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Article

Models As Fictions, Fictions As Models

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ABSTRACT

Thinking of models in science as fictions is said to be helpful, not merely because models are known or assumed to be false, but because work on the nature of fiction helps us understand what models are and how they work. I am unpersuaded. For example, instead of trying to assimilate truth-in-a model to truth-in-fiction we do better to see both as special and separate cases of the more general notion truth-according-to-a-corpus. Does enlightenment go the other way? Do we better understand fiction's capacity to generate knowledge by thinking of it as a kind of modelling? If we see, as we should, fictions and models are parts of larger patterns of cognitive activity that include institutional frameworks, the best answer is no.

Reading a novel we imagine a woman in an unhappy marriage, a detective living in Baker Street, a plague that turns people to zombies. There is, we know, no woman, man, or plague such as these works purport to refer to. Reading a physics text we imagine a frictionless surface, an incompressible fluid, an object with mass concentrated at its centre. There are, we know, no such things. We turn to a treatise on economics and find a population of perfectly rational agents. No such things exist, as we well know.

There are, apparently, similarities between fictions in the ordinary sense—novels, short stories, movies and plays—and the constructions of systematic theorizing in the sciences, natural and social. The sciences regularly appeal to what are called theoretical models. These models may be unrealistic in various ways: they fail to take account of factors known to be in play, as Ehrenfest's model of thermalisation focuses on randomness and ignores causal relations between molecules. They postulate entities which are off the scientific menu and may even be strictly impossible, as with extended objects with mass concentrated at their centres or Maxwell's incompressible fluid; they characterize entities assumed to be real in manifestly unrealistic ways, as with Thomson's plum pudding model of the atom, or Fisher's infinite population of genes.[1] These models often make our problems tractable; with the right choice of false assumptions we are able to calculate outcomes that are close to the outcomes

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observed. Assumptions like these, known to be false and used without deceptive intent, have long been referred to as fictions.

1. THEORIES OF FICTION

Using the term 'fiction' that way serves to indicate that no claim to truth is in play; such usage has not traditionally been intended to drag with it any very heavy-duty philosophizing about fiction and its nature, of which there has been a great deal over the last twenty-five years.[2] Recently the idea that science trades in fiction has gone beyond the acknowledgement that models may be false while being valuable in many ways to embrace the idea that we might learn something about the scientific practice of modelling from the way that fictions as ordinarily understood have been theorized.[3] For example, philosophers of the arts have been unimpressed by the commonly heard suggestion that we "suspend disbelief" in fictions or that we "half believe" them, or that we in some way undergo an illusion of their reality. They have also struggled with the problem of fictional characters like Anna Karenina, framing theories about the "ontological status" of these entities. They have tried to explain what it is for something to be "true in a fiction" when it is not true, as it is true in Tolstoy's novel, but not true, that Anna commits suicide.[4] Perhaps we can learn from these investigations something about the fictions of science, the entities they postulate, their domains of validity, and our relations to them. Here are some suggestions about what we might learn.

A view now widely held among philosophers is that we need not, and generally do not, believe in fictional stories or their characters to any degree, and do not engage in any act of suspending our disbelief in them. What we do is imagine them, and imagination makes available to us the things we might otherwise suppose are dependent on belief, notably emotional and inferential engagement.[5] Imagining fearful things can make us fearful just as believing in them can, and imagining that the detective has been struck on the head induces the consequential imagining that he is injured, without the author needing to make this explicit. While the affective dimension of imagination is not of obvious importance in scientific modelling (an issue I'll return to) the ability to draw inferences clearly is; that's exactly what we do with models in science.

One might object that imagination is too irresponsible an attitude to be useful for engaging with the models of science. Our imaginings are less constrained than our beliefs. For exactly what reason is controversial. Popular contenders are: while the aim of belief is truth, the aim of imagining is not; we choose our imaginings but not our beliefs.[6] But none of this implies that imagining is unconstrained and in certain circumstances there is a right and a wrong to imagination. Fictions provide rules for imagining, making certain imaginings appropriate and others not, even when nothing is explicitly said on the topic. A reader may imagine Anna Karenina to be a Martian disguised as human; in that case she is not engaging appropriately with the novel. Even if nothing actually said in the text settles this issue, the novel, taken as a whole and respecting the implicatures that prevail in realistic fiction, authorizes the imagining that she is human and not the imagining that she is a Martian; to imagine the latter is to embark on some fictional enterprise of one's own.[7] Similarly, one may

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imagine various things concerning a scientific model, and many of them would be wrong, given that one's project is to use the model for predictive and explanatory purposes. I can imagine that economic agents are all deeply irrational, but this won't be an appropriate imagining if I am interested in using neoclassical theory itself rather than some construction of my own invention. While it is not true that the sun and this planet are the only bodies gravitationally interacting, it is true-in-a-certain-model that they are, and so the use of the model for scientific purposes makes it appropriate to imagine that, at least when the question arises.[8] Model builders also need to keep track of how well the model reflects reality, comparing what is true-in-the-model with what is true. It is important to the experience of fiction that we do similar tracking: we cannot fully appreciate *Anna Karenina* if we do not understand that a good deal of what is true-in-the-story is also true: that St Petersburg is a city, that women in Russia at that time had few rights and little independence. Without that tracking we could not tell a realist novel from a wild fantasy.

Lastly, the assimilation of models to fiction is said to help with understanding what is being referred to when we describe a scientific model. We talk of frictionless surfaces in such situations, when in fact there are none; what are we referring to? It has been suggested that models are structures with abstract entities and relations as their constituents. But we were hoping to find ourselves referring to surfaces, not to abstract entities. We seem able to refer to fictional characters like Holmes and Anna, and to speak intelligibly about them; perhaps thinking of our frictionless surface as a fictional character will help.

I'll suggest that in some respects this is too optimistic a picture of the aid that reflection on fiction can bring to our understanding of scientific modelling.

2. TRUE-IN AND TRUE-ACCORDING-TO

On one issue at least I think the philosophers of science have been misled by false advertising from the philosophers of fictions—I include myself among the guilty parties. Philosophers of science have said that the idea of something being true-in-a-fiction is useful to them, and we philosophers of fiction have certainly offered theories labelled "theories of truth in fiction" (we have not agreed on which is the right one).[9] It was a mistake for us to label them this way; we should have called them theories of truth-in-a-story. Sometimes fiction and story are not distinguished; "Tell me a story" sounds like an invitation to communicate something fictional. But fiction and story are not the same; history and journalism as well as fiction provide us with stories. Among the things that are true-in-*Anna Karenina* some are not true, while some are true; so we need the true/true-in distinction for fictions. And we need it also for nonfictional narratives. Sadly, not everything historians claim turns out to be true, so there are things that are "true-in" an historical account which are not true. Just as with fictional stories, nonfictional ones are silent on certain issues; just as there is no n such that it is true-in-*Macbeth* that Lady Macbeth had n children, there may be no n such that it is true-in-the-history-text that Caesar was stabbed n times at his assassination. We realists about the past think that there is a positive n such that Caesar was stabbed n times at his assassination even if no history specifies that number, and we don't think that there is a positive n which is the number of the Macbeth

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children, but that has no bearing on the present question. And just as unresolvable interpretive disputes can make it indeterminate whether something is true in the fiction, so ambiguity in a nonfictional text can generate a parallel indeterminacy. We may value ambiguity in fiction and deplore it in nonfiction; that, again, is nothing to the question.

Perhaps a significant difference between fictional and nonfictional cases still exists. With nonfiction it can seem more appropriate to say that something is true "according to" the story than to say that it is true "in" the story; "true-in-the-story" seems to carry implications of being true *somewhere*, that somewhere being, for fictional cases, the "world of the fiction." But—so the reasoning goes—while consistent nonfictions are true in some possible worlds, those worlds are not the ones where they are supposed to be true. So for nonfiction the relevant contrast is between what is *said to be* true and what *is* true; that what you said is true in some nonactual worlds is of no help to you as speaker or me as hearer. Nonfiction, we can say, is oriented towards actuality. But fictions don't sustain the same dichotomy, because fictions are not supposed to be true (aka actually true). They are true somewhere else. They are not so oriented.

I disagree, seeing no relevant difference between the fictional and the nonfictional cases. "True-according-to" strikes me as good terminology for both kinds. There is of course a difference between nonfiction and fiction: the former is aimed primarily at securing belief while the latter aims primarily to have us imagine things, and belief and imagination are different in various ways.[10] But they are not different in their orientation towards actuality. Explaining the point will seem, for a moment, to distract us from our topic.

If you lay before me all the possible worlds I can't tell you which one is actual. For worlds are individuated by what is going on in them and we do not know everything that is going on. The more we know, the more we are able to narrow the class of worlds that are candidates for actuality, though we never reduce this to a singleton. Thus far I take actuality to lie within a certain class of worlds; these are the worlds where all I so far believe is true. Reading a history text, I may take it as an invitation to believe various things; I take on board what it says and come to believe that actuality lies within a narrower class, the class of worlds where all I previously believed, together with all the beliefs I acquired from the text, are true.[11]

So much for the nonfiction case; the story I tell about the impact of fiction is strictly parallel to this, with imagination substituted for belief. I am reading *Oliver Twist* and take it as an invitation to imagine things. At the start, let's assume, I have no relevant imaginings in place; in this null case imagination places actuality in a class of worlds no narrower than the class of all possible worlds. But as I read, I start to narrow this class. I imagine actuality to contain Oliver, Fagin, and the Dodger. As I am introduced to more characters and events, this class gets progressively narrower.[12] I don't believe actuality to be in the class of worlds I end up with, but I do imagine that it does. Imagining is as oriented to the actual as belief is.

This refusal to interpolate a "world of the story" between the text and the reader's conception of reality helps, a bit, with understanding models in science. Supposing there to be some place where things are true ("true-*in*-fiction") encourages the view

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that the scientist's modelling efforts, while not true of the target (though approximating to it) are true of something; they are true-in-the-model. So the model is now postulated as an entity between our description and the target system (call that the intermediary view). But the discussion above suggests that we ought not to think this way.[13] The model is a representation of actuality and may be to some extent a false representation of it, perhaps even a necessarily false one. But all we need to make sense of this is a contrast between what is true and what is true according to the model: we don't need, additionally, a place where what is true according to the model is true. And the notion we have imported to motivate this point—truth-according-to-a-story—is neutral between fiction and nonfiction.

Might there not be differences between fictional and nonfictional cases when it comes to specifying general rules concerning what is true-according-to? If there are, we might end up modelling truth-according-to-the-model on truth-according-to-fiction after all. I am far from having an answer to this question; we have not been able, so far, to give an uncontroversial account of truth-according-to for fictional cases and nonfictional cases have hardly been investigated. But there is no a priori reason why, if there are systematic differences, the account of truth-according-to a scientific model should be closer to the account for fiction than it is to nonfiction. So I admit the possibility but see at present no reason to believe things will turn out that way.

Indeed stories or narratives, fictional or not, might not turn out to be the best guide to understanding truth-according-to-the-model. Stories are just one kind of representation and other kinds accept the "according to" construction. We do want to confine ourselves to relatively complex yet systematic bodies of representation: the kind of thing Lewis calls a *corpus*. Among the corpora are data banks, almanacs, text books, systems of belief (personal and communal), stories, scientific models.[14] These are all complex systematic forms of representation according to which various things are true that are not, in fact, true. If there are systematic differences between all these different kinds of corpora with respect to how truth-according-to gets determined[15] we have, again, no reason yet to think that fictional and modelling cases are especially similar.

3. ONTOLOGY

What about all the work done on the ontology of fictional characters? The frictionless surfaces of scientific models should, at the least, be surfaces, not abstracta; similarly with the perfectly rational agents of certain economic models. It is said that by taking seriously the fictional status of models we can think of these things as surfaces and people, with the proviso that they are imaginary ones. Roman Frigg puts it like this:

> What is missing in the structuralist conception is an analysis of the physical character of model systems. The view of model systems that I advocate regards them as imagined physical systems, i.e. as hypothetical entities that, as a matter of fact, do not exist spatio-temporally but are nevertheless not purely mathematical or structural in that they would be physical things if they were real.[16]

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Frigg says that models (and their constituents) do not exist spatio-temporally, which suggests that somehow they exist in another way. But if these are physical things, as he wants them to be, how could they exist in any other way? He also says that "they would be physical things if they were real," suggesting that they do not exist. Or is the idea that they exist as mere possibilia? For many, recognizing the existence of merely possible surfaces is not metaphysically acceptable; anyway it does not solve the problem. There is (granting that locution for the moment) a possible individual who does everything that the Holmes stories say are done and who has genetic make-up X; there is, in some other possible world perhaps, another possible individual who does those things and has genetic make-up Y. They can't both be Holmes, but neither is a better candidate than the other. So neither is Holmes nor is any other candidate.[17] Which possible surface is the one I am considering as I study the model before me? There are too many candidates among the possible surfaces. And what of entities which are contradictory, as some entities postulated by scientific models are said to be? Possible entities won't help here.

There are views currently on the table according to which creatures of fiction do exist. These views do not provide what fictionalists about scientific modelling seem to want from an ontology.[18] If there is a worry in thinking of models as structures and their elements as abstract entities, the same sorts of worries will arise in thinking of them as creatures of fiction. According to the theories I have in mind, fictional characters like Holmes do exist but do not have the properties we normally think of them as having, such as being human. Holmes is, exactly, a fictional character, an abstract object created, perhaps, by Doyle in the act of writing stories. He is not a detective or even a human, for no human is created in the act of writing.[19] Talk of Holmes being a human and a detective is to be understood as recognizing not that Holmes possesses these properties, but that they are ascribed to him (it).[20] If that is the right view it looks as if we must say that the frictionless surfaces of scientific modelling are not frictionless and not surfaces but abstract entities to which these properties are ascribed, and we are back where we started.

Perhaps it will be suggested, more radically, that fictionalism dissolves the ontological problem; we don't need to ask what Holmes is, but merely to note that readers pretend that Holmes is a detective, that he exists, etc. All we need countenance is a psychological attitude, not a mysterious entity.[21] But then we need a story about what it is to pretend that Holmes is a detective. Pretending that Holmes is a detective is different from pretending that Poirot is a detective; it looks as if the difference is the contents of the two propositions pretended. What distinguishes them? Answering seems to call on us to assign distinct semantic values to "Holmes" and to "Poirot," and we are back with the ontological project again. There are many solutions on offer here, including a class of solutions which offer positive accounts of representations containing empty names, which can of course appear in fictional and nonfictional contexts.[22] What won't do as a solution is to assume that, where the representations in question are ones we take the attitude of imagining or pretending to, no problem arises.

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4. FICTION AS MODELLING

Let us look at the models/fictions comparison from the other direction. I have argued that there is not much in the metaphysics of fictions as ordinarily understood that is helpful for thinking about models in science. Ronald Giere makes a distinction that is useful for thinking about the relations between the two: a distinction between ontological and functional similarities. Fictions and models might be very similar entities with quite distinct functions. I will give the question about functional similarity a particular formulation, one that focuses on the functions of models and fictions in learning. I take it for granted that what gives models a role in science is that we can learn from them. What I don't take for granted and what I am interested in finding more about, is whether ordinary fictions function in anything like the way that models in science do when it comes to learning. My goal here is to bring some clarity and systematicity to the often-expressed but inchoate view that we learn from fictions, that fictions—the usual examples are the high-value literary fictions such as those of Proust and Tolstoy—are able to tell us something novel about the real world. So my question is whether there are informative similarities between the ways we learn from models and the ways we learn from fictions.

Those involved in the debate about whether scientific models are fictions have not so far addressed this problem, perhaps because they see relatively little opportunity for learning from fiction in the first place.[23] Discussing fictionalism about scientific modelling, Peter Godfrey-Smith says, "There is some learning about the world from literary fictions, but this is a comparatively low-powered phenomenon that does not pose special problems."[24] Many humanistically inclined scholars will object. Strong claims are often made in the literary media about the supposed benefits of literary fiction, said to range from the transmission of a kind of collective wisdom to the inculcation of empathic and other socially desirable skills and dispositions; these claims are sometimes made in the course of defending the place of literature in the school curriculum. Concrete support for these claims is not often provided, and the available evidence is in fact somewhat thin.[25] That may be because we do not yet have theories about how fiction induce learning; with better theories we might construct experimental scenarios that reveal significant but unobvious effects. Even if learning from fiction turns out to be low powered, an interesting question arises as to how it is possible to learn from fiction at all. Perhaps the process of modelling in science can help us solve the problem.

Is it sensible to think that we can learn from fiction? After all, to imagine something is not in itself to learn anything. But imagining is sometimes done in the cause of learning; imagining trying to get that large armchair through my front door leads me to the belief that it will not fit and determines me not to buy it.[26] The point of certain fictions is often to get us to change our beliefs as a result of what we imagine, as many people did, apparently, on imagining the characters and events described in *Uncle Tom's Cabin*. Also, there are ways to learn from fiction that need not involve imagining things. One is to assume the verisimilitude of a fiction's background. This is perhaps most notable with historical fictions which are supposed to follow the course of known events as far as possible and which are subject to criticism if they fail to do so without good reason. But no genre of fiction is without such constraints;

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ghost stories are expected to get the details of their locations right if they are set in identifiable places, and Ian Fleming was criticized for allowing Bond to order Champagne in a half-bottle when the brand in question was unavailable in that size. The little I know (or believe) about Russian society in the nineteenth century is derived from reading Tolstoy's fiction; I assumed, reasonably I think, that Tolstoy knew a good deal about the facts of that society and took some care to respect them in constructing his story. Readers who assumed that Fleming knew what Champagnes were available in what sizes were mislead.

While this suggests the possibility of learning from fiction, it does not support the idea of a close relation between fictions and models. We do not treat models in science as mere indicators of the opinions of their makers; the model has a maker but we are learning from the model, not from the maker. And learning which depends on the reliability of another agent is a way of transmitting knowledge, not of generating it, whereas models are thought of as devices for knowledge generation.[27] Is that sort of model-based learning possible in fiction? Some assume so. Richard Wollheim, for example, cites the behaviour of Proust's characters to support claims in moral psychology.[28] Wollheim's idea is, I take it, that if we focus on the characters, their situations, and their responses to them, we find in those responses things revelatory of human character. He is not pointing, in this context at least, to Proust's reliability on questions of human motivation. We learn from Hamlet and Ophelia rather than from Shakespeare; from Mr. and Mrs. Verloc rather than from Conrad. Engaging with these characters and situations, we see in them realistically human traits and actions for which we don't need the support of a belief in the reliability of their creators; they have an intrinsic credibility. This suggests, at last, a genuine similarity between literary fictions and scientific models: both provide learning by enabling us to see how a system operates under certain conditions: a gravitational system in the one case, a system of interacting persons in another. Catherine Elgin who emphasizes the causally simplifying assumptions of at least some fictions offers something like this picture:

> [A] work of fiction selects and isolates, manipulating circumstances so that particular properties, patterns, connections, disparities and irregularities are brought to the fore. It may localize and isolate factors that underlie or are interwoven into everyday life, but that are apt to pass unnoticed because they are typically overshadowed by other, more prominent concerns. This is why Jane Austen believed that "three or four families in a country village is the very thing to work on." [note omitted]. The relations among the members of the three or four families are sufficiently complicated and the demands of village life sufficiently mundane that the story can exemplify something worth noting about ordinary life and the development of moral personality. By restricting her attention to three or four fictional families, Austen in effect devises a tightly controlled thought experiment. Drastically limiting the factors that affect her protagonists enables her to elaborate in detail the consequences of the few that remain.[29]

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Austen's communities are not isolated from external influences such as Frank Churchill, illness, or nationally imposed systems of inheritance, and insistence on a very restricted canvas would suggest that there is little to be learned from *War and Peace*.[30] All fictions, no matter how large their ambitions, select from the flow of events; how much confidence should this give us in the epistemic role of fiction? I will suggest a range of significantly destabilizing factors, including one to do with simplicity, which collectively undermine the idea that canonical fictions such as Austen's (or Tolstoy's for that matter) function to illuminate causal-intentional processes through model-like simplification. Understanding these factors will require us to look beyond the models and the fictions themselves, and to see them in their relevant contexts. We have moved on, as I said we would, from thinking about the ontology of models and fictions to thinking about their functions, and in particular their epistemic function.[31] To comprehend those functions we have to see them as parts of broader systems of cognitive activity that include institutions of knowledge-gathering.

5. TRUTH AND THE FEELING OF TRUTH

Scientific models have a relatively well-understood role in the system of knowledge creation that science represents. Providing computational tractability is one function of models already noted. There are others. Models have a heuristic role in developing more realistic theories. They enable us to "probe the resources" of the theories in approximation to which they are conceived.[32] They may even serve explanatory as well as predictive purposes despite their acknowledged falsity.[33] Some of this is disputed but we can, at least, speak coherently and in detail about the relations between models and the growth of scientific knowledge. Nothing comparable is available to help us assess the epistemic value of novels, films, and other fictions. We have no more than the vague suggestion that fictions sometimes shed light on aspects of human thought, feeling, decision, and action; a proposition that so far no one has found a way to test.

This raises an interesting question: what persuades us to say, as we often do, that a fiction is "truthful"? Truthfulness in these contexts does not seem to mean anything as ordinary as getting your facts right, and people struggle when asked what exactly they find truthful in an avowedly fictional story. I suggest that these utterances express something psychologists have gone some way towards understanding: a "feeling for truth" that people often invoke in praising the realism, or the realistic implications of a fiction. We know that the feeling for truth is highly unreliable; it is predictably activated by factors that have nothing to do with truth. Subjects express greater confidence in a principle if it is expressed as a rhyme ("A stitch in time saves nine") than if it is not ("Too many cooks spoil the broth")—and statements that rhyme are not more often true than statements that don't.[34] The tendency to be influenced in judgements of truth-value by irrelevant factors has been widely studied, sometimes under the heading of "fluency" or perceived ease of processing; rhyming verse makes prediction of the final word easier since the space of possibilities is dramatically reduced.[35] There is also a general tendency to be more persuaded by a message when it is accompanied by some pleasurable stimulus, including such things

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as the speaker's attractiveness.[36] The range of aesthetic features of literary works beyond rhyme have not been examined for their effects on the feeling for truth but it is certainly plausible that such things as evocative description, placement of emotionally charged incident, and vivid characterization—all features we look for in fiction—provide pleasures which will boost the feeling for truth.[37]

The idea that literary, dramatic, and filmic narratives offer so many triggers for the feeling for truth suggests a further disanalogy between fictions and models. Models are not dependent for their value in learning on any particular formulation; rather they depend on their capacity to get good predictive or explanatory results or to achieve some other epistemic aim. Literary fictions are not, we have seen, predictive and they do depend on their formulations, especially on their emotionally relevant features, to convince. It's Shakespeare's or Jane Austen's or Marcel Proust's particular choices of words and their order that matter, and different formulations would significantly affect the extent to which readers would regard their representations as truthful.[38]

6. CAUSAL STORIES

The next disanalogy between fictions and models I will call *causal fragmentation*: While models are generally in the business of simplifying and perhaps idealizing the causal processes they model, they do aim to give a comprehensive account of the aspects of causation on which they focus, as when a model generates a predicted path for Mercury around the sun based on the assumption that no other bodies contribute to the net gravitational force. We don't find that the model says nothing about large portions of the orbit, simply taking up the story again at some future point without any accounting for how we got from there to here; if it did we would not trust it. And the causal processes represented in the model have an important kind of autonomy: the act of constructing the model generally involves specifying a set of equations and their domains of application. Once specified, the entities of the model are understood to behave in accordance with the equations and are not governed by the choices of the model maker. But literary fictions do not do anything like this. They deliver highly fragmented representations of processes which focus on moments of dramatic power capable of holding our attentions, simply ignoring chunks of the causal-temporal process deemed to be of less dramatic interest. And where causation is represented, as when thought is described as leading to action, there is no point at which intentional control is relinquished. Whatever happens between the thought and the behaviour represents the author's choice of what is to happen; the agent in question acts or fails to act on a thought because the author chooses to have her do just that. And that choice will be dictated at least partly by dramatic considerations to do with sustaining the interests of an audience, keeping the narrative on track, providing an opportunity for later developments that are thought desirable. Authors are thereby able to create impressions of plausible causal consequence between antecedent circumstances and outcomes by highlighting selected components of a causal sequence, generating enough narrative momentum to carry us, in imagination, over the gap. This sort of fragmentation, taken in conjunction with the previous point about emotional and rhetorical power, means that fictions often have the capacity to

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appear to represent plausible models of human thought and action without that capacity to appear in a certain way counting as evidence that they actually succeed in this task.

7. MAKING LIFE MORE COMPLICATED

Elgin, we saw, thinks it significant that fictions simplify. Let us look again at the issue of complexity versus simplicity. Nancy Cartwright has likened models in science to fables and, more recently, to parables. Like fables, models provide us with instances of more general situations and ideas; like parables, they need interpreting.[39] Both fables and parables have another similarity with models: simplification. Models in science, while often not simple in any absolute sense, are designed to make problems tractable by simplifying: ignoring friction, pretending there are only two bodies or that agents have perfect knowledge and perfect rationality. Fables and parables can be powerful devices for guiding behaviour and are likely true in certain situations. But they are unrepresentative of the corpus of fiction we have, and are especially unrepresentative of the novelistic and dramatic tradition that has been central to the humanistic arguments about learning from literature. These works tend to generate complexity rather than simplification, presenting the circumstances of social life as more surprising and unpredictable, more packed with incident than they are in reality. There are good reasons for that. Fictions of substantial length work by engaging readers, keeping them guessing, having characters act in unexpected ways, subject to conversions of outlook and behaviour rarely seen in the real world, more distinct one from another than real people tend to be, and more resistant to submersion in the flow of events than real people tend to be since the behaviour of real people is often predictable from circumstance.[40] Fictions can hardly be expected to function in any way similar to that of models when they answer to quite different imperatives from those of modelling.

8. INSTITUTIONS

This last point raises a broader question about what we might call the epistemic institutions of fiction and those of modelling. It is not an accident that in science we frequently come upon examples of successful models: models with excellent predictive power, highly suggestive of further theoretical and explanatory moves. Science is organized in such a way as to focus its participants on success in these things; they are the things which bring professional advancement, and which professional training, conference attendance, and seminar presentations reinforce. The effect of these pressures is, unsurprisingly, to drive a search for ever more effective ways of achieving epistemic goals. While literature has extensive institutions, none of them are epistemic; awards of literary prizes are not contingent on stringent tests of whether the sense we have on reading the novel of what some experience is like is really what that experience is like. We have no idea how to conduct such tests and no one would award prizes based on their outcomes if we did. It would be surprising to find that some complex and difficult goal was being regularly achieved by an activity the organization of which took no account of that goal and did nothing to promote it.

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9. LOOKING IN THE WRONG PLACE

These are some of the reasons it is unlikely that literary activity is closely analogous to modelling in science, and even less likely that we will find it successful as measured by the standards regularly applied to modelling. I grant that, from a certain point of view, the discussion leading to this conclusion can seem odd. Of course, someone might say, we don't learn from fictions in anything like the way we learn from models; to assume that learning from fiction, if there is any, should be of this kind would be to condemn fictions as epistemically useless because fictions are radically different from models in science. Instead fictions provide the following: exercising and refining imaginative capacities; providing us with novel and sometimes interesting perspectives which may provoke interesting thoughts; providing us with opportunities to exercise skills of mind reading, empathy, and interpersonal interpretation in ways which improve those skills while avoiding the potentially costly mistakes that encounters with real others make probable.[41] These are all significant if indirect contributions to learning which it is plausible to think are made by certain fictions. I agree that these are the better places to look, though all such claims need to be well supported by evidence before they can be accepted, and the currently available evidence is not impressive. In seeking evidence for anything we should look first at places that have the higher probability of disclosing it. When it comes to evidence for learning from fiction, looking at the epistemology of scientific modelling is a region of low probability.[42]

NOTES

1. For the Ehrenfest model see Barberousse and Ludwig (2009). For the plum pudding, see Suárez (2009, 162–63).
2. Achinstein (1968) characterised models largely in terms of the known falsity of assumption, useful because they combine simplification and approximation. Vaihinger, more or less the founder of fictionalism, says little about literature or the imagination. There is brief discussion of "aesthetic" and "poetic" fictions, and of mythology; centaurs, griffins, and other nonexistents are said to be important for the theory of existential propositions but of "minor importance for our present theme" (1924, 82).
3. Theories of fiction often appealed to in this context have been Currie (1990), and Walton (1990). For negative assessments of this idea see Giere (2009) and Teller (2009).
4. Later on I will question this way of putting the matter; see below, Section 2.
5. Versions of this view are developed in Walton (1990) and Currie (1990). One dissenter is Matravers (2014), though he does not claim that belief is the appropriate response to fictions. For more dissent, confined to the cinematic case, see Quilty-Dunn (2015).
6. Williams (1973) offered the first of these as the reason why the second is true. There is now a substantial literature on both, with no agreement as to the truth of either or even their best formulations.
7. I ignore some complications here. For more detail see my (2014a).
8. See Walton (1990; 2015).
9. See Lewis (1983), Currie (1990, chapter 3), Byrne (1993).
10. There is currently a debate over whether we can define fiction in terms of its functioning or being intended to secure a distinctive attitude of imagining on the part of an audience (see e.g., Friend 2012; Currie 2014b). But even those who deny this might agree with the sentence above. If they do not, that's one less difference between fiction and nonfiction for me to worry about, at least for the purposes of this paper.
11. I assume here for simplicity that the new beliefs I get cause no revision to the prior set.
12. The right formulation here depends on your views about the ontology of fictional characters; perhaps it is better to say that I imagine actuality to contain someone called "Oliver" who does such and such, and someone called. . . etc. For more on this issue see below, Section 3.

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13. My conclusion here is similar to that of Toon (2012), especially pp. 42–43 and p. 56. Toon is arguing against Frigg (2010a). I do not follow Toon in putting weight on the distinction between cases where scientists model a real system and cases where they "describe an imaginary system."
14. See Lewis (1998) especially p. 102.
15. The whole thing might, on the other hand, be a mess with no general principles discernible at any level.
16. Frigg 2010b, 253.
17. See e.g. Kripke (2013, Lecture II). My own view, as represented in my (1990), is that, while it is pretence that "Holmes" is a proper name, it is actually a definite description of a particularly complex kind that is occupied by no one in the actual world but by various people in various possible worlds. It is not a consequence of that view that "Holmes" as used by any of us refers to any of these people. Various people, notably Robert Stecker, have made me see the defects of that earlier theory; I have no firm opinion on this now other than to deny that people who use "Holmes" are referring to anyone.
18. Giere says that scientific models and works of fiction share "an ontology of imagined objects" (2009, 251) without telling us what that ontology is.
19. If Holmes the fictional character was not created by Doyle (as argued by Brock [2010]) he was also certainly (and necessarily) not created in the way real humans are.
20. This is van Inwagen's way of putting it (1977).
21. Frigg does not seem to be adopting this perspective in the passage I have quoted from above.
22. See e.g., Sainsbury (2009). For a variety of approaches see the essays in García-Carpintero and Martíi, eds. (2014). See also Friend (2011) and Salis (2013).
23. As noted by Frigg (2010a, 125–26).
24. Godfrey-Smith 2009, 110.
25. See my (2013) and (forthcoming).
26. An upbeat case for learning from imagination is provided in Williamson (2014).
27. Cases have been cited as supporting the idea that testimony can generate knowledge as well as transmit it (see Lackey's "fundamentalist biology teacher" and variations thereon [Lackey 1999]; [Graham 2006]). What I am calling reliability-based knowledge is a broader category than testimony; at least some of the things I learn from reading *War and Peace* are not things which Tolstoy is intending to convey to an audience; his writing in the way he does merely indicates his belief in these things. But Lackey-style cases, if they work for testimony will work also for cases of mere belief-indication. Tolstoy might have had very odd and unreliable beliefs about Russian society but have written as if he had conventional opinions so as not to upset his readership; the beliefs one picks up from reading his work would be as reliable in that case as they would have been had he actually believed these things. I grant, for the sake of the argument, that cases of knowledge generation are possible in cases where (1) the knowledge is based on assumptions of authorial reliability and (2) the author accepts but does not believe the propositions in question. But if this is the only way for reliability-based knowledge to be knowledge-generating rather than merely knowledge-preserving, the stark difference between this and the standard means by which we get knowledge from models remains; models regularly generate knowledge without the need for appeals to authorial reliability.
28. Wollheim 1984, 82–83, 170.
29. Elgin 2010, 7.
30. Elgin speaks specifically of thought experiments, which we might think of as, in many cases at least, particular operations of models. But thought experiments deserve a treatment of their own for which I have not space here.
31. See Suárez (2009).
32. See Redhead (1980), a complex but rewarding account of the actual use of models in scientific practice.
33. See Bokulich (2009).
34. Reber and Schwarz 1999; McGlone and Tofighbakhsh 2000.
35. See Fabb (2014).
36. See Chaiken (1979).
37. A complication here is that literary effects and the pleasures that go with them are often connected with increases in complexity that we would expect to reduce fluency and hence reduce the feeling for truth. But while effects that reduce fluency, such as use of long words, generally also reduce credence there are situations that will induce the opposite effect (see e.g., Oppenheimer [2006, experiment 5]). It is a

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plausible but as yet untested hypothesis that an audience keen to rise to the challenge of deliberately disfluent prose (think of Henry James) will be influenced by the feeling for truth as a result of the pleasure that comes from succeeding in this difficult task.

38. As David Velleman (2003) has noted, we may easily mistake the emotional arc of a narrative, with its satisfying conclusion, for a satisfactory explanation of the events on which it focuses. We can slightly soften the conclusion (text above) by noting that not all models in science are intended to function predictively: some have a heuristic role in the further development of thinking. Perhaps this is the closest that models and fictions come together: fictions can perhaps be thought of as suggesting ways of thinking about human motivation, rationality, responsibility, and other puzzles of existence.
39. See her (1999, 36–44; 2010).
40. See the literature on situational versus character-based explanations of behavior, discussed in my (2010, chapter 11).
41. ". . .a work of literature (or music) might expand our conceptual repertoire, leading us to approach our experiences with new categories and to react to experience in different ways. . ." (Kitcher 2013, 16).
42. An earlier version of this paper was read at a conference on Scientific Fiction Making, Institute of Philosophy, London in June 2015. I am grateful to the audience on that occasion, including Alisa Bokulich, Roman Frigg, Stacie Friend, Mauricio Suárez, and Adam Toon for their helpful comments. I am especially indebted to Fiora Salis for a very helpful set of written comments.

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