigg 2010; Toon 2010, 2012; Levy 2015). The suggestion is that a model is but a game of make-believe, such that one can move from explicit assumptions, via rules appropriate for the scientific context, to conclusions about the model system. (There is an additional step of applying such conclusion to the target system. I leave this aspect aside.) Thus, the Lotka-Volterra model's explicit content plus rules of inference appropriate for the context

2. While this article will not, as noted, discuss metaphysical questions, it is perhaps worth noting that even views that disagree with Walton's antirealist stance on fiction typically hold that we exercise our imaginations in the course of consuming fiction (e.g., Thomasson 1999).

(of theoretical ecology) generate conclusions, and qua users of the model, we should entertain these conclusions as true according to the model.

The appeal of Walton's account in these contexts is easy to see. Fictionalists aim for a view that allows, on the one hand, for the scenario specified by the Lotka-Volterra equations to be a mere make-believe, a "thing" we explore in the imagination. But, on the other hand, they think there are fairly definite (and objective) standards of correctness with respect to claims we make in modeling: it is correct to say that the predator population will oscillate with a period proportional to the oscillation of the prey's oscillation but with a lag. Walton's account allows for just such a combination; the claims made within a game of make-believe hold only in the sense that they spell out what is to be imagined in the game. But we can, because of the existence of rules of generation, speak of correctness in a definite and nontrivial sense.

So far so good, at least as regards models. I want to suggest, however, that this very feature of Walton's view generates problems for it in its "home ground," that is, as a view of fiction. Moreover, I think another stance on fiction, a view usually termed *intentionalism*, fares better as a view of fiction, although it does worse as a view of models. First let me explain the intentionalist view.

4. Intentionalism. Intentionalism, like Walton's game-of-make-believe account, treats fiction as centrally involving the imagination. In this respect these are kindred views. But while Walton takes fiction to be an extension of child's play and related social exercises of the imagination, the intentionalist views it as an outgrowth from, or indeed as a form of, our practices of interpersonal communication. At the core of the intentionalist view is the idea that fiction is an attempt by an author to generate certain imaginings in the minds of consumers and that they, the consumers, are correctly understanding the fiction inasmuch as they imagine in accordance with authorial intentions (hence the view's name).[3]

Before saying more about the contrast with Walton's view, let me offer a few remarks about the broader context. First, while I focus on functionalism versus intentionalism, there are other views of fiction. For instance, *reader response theory* (Fish 1967; Iser 1974) places the generative burden, so to speak, on the reader, allowing for far more interpretive freedom than either Walton's or the intentionalist views. The *New Historicist* approach, pioneered by Stephen Greenblatt (see Vesser 1989), aims to marry literary interpretation and the history of ideas. While I cannot discuss these and other alternatives here, I tend toward an intentionalist view (as a view of "ordinary"

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3. Intentionalists often add a Gricean condition to the effect that the audience must recognize the author's intentions as such (e.g., Currie 1990, sec. 1.8), but this matters less here.

fiction).[4] Moreover, assuming other views of fiction—at least those I am aware of—would, if anything, strengthen the current argument, since they tend to leave less room, relative to functionalism and intentionalism, for standards of correctness and incorrectness with regard to fictional content.

Second, note that there are different versions of the intentionalist account. Some regard the author's actual intentions as relevant (Carroll 2001; Stock 2017), whereas others think that the relevant authorial intentions are those of a hypothetical or "fictive" author figure (Currie 1990; Levinson 2006). Likewise, some intentionalists take intentions to be the sole, or near exclusive, determiners of fictional content (sometimes called 'extreme intentionalism'; e.g., Stock 2017), while others are more 'moderate', seeing intentions as only partly determining content (Carroll 2001). These distinctions within intentionalism are not insignificant, but they matter less here, and I will not attend to them.

Thus, the intentionalist takes fiction to be continuous with interpersonal communication, in particular with our practices of interpreting our interlocutors and, even more specifically, their intentions vis-à-vis what ideas and propositions we, their audience, are to entertain. On such a view, the main difference between ordinary conversation and fiction is that in the former case the goal is typically to figure out what our interlocutor believes and wants us to believe, whereas in the latter, we are to figure out what the author intends for us to imagine (or make-believe). This leads the intentionalist, typically, to define fiction as, roughly speaking, a set of utterances produced in order to get consumers to imagine certain propositions. And it leads her to view the content of fiction as, roughly speaking, whatever it is that the author intends us to imagine. So the central, overarching difference between Walton's view and intentionalism is that the former regards fiction as akin to a regimented rule-based practice, whereas the latter accords a primary role to authors and their intentions, treating interpretation as a near cousin of the practices we employ in everyday communication.

A complication worth mentioning is that within Walton's view room can be made for a form of intentionalism, insofar as one takes the operative rule of generation to be something like "imagine whatever the author intended you to imagine" (cf. Walton 1990, 88). But while this shows that, formally speaking, the difference between Walton's view and intentionalism can be reduced, it does not change the key point we have been making: Walton views interpretation as a matter of following rules, whereas the intentionalist sees it in terms of figuring out authorial intentions. From this perspective, a

4. In conversation I have often heard the claim that the intentionalist view is old-fashioned and that "everyone knows" that "the author is dead." Frankly, such claims appear ill informed, especially as regards philosophical discussions of fiction (for a recent book-length defense of intentionalism, showing clearly that it is alive often, see Stock [2017]).

rule that states that one imagine in accordance with an author's intentions is a rule in name only.

5. Intentions or Rules? I now want argue for three interrelated claims. First, intentionalism is well suited to fiction but not to modeling. Second, and conversely, Walton's view is well suited for modeling but not for fiction. Third, this shows that fictions and models are, at best, related forms of representation and cognition; there are important differences between them. I will take these questions in order; the first two in this section and the third in the next section.

Recall that the intentionalist views fiction consumption as, in essence, a form of interpersonal communication. According to this conception, we treat a text as fiction in large part because it is created with that intention. More importantly, the intentionalist thinks that when we interpret the text, especially when we look to figure out its implied content, we do so by employing skills and habits of intentional interpretation, much as we would when conversing with others.

There are a number of considerations in favor of this view, as a view of (ordinary, perhaps primarily literary) fiction. I will outline them relatively briefly: first, such a view is attractive insofar as it portrays our consumption of fiction as continuous with everyday communication, since that makes clear both how we go about interpreting fiction and why we appear to do so effortlessly (Carroll 2001; Stock 2017). Second, it sits well with plausible evolutionary accounts of our tendency to produce and consume fiction and art more generally (Godfrey-Smith 2013; Carroll 2014). Third, the intentionalist view fits well with a range of examples—indeed it seems to fit many cases better than Walton's and related views (Currie 1990; Byrne 1993; Stock 2017). Fourth and finally, the intentionalist can more readily account for the fact, which seems (to me) plainly obvious, that in many respects the content of a fiction is indeterminate: inasmuch as an author's intentions do not cover details of the imaginary scenario—How many inhabitants does King's Landing have? Did Sherlock Holmes have a hobby horse as a child?—there seems to be no definite answer. The intentionalist can easily explain this on the assumption that George R. R. Martin and Arthur Conan Doyle had no specific intentions in this regard.

But these very features of intentionalism make the view ill suited, I think, for an application to models. For one thing, it seems unlikely that whether a bit of scientific theorizing counts as a model depends on whether its authors intended it to be so. More importantly, when analyzing a model we rarely, if ever, attempt to ascertain the intentions of its creators; they may interest us for historical or sociological purposes. But it does not normally count for (or against) an analysis of a model that it agrees (or disagrees) with the modeler's intentions in constructing it. It is neither here nor there whether Volterra

intended users of his model to imagine the prey population as limited by the environment's carrying capacity—either there is an appropriate parameter in the equations or there is not. If Volterra intended there to be such a parameter but failed to include it, then that says something about Volterra, the circumstances under which he created the model, how good a modeler he was, and suchlike. But it is not of much relevance for figuring out the model's content.

Instead—and this brings me back to Walton's account—model analysis typically proceeds by applying rules of inference, be they general rules of a mathematical or causal character or more domain-specific principles relevant to the analysis of the system in question (e.g., principles relevant to ecology). We apply such principles to explicitly stated assumptions and arrive at the implied, and typically most important, properties of the models, as the conclusions we seek. Notably, this is precisely the Walton picture as applied to modeling: the model description serves as a prop to which we apply principles of generation, resulting in implied contents. We ascertain whether there is a limit cycle in predator-prey populations by applying mathematical and biological rules of inference to the Lotka-Volterra equations.

The question whether models gain their status (as models) in part because of authorial intention is slightly less clear cut, to my mind. There may be a role for intentions in this context, but it is fairly subtle, and at any rate, it is the intentions of consumers rather than authors that primarily matter (Levy 2018). This is so especially with respect to idealization, a central feature of modeling: Mendel's theory of inheritance was seen as applying to biological inheritance exactly, or nearly so, around the turn of the twentieth century. Today it is more commonly treated as a model, owing to the recognition that some of its assumptions can at most be regarded as idealizations.

But mirror imaging the case of intentionalism, the features that make Walton's view a good fit with modeling are precisely those that make it a poor fit with fiction. The principal reason for this, certainly the most important reason for present purposes, is that it seems implausible that fiction consumption is a matter of rule following. Setting aside general problems about rule following, the simple fact is that it is very unclear what, in many cases of fiction, the rules (i.e., the principles of generation) are. Walton gives a few examples (e.g., the Reality Principle mentioned above), but these are of limited scope and have many problems and counterexamples (Currie 1990, chap. 1; Stock 2017, chap. 2). Indeed, Walton readily admits that he cannot specify principles for the vast majority of cases. Walton's view also has trouble explaining various other features of fiction consumption, such as the fact that we often interpret and judge a given work of fiction on the basis of its relation to other works by the same author or that facts about the author's personal background, sources of influence, and society of origin are typically seen as relevant to understanding her works. Together, these considerations

are fairly strong indications, I think, that Walton's view does not present a plausible picture of fiction.

6. Models and Fictions: Related but Not Identical. If the arguments made above are correct, then Walton's view is, perhaps ironically, a much better view of modeling than it is of fiction. More specifically, it is a better framework for thinking about how we use, interpret, consume, and analyze models. Conversely for intentionalism, it gives a plausible account of the consumption of fiction while, in turn, looking unlikely as an account of models. These conclusions raise questions about the tendency among advocates of the fictionalist approach to modeling to appeal to Walton. More importantly, it conflicts with the idea that models and fiction are very similar, in terms of our cognitive engagement with them.

Thus, I suggest that the appeal to Walton has led advocates of the models-fictions analogy partly astray. The source of this error, I suspect, is interesting and can be put as follows: philosophers of science—perhaps following fictionalists like Kalderon and Yablo, cited above—have focused on the metaphysical status of models and on related semantic issues (what are modeling claims about, how can they be right or wrong, etc.). Walton's view is anti-realist, suiting the naturalist tendency of many philosophers of science. And it is well equipped to make sense of various semantic puzzles in this context.

These aspects of Walton's view, and the concerns motivating the models-fictions analogy, suggest that we should take the game-of-make-believe account seriously as applicable to modeling. But these same considerations also, I think, militate against it as an account of fiction. And as a consequence, they militate against viewing fictions and models as closely kindred. Models may be fictions sensu Walton, but they are not fictions in the normal, general, artistic sense.

Another way to make the point is by noticing that Walton's view aims, in a sense, to "scientize" fiction. He has offered a picture in which fictions are consumed in a manner akin to how scientists use models (or to how mathematicians use calculi—possibly the more direct analog in Walton's original thinking). This may be advantageous for solving some of the vexing metaphysical questions that arise with regard to fictions. But it should not mislead us into thinking of modeling as an instance of the phenomenon of fiction consumption, or even as an exercise of the same set of cognitive resources on the part of human agents. Both modeling and fiction may very well be employments of the imagination, but the manner in which these practices use the imagination differs considerably and in interesting ways.

In sum, while the models-fictions analogy was proposed and developed by thinking of modeling as a more regimented and epistemically oriented version of our use of fiction, I suggest that we look at it differently: we have

a set of capacities for imaginative thinking that are employed in distinct ways. Some are closer to everyday conversation and storytelling, while others are more rule based. Modeling and fiction are more like branchings from a common stem than they are similarly structured analogs.

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