Models in Novels

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Abstract: Novels and scientific models have in common being functional kinds, being products of make-believe, essentially involving narration, being schematic/sketchy, having cognitive functions, concretising abstract ideas, having representative functions without necessarily having truth values, essentially involving scenarios, and being instruments for the filtering of experience. Suspension of disbelief is required for the understanding of both novels and models.

Novels refer to real world instantiations of some, or all of, the concepts of actions, subjectivity, situations, and things.

Novels involve implicitly two kinds of models: Internal models of the Storyworld and External models of the slices of reality that pertain to the Storyworld. They filter experiences and emotions.

Keywords: Scientific models, literary models, make-believe, literary emotions, believability

In this paper I discuss the relationship between scientific models and novels. I commence by introducing a host of ontological and functional characteristics that they share. In this context, I discuss Roman Frigg's theory of scientific models being akin to novels. Finally, I introduce my theory that novels involve models of particular kinds and that they are essential aspects of novels.

1. A Brief Introduction to the Concepts of Novels and Models

What are novels and scientific models? I will not address potential boundary problems for both the concept of novels and that of models, and will assume that they have a fairly straightforward application.

A novel involves a narrative and is of artistic and/or aesthetic nature. A typical novel has what I call a 'storied structure'; such a structure is a beginning-middle-end structure where there is some kind of causality involved in the move from the beginning to the end, by route of the middle, which often contains the turning point of the story. The fact that stories can be told in various ways, for instance by starting with the end, does not change the fact that the concepts of a storied structure and of novels are interwoven. Moreover, a story does not have to be narrated; for instance, a daydream can have a storied structure without being narrated. The daydream just exists in a series of successive creative acts and does not have to be told.

That there are novels containing hardly any narrative does not invalidate the importance of the storied structure. The concept of a novel would be empty unless it was the rule that novels have such a structure. If not, there would not be any clear difference between them and other kinds of fiction, for instance paintings of fictional landscapes. A novel lacking this structure is only understandable in light of it being an exception to the rule, perhaps an attempt to shock the reader into reflecting upon whether our lives have storied structures. *Finnegan's Wake* can be seen in this light.

When I generalise about novels in this article, I am referring to typical ones, i.e., those that contain storied structures, which play a prominent role in them.

It is important to note that objects lacking a storied structure can also serve as a means for narration. Poems and essays do not necessarily have such a structure but can nevertheless be used as a means for telling stories.

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Let us now turn to models. Roman Frigg (2023, 47–48) says that according to one survey, there are 120 different kinds of scientific models. They have different functions and ontological status (Frigg 2023, 399). Some models are purely abstract, while others are quite concrete. Some models have targets, while others are targetless. Generally, models have representative functions, although logical models are exceptions. I take it that empirical models must have such functions.

The problem lies in the lack of consensus about the nature of this representative function. According to Frigg, some theorists even think that the mental representations are primary, and any other representative functions of models are derived from mental ones. Therefore, so to speak anything, can be used to represent anything else; a saltshaker can be used to represent the Big Bang by somebody who has made a representation of it in their mind. It is the thought that counts.

However, Frigg (2023, 264–266) points out that a mere stipulation is not sufficient to make an object a valid means for scientific representation (such as through a model). There must be some way to invoke the properties of the carrier of representation in trying to understand the target. This means that the saltshaker has no properties that help us to reason about the Big Bang. In contrast, water currents have properties such that invoking them can help us reason about electrical currents. Hence, a model of electricity as a water current is a legitimate model whereas a saltshaker is not. Frigg wisely concludes that representations cannot be reduced to mental ones.

I will now outline some *sufficiency* conditions for MO being a non-logical model: MO is a model if it satisfies the condition of having a target and being able to represent that target in a schematic/sketchy fashion, as maps do. Just like maps, models do not necessarily have truth conditions; if they have them, then they can be useful, even though untrue. Models are tools designed to enhance understanding of their targets; for instance, because testable propositions can be derived from descriptions of a model, just like one can do with descriptions of maps (the target mentioned is a slice of reality).

Consider an example: Strictly speaking, consumers do not possess all relevant information and the market is hardly ever perfectly free, so models based on these assumptions are not true. Nonetheless, economists maintain that models based on these assumptions help throw light upon actual economic behaviour.

The key point is that the truth conditions of a model are not of paramount importance for its cognitive function. In a similar fashion, maps can serve cognitive functions without having truth conditions. Having a cognitive function means being a tool for understanding something or collecting facts about it or even helping create a thought-provoking conception of it.

I shall primarily focus on models for which these sufficiency conditions obtain and call these models 'S-models'. The scientific models shall be called 'ScS-models' or even just 'ScSs', and the potentially literary ones 'Litt-models'. When discussing ScS-models I shall only focus on empirical ones.

2. Make-Believe, Models, and Novels

Now, let us explore the common characteristics of novels and ScS-models. I will begin by showing that they share ontological and functional characteristics, and that at least some of the latter also have ontological import. It must be emphasized that since both models and novels are functional kinds, then differentiating between their ontological status and their functions is not always fruitful. They are at least partly sums of their functions.

Being functional kinds is not the only factor that places ScSs and novels on the same ontological level. In addition, both are products of make-believe. This is a shared ontological characteristic, but not a functional one because make-believe constitutes them while not being a tool for anything else but constitution. This shall be demonstrated in the discussion of their common, actual, or potential functions.

In order to see how these two can be constituted by make-believe, we must familiarise ourselves with Kendall Walton's (1990) pretense theory or theory of make-believe. His point of departure is

the capacity of humans to imagine things. He argues that make-believe (pretense) is a pervasive element in the human world, even in the theoretical sciences, but more obviously in children's games and the artworld (Walton 1990, 7). Children can make-believe that a chair is a horse and play the game of trying to capture it with a lasso.

There are cases where the presence of particular objects prompts our imagining, and such objects he calls 'props'; anything that can affect our senses can be a prop. Thus, the chair in the example above is a prop.

Walton writes (1990, 12): 'Games of make-believe are one species of imaginative activity, specifically, they are exercises of the imagination involving props'.

What kind of things can be props in these games, besides the chair in the children's game? Dolls, toy trucks, cloud formations, and not least representational artworks function as props in make-believe games (Walton 1990, 69). In novels, words and sentences serve as the props in the make-believe that constitutes them. When reading Jane Austen's (1918) acclaimed novel *Pride and Prejudice*, we make-believe, among other things, that there were persons called 'Fitzwilliam Darcy' and 'Elizabeth Bennet' and that they had a tense relationship when they first became acquainted but ended by getting married.

Frigg uses Walton's pretense theory to ground the view that scientific model systems are akin to novels (Frigg 2010, 251–268; 2023, 393–429). Before showing how Walton's theory can be of use, Frigg makes some general claims about the relationships between models and novels (1-4):

1. He writes (2010, 257): '… characteristically, there is nothing in the world of which essential passages in the text of a novel are a true description, and the names of fictional people and objects characteristically do not denote real people or objects. Competent readers are fully aware of this, and do not mistakenly believe that they are reading a descriptions of fact when they engage with the text.'

The same applies to science. Scientific texts abound with passages that appear to be plain descriptions of physical systems, but are not descriptions of actual systems and are not taken as such by competent people. Frictionless planes, spherical planets, massless strings, perfectly rational agents, and markets without transaction costs figure prominently in diverse models but have no counterparts in the real world.

2. In the novel *Changing Places* by David Lodge, the main character is a certain Morris Zapp, and in the Storyworld of this novel, he is a professor of English literature. It is also true that he has a heart and a liver but not that he is a ballet dancer. Only the first part is explicitly stated in the novel, but the rest is also true in that world, even if not explicitly stated. The situation of model systems is the same. The description of such a system specifies only a handful of essential properties, but it is understood that the system has properties other than those explicitly mentioned in the description. No one would spend time studying model systems if all that were known about them was the explicit content of the initial descriptions. It is true that in the Newtonian model, the solar system is stable and the planets follow elliptic orbits, but none of this is a part of the explicit content of the model system's original specification. In my parlance: novels and models are schematic/sketchy.

3. A story has a content that goes beyond that which is explicitly stated, and the reader has the means to learn about this extra content by typically using implicit rules of inference. The same holds for model systems: discovering what is true beyond what is explicitly stated is a crucial aspect of the scientist's engagement with the system. In my mode of writing: this is another example of them being schematic/sketchy.

4. Frigg writes (2010, 258): '…although we sometimes read just for pleasure, when we read serious literature we often engage in comparisons between situations in the fiction and real circumstances, and in doing so we often learn about the world.' We find a parallel in model systems where the scientists compare features of the model system with those of the target system, i.e., that which is being modelled.

In Frigg's view, these four points can be understood with the aid of Walton's theories. Walton believes that fictional truths can be generated directly or indirectly—the directly generated ones being primary. Primary truths follow immediately from props, while implied truths result from the application of rules of inference. In Lodge's novel, Zapp started a project of commenting on every aspect of every novel by Jane Austen. Frigg states that the reader is now invited to imagine the direct truth that he is working on this project as well as the indirect and inferred truth of Zapp being overconfident. Such inferred truths are deduced by the reader from common knowledge of academic projects and academic thought.

Frigg maintains that model systems are presented via descriptions. He writes (2023, 414):

> These descriptions should be understood as props in games of make-believe. This squares with the practice of modelling where model-descriptions often begin with 'consider', 'assume', or 'imagine', which make it explicit that the descriptions to follow are not intended to be descriptions of real-world objects but should be understood as a prescription to imagine particular situations.

I think that Frigg is right in claiming that novels and models are products of make-believe and that they are schematic/sketchy), such that they have content that goes beyond what is explicitly stated. In addition, both have some cognitive functions.

The issue with Frigg's otherwise insightful analysis is that he ignores the important moment of narratives; if models function like novels, then they must have such a moment. I maintain that at least some important representative (empirical) ScS-models contain a narrative moment, which means that parts of them contain a storied structure. That moment can be found in a model's applications, and there is no such thing as an empirical ScS model that does not have a set of actual and potential applications. Hence, the concepts of such models and their implications are interwoven.

Let us use as an example the model of the universe, involving the General Theory of Relativity. Given some initial conditions, it can applied to a beam of light coming from a distant star. It must sway on its path when it is close to objects like the sun, due to gravity.[1] Here, we have a story, however much it is told in terms of abstract mathematics. This means that at least one important class of ScS models—even all such models—have in common with novels the function of being a means for narration. This narrative function is their second common functional moment, the first one being the cognitive functions. Being functional kinds, products of make-believe, and schematic/sketchy are shared ontological moments.

3. More on Scientific Models and Novels

As Frigg suggests, scenarios are logically built into ScS-models of the representative kind. A scientific model involving planets that are perfect spheres is a model that contains the scenario 'let us assume that planets are perfect spheres ...' The same holds for economic models involving perfect competition and omniscient actors: 'Let us assume that there is perfect competition ...' Perfect competition, perfect spheres, omniscient actors, and so on, are props in games of make-believe.

I want to add that there is a representative moment in these scenarios, perhaps only representations of imagined realities, but representations all the same. Novels, like empirical ScS-models, involve scenarios, which is the third common function. In Austen's novel the scenario is something like 'let us assume that there was a proud gentleman called Darcy and a rather poor vicar, who had a host of daughters, including one Elizabeth.' Much more about the literary scenarios a bit later in this article.

The fourth common functional moment is that both represent objects and states of affairs without necessarily having truth conditions (like maps and diagrams). More precisely, their cognitive function is not a function of their possible truth conditions; witness the earlier example of economic models. A novel might consist of sentences that are all true, but its main cognitive function has not much to do with the truth condition of its sentences. The truth of its sentences are not a function of them being a part of a novel, as they could just as well have been expressed in a non-fictional form.

However, truth conditions matter a bit for the representative functions of novels. They have at least a minimal representative function in the sense of describing directly or indirectly (the latter through implications) four kinds of objects: actions, subjectivity, situations, and things (physical objects), fictionally or not. Subjectivity in this context is used in a broad sense: it can be thinking processes, mental acts in general, subjective states including emotions, and contents of mental acts including thoughts and subjective states. They can both be the thoughts/other mental acts/subjective states of the characters and the implied author.

I shall use the term 'Minimal-Mimesis' and refer to the four kinds of objects novels usually represent as 'the Foursome.' These might be representations of the real world, imagined worlds, and/or normatively desirable/non-desirable worlds. Nonetheless, the representations must be of some or all of the Foursome. So, like the ScSs, novels have a representative function without necessarily having truth values.

More precisely, the representations by novels essentially involve references to potential realisations of the concepts of the Foursome. This reference pertains to the Foursome because potential realisations are parts of the nature of concepts. Knowing such possibilities means possessing knowledge about the concepts. Thus, this kind of reference is not only a reference to the Storyworlds of these fictions, and these concepts are not confined to these worlds (it is an open question whether it makes sense to situate concepts anywhere). A novel can at least provide us with conceptual knowledge, more precisely a better understanding of the logical possibilities built into the concepts of the Foursome.[2]

Orwell's (2001) *Nineteen Eighty-Four* shows, among others, ways of thinking that seem bizarre but might be logically possible. People in the book's dystopia are conditioned to doublethink, i.e., to think contradictory thoughts, such as 'slavery is freedom'. In Orwell's (2001, 34) own words, doublethink is '… to hold simultaneously two opinions which cancelled out, knowing them to be contradictory and believing in both of them.'

If doublethink is logically possible, then that would enrich our understanding of the concept of thinking and hence that of subjectivity. If it is not logically possible, then we have learned something about the limits of thinking.

The fifth common functional moment is that both can concretise abstract ideas. Nancy Cartwright (1999; 2010, 19–31) says quite correctly that this holds for scientific models. She maintains that models are like fables and parables; they are, strictly speaking, fictions, but can shed light on different empirical situations and phenomena, due to their ability to concretise abstract ideas. *The New Testament* parable of the workers in the vineyard can be applied to any number of different situations. The same holds for scientific models that represent balls rolling down totally frictionless and stable planes. Such models can concretise the abstract physical laws of gravity.[3]

Cartwright is on the right track. At least some kinds of ScS-models are tools for concretisation, whether or not they share important characteristics with parables and fables. I want to add that novels can be instruments for concretising abstractions, like at least some ScSs. Thus, *Nineteen Eighty-Four* concretise the abstract idea of totalitarian danger. In virtue of that, our understanding of the concept of such a danger can become more profound. Such a danger involves a potential situation.

As earlier said, novels, like empirical ScSs, involve scenarios. I shall use the expressions 'Model-Scenarios' (the ScS kind) and 'Novel-Scenarios'. One kind of a Novel-Scenario is that which I call 'the Constitutive Scenario,' which constitutes the Storyworld. It must include descriptions of the way all or some of the Foursome are instantiated in the Storyworld. Such a scenario is a kind of make-believe: let us imagine/assume that there was a proud aristocrat named Fitzwilliam Darcy and a beautiful, brainy, witty, but rather poor girl called Elizabeth Bennet. Like Model-Scenarios, such scenarios can be used to throw light upon reality. In the case of Novel-Scenarios they refer to that which I call 'Exworlds,' i.e., slices of reality external to Storyworlds, but pertaining to them. The Novel-Scenarios can refer to these slices either through some or all of the Foursome or by thematising them by, for instance, containing a message about them. The scenario in Austen's novel involves

representations of such Exworld situations as family life, male-female relations, and class systems. It also contains representations of Exworld subjectivity, including pride and prejudice. The scenario can be used to reflect upon these instantiations of the concepts of situations and subjectivity; perhaps one can learn something about them. Thus, Constitutive Scenarios can function somewhat like thought experiments.

Philosophical and scientific scenarios in the guise of thought experiments are made to prove certain conclusions. In contrast, it is usually hard to find any given message (conclusion of a thought experiment) in the scenarios of novels.

Consider yet again Austen's *Pride and Prejudice*. Is the message that one should not judge a book by its covers, not jump to conclusions about other people as Elizabeth Bennet does when she labels Fitzwilliam Darcy an arrogant snob? Or that love can bridge the gap between classes? Elizabeth changes her view of Darcy and winds up marrying him, despite the fact that he is a nobleman and she a commoner. Maybe all of these conclusions are built into the novel as parts of possible, justifiable interpretations of it.

What use would it be if all novels had one given message, one given conclusion? If all of them had one given conclusion and one given interpretation, then there would hardly be any need of several hundred pages to present the conclusion and the interpretation. It must rather be the rule than the exception that novels do not have a given message (conclusion). If not, then the concept of a novel might lose its usefulness; it would suffice to use the concept of a message.

Moreover, complex and concrete descriptions in novels enhance their ability to concretise abstractions; for instance, the concrete descriptions of totalitarianism in *Nineteen Eighty-Four*.

Experience matters to the understanding of novels just like it matters to the use of empirical ScS-models. Scientific observations are often filtered through the actual or real model involved in the investigation in question. The model involved in the General Theory of Relativity makes an astronomer, testing a theory derived from it, focus on beams of starlight that travel in the gravitational field of the sun while ignoring (filtering away) beams that the sun emits. The scientist focuses on elements that pertain to the model and ignores others.

In an analogous manner, novels filter our observations both of their Storyworlds and their Exworlds. While reading Austen's novel, we tend to focus on the interaction between Darcy and Elizabeth, but give less weight to other aspects of the novel's Storyworld (we filter them away). The novel functions as a filter of our knowledge and observations of such slices of reality (situations) as the British class system, love (subjectivity), and the relations between men and women. Novels have this filtering function in common with the ScSs, their sixth common functional trait.

It has to be added that the experience of the novel's Storyworld is not only an experience of the meaning of its words. It is also the imaginative experience of the characters and the situations described in the novel. Sounds and smells stemming from imagination might also play a role, provided that they are prompted by the reading and pertain to the story. Experience matters to both novels and ScS-models.

Understanding both ScS-models and novels essentially demands the suspension of disbelief. One cannot understand a novel if one focuses on purported factual mistakes of certain kinds; for instance, the fact that Jane Austen's *Pride and Prejudice* contains a lot of statements about people that have never existed. Or if one criticises Franz Kafka's *The Process* for not saying that the protagonist could have escaped his tormentors by slipping out of the country. In a similar fashion, a scientist would be committing a mistake if she criticised a model of planets as perfect spheres on the grounds that this is not true. Yet she would be justified in criticising it for not being fruitful, given that she has some good arguments in favour of that contention. So, suspension of disbelief is a precondition for the particular functions of novels and ScSs and also their make-believe mode of being.

We have seen that novels and ScS-models share at least three ontological moments, one common precondition, and six common functional traits. These traits must have some ontological implications for both novels and ScSs since they are functional kinds. Given the argumentation here, an N

on the one hand, an S on the other hand, which have all six functions, are almost certainly in the case of N a novel, and in the case of S an ScS-model. If additionally they are the products of make-believe and have the stated precondition, then N must be a novel and S an ScS. This does not exclude the possibility of there being novels and ScSs that have fewer than six of these functions or even some other functions not discussed here.

Notice that novels and ScS-models would not be able to filter experiences unless they represent objects that can be experienced. Furthermore, they cannot have narrative moments or concretise abstractions without representation of something, be it real or fictional. At the same time, a host of representations involved in novels and ScSs have scenarios as preconditions. Thus, the traits are not isolated from one another, which means that a novel or a ScS cannot have, say, just a narrative moment and not a representative one, and so on. This means that there are limits to how few of the common moments an N or an S can have and still count as a novel, respectively an ScS.

4. The Models in Novels

In light of so many common traits, it makes sense to say that novels are S-models or essentially involve them. However, S-models and novels each have some necessary components that the other does not necessarily have. One of these components is the fact that novels can be mainly vehicles for aesthetic enjoyment and/or pure entertainment while their cognitive functions play the second fiddle. Many scientific models might be such vehicles, but it is hardly an essential feature of them; they can be purely cognitive. Thus, we can find aesthetic enjoyment in reading Austen's novel and be entertained by it without thinking much about the nature of the British class system. And we can use the Newtonian model without spending much time contemplating its aesthetic features. So, it does not make much sense to equate novels with models; instead, we shall be talking about 'models that are essentially involved in novels'.

These models are Litt-models. Every novel (a typical one) incorporates two intertwined Litt-models: an internal one (hereafter 'the Internal Model') and an external one ('the External Model'). The former is a model of the Storyworld of a given novel, the latter of its relations to the slices of its Exworld. It is the External Model of Austen's novel that does the filtering of our knowledge/experience of class systems etcetera.

The model of the Storyworld, the Internal Model, involves Constitutive Scenarios; witness the example above about Austen's novel (more precisely, the scenario takes part in the constitution of the Storyworld). Due to this and the fact that it is a model of a Storyworld, then it has a storied structure, as scenarios are stories. It involves make-believe as ScS-models essentially do.

Like other models, Internal Models are schematic/sketchy. As Frigg pointed out in his analysis of Lodge's novel, there are many implied truths in any novel. In my vocabulary, the reader has to fill in the blanks of the Internal Model's scenario.

In the Internal Model, we usually get descriptions of the characters, their looks, their dwellings (things), their social status (situations), subjectivity, and actions; in short, the Storyworld. The descriptions are usually schematic/sketchy such that being a nobleman is a part of such a description of Darcy, not details about his looks.

Notice that when the reader focuses on Elizabeth and Darcy, while filtering many aspects of the novel away; it is the Internal Model that does the filtering.

At the same time, the Internal Model provides the reader with a means of experiencing the Storyworld that helps her understanding it. She can, for instance, conclude, on the basis of her experience of the Storyworld of Lermontov's (1976, 143–301) novel *A Hero of Our Times,* that the protagonist, Grigory Pechorin, has some psychopathic traits. He is a Byronic hero, a nihilist, reckless and callous, but not without passions. He says: '… I love enemies, though not in the Christian way. They amuse me and quicken my pulse' (Lermontov 1976, 253). He adds that he loves vanquishing them by deception, a psychopathic trait.

A part of the experience of this Storyworld can be having visual images of Pechorin as he is described in the novel: a youthful-looking thirty-year-old man of small stature, broad shouldered, having a slightly turned-up nose, dazzling white teeth, delicate skin, small hands, slender fingers, naturally curly fair hair, but with a dark moustache. He walks in a careless and indolent manner while never swinging his arms; in the words of narrator 'a sure sign of a certain reticence of character'. He has eyes that 'did not laugh when he did'. The narrator says that this is a sign 'either of evil nature or deep constant sadness' (Lermontov 1976, 189). There is no reflection of spiritual warmth or fertile imagination in his eyes, instead they are of 'smooth steel, blinding but cold'. His glance is piercing and oppressive. The narrator then admits that knowing details about Pechorin's life might have tainted his picture of him (Lermontov 1976, 190).

In addition, one can fill in the blanks of this description by, say, visualising the aspects of Pechorin's body and comportment that are not described in the novel; perhaps getting a better understanding of the character through this visualisation. The reader is not obliged to accept the interpretations of the narrator; perhaps the reader does not agree with the contention that not moving one's arms much is a sign of reticence, not even in this Storyworld.

The Internal Model cannot be entirely divorced from the Exworld. The reason is that it contains references to the Foursome and those four concepts exist outside of the Storyworlds while pertaining to them. This brings us to the External Models.

Such models involve sketches (schematic descriptions) of how the world of the novel refers to actual or potential Exworlds. Actually, an External Model is a model of the instantiation of all or some of the Foursome in the relevant Exworld. In addition, mediated by the External model, the theme of the novel refers to slices of the Exworld. The theme can be the message of the novel and the slice it refers to can be a slice of an actual or a possible world. The theme can also be the atmosphere of the novel;, for instance, the atmosphere of uncanniness of the reality described in Kafka's *The Process*. The reader might draw the conclusion that the Exworld is really uncanny.

External models consist of up to five submodels, four models pertaining to each concept of the Foursome, and one to the theme. At the same time, in order to understand a novel as a whole, then the submodels must function as one or at least be synchronised. There is no law against focusing on one submodel in isolation from the rest.

In Austen's novel, the actions and the subjectivity of members of different genders, classes, and personalities are modelled. Also modelled are situations involving the interaction between members of different classes, genders, and so on. In addition, we have models of the things, including houses and palaces, that figure prominently in the novel.

The External Model can help us get a richer understanding of at least some of the Foursome concepts, for instance the one of action. *Pride and Prejudice* enhances our understanding of those actions we call 'Speech Acts' due to the many witty and interesting locutions in the novel. Elizabeth Bennet's performance of Speech Acts is the prime example; for instance, this comment on Darcy's pride and her first encounter with him: '… I could easily forgive him *his* pride if he had not mortified *mine*' (Austen 1918, 18).

It is the External Model of Austen's novel that helps us contemplate the concepts of such subjective contents and processes as those involved in pride and prejudices, actions such as speech acts, and such a situation as the one of a class system.

Nineteen Eighty-Four can provide us with the possibility of contemplating the concept of totalitarian subjectivity (doublethink) and situations (totalitarian society). Of course, also provided is the concept of criticism of totalitarianism, which is the message of the novel.

Does this mean that External models can help us discover conceptual truths about the Foursome? They might contribute to such discoveries while also making contributions to empirical knowledge; the latter because they can refer by route of an External model to the Exworld. The reference is mediated through the Foursome and the themes. What is certain is that they can give us food for thought concerning the Foursome and whatever themes given novels have.

External models do not have a storied structure because there is no scenario involved. Its application involves essentially narratives, like the model involved in the General Theory of Relativity. The sketches must have some narrative moments; for instance by containing stories about how individuals of different classes and genders typically related to each other in Britain at the time of Austen's novel. The same holds true even for such abstract Exworld phenomena as the contention that human existence is absurd, thematised in such novels as Albert Camus' *The Stranger*. The sketches must contain narrative moments, such as stories about individual reactions to this alleged absurdity. It is hard to see how an External model can refer to a pure abstraction; for instance, a mathematical one. In contrast, it has no problems referring to slices of Exworlds that have narrative forms.

In the case of referring to potential reality, the sketch involved in the External Model can have different directions of fit. It often has a normative form, saying how reality ought to be or ought not to be. *Pride and Prejudice* can be an example of the former, i.e., the non-normative one. It is as though its author is saying 'let us assume that the world of the novel represents the British class system, and/or the power of love to bridge opposites and so on' (again, we are talking about the products of make-believe). An example of the normative one can be *Nineteen Eighty-Four*, where it seems that the author is saying 'let us assume that the world of this novel represents a terrifying, possible future society that people should be warned against'.

5. Litt-Models and Emotions

Litt-models have a filtering aspect, which they do not share with ScS-models. They filter emotions, whereas the ScS ones do not. Thus, the Internal Model, involved in a tragedy, filters out (or ought to filter out) such emotions in the spectator as that of feeling happy about the plight of the protagonist, and make fear and pity be his or her dominant emotion (witness Aristotle's *The Art of Poetry*). At the same time, the fear and pity in question are not of the same kind as the fear and pity of real life, outside our relation to the Storyworld of the tragedy. Call them 'Real-World-emotions' (R-W-emotions) in contrast to 'Litt-emotions.'

What is the difference between R-W-emotions and Litt-emotions? The latter have intentional objects that inhabit the Storyworlds (even the Exworlds) of literary works, whereas the former has objects stemming from our mundane reality.

Am I implying that the former is real while the latter are fake or feigned? No, Litt-emotions are just as real as other kinds of emotions. However, there could be a society of humans having R-W-emotions, but nothing resembling literature or arts and hence no Litt-emotions. It is hard to conceive of the opposite: a society of humans with Litt-emotions but no R-W-emotions. Furthermore, higher animals seem to have a register of emotions not unlike R-W-emotions but certainly no Litt-emotions. Hence, it makes sense to regard the R-W-emotions as both conceptual and causal preconditions for Litt-emotions, but that does not make Litt-emotions unreal.

R-W-emotions and Litt-emotions differ not only in terms of the nature of their intentional objects, but also in terms of their associated modes of behaviour. Emotions get their identity partly through the feelings (sensations) essentially associated with them, partly through their intentional objects, and finally through behaviour essentially connected to them. Johnny might think he loves Anne, but he never shows her any affection, beats her, and is systematically unfaithful to her. In the light of his behaviour, we are justified in concluding that he conflates the feeling of love with that of erotic attraction to her, combined with a need to dominate her.

R-W-fear for the wellbeing of others manifests typically in a tendency to help them, whereas Litt-fear does not have these behavioural implications. Jumping on the stage during the performance of Greek tragedy in order to aid the protagonist, for whose wellbeing one fears, would mean conflating Litt-fear with R-W-fear; not understanding that the intentional object of the former is fictive, whereas the latter is not.

What role does feeling (sensation) play? Is there an essential difference between the sensation felt when one has a R-W-emotion and the one felt when one has a Litt-emotion? No, reading a ghost story might make the reader feel just as frightened as she would be feeling an R-W-fright, even though she is fully aware of the fact that she is reading a fictional tale. There is a difference in attitude to the intentional object, as the competent reader knows that the object is fictional and knowing this shapes the emotion. In contrast, knowing that the object is real shapes R-W-emotions differently. Differences in behaviour, associated with emotions, their different intentional objects, and different attitudes towards them, determine the difference between Litt- and R-W-emotions.

The Internal Model filters out R-W-fear and other R-W-emotions, while creating Litt-emotions.

When it comes to filtering emotions, the External Model does the opposite of what the Internal one does: it filters (or ought to filter) out the Litt-emotions and leaves some R-W-emotions behind. Thus, one can read *Nineteen Eighty-Four* and let the External Model create an R-W-fear of rising totalitarianism while the Internal Model creates Litt-fear for the wellbeing of the protagonists Winston Smith and Julia.

It must be added that if novels thematise emotions, then they refer to R-W-emotions through the External model. The Internal model does not involve any reference to Litt-emotions because they are parts of the subjectivity of readers, not of the Storyworld.

6. Believability, Novels, and Reference

The Litt-models also play different roles when it comes to the cognitive aspects of novels. The Internal Model prompts us to suspend disbelief concerning mundane reality, while the External Model mobilises our beliefs about this reality and creates new ones; for instance, new beliefs about love, class systems, psychopaths, and totalitarianism.

The Internal Model filters out reference to reality outside of the novel and therefore the truth about it, while retaining and accentuating the weight of believability. A science fiction story about green monsters that talk in rhymes can have various degrees of believability. If one of these characters suddenly starts to talk like an ordinary earthling, that would usually undermine the story's believability.

In contrast, the External Model focuses on reference to the reality outside of the novel, thereby also on the possible correctness of the text's reference to its Exworld.

I must argue more systematically in favour of the theory that novels actually refer to reality. As earlier said, they cannot help but refer to instantiations of at least some of the Foursome.

Secondly, their believability is logically tied to truth about this reality (the Exworld), just like Litt-fear is logical tied to R-W-fear. Believability is a function of the distance between the Storyworlds of novels and the purported truths about reality. Thus, in a realistic work, the distance is small, as it is the distance between the actual world and some possible ones in a close vicinity.

Let us consider an example of realist fiction. In an Icelandic dime novel from the Sixties, a young, desperately poor girl enters an apartment without any coat; she cannot afford one. However, when she leaves the apartment, she puts on her old, tattered coat. This is an obvious contradiction, and respecting the law of contradiction is often one of the conditions for the believability of stories, at least those that are told in the realist mode as this dime novel was. In the real world, there is no such thing as at one moment not possessing any coat and minutes later having been in possession of such a garment for a considerable time.

Nonetheless, such a contradiction might work perfectly well in a surrealist novel, and be believable in the context of such artworks, for instance in Robert Desnos's *Liberty or Love!*. In such surrealist fictions, the distance between the work's Storyworld and the actual one is greater because it describes a world where rules of logic do not necessarily apply. The world shown in Desnos's novel is an impossible one, the laws of logic do not apply, and the characters appear or disappear like in a dream. Thus, the Storyworlds of surrealist fiction can depict impossible worlds. In contrast, the Storyworlds of realist fiction are at greater distance from impossible worlds than from possible worlds.

There is no believability without some relation to truth and no novel without some reference to reality outside it. So, if believability matters to novels, then by implication, truth does too.

The implication of this is that a novel cannot be like a monad, wrapped upon itself, as for instance Monroe Beardsley (1981, 114–128) seems to have thought (he did not use the expression 'monad'). As should be obvious from the earlier parts of this paper, I do not agree with such a monadology concerning novels.

Thirdly, we have problems understanding novels unless we can determine their genres. That would help us to determine their identities. An important part of that endeavour is studying the way in which they relate to that which we think is real. Novels are judged as fantastic, realist, or even magically realist, largely because of the assumed distance between their Storyworlds and the real one (this distance determines their referential relations to reality, including their Exworlds).

Thus, John Steinbeck's *The Grapes of Wrath* is a realist novel even though it is fictional and therefore contains moments of fantasy. It is deemed realist because it happens in a possible world, very much like our own. Large swathes of its Storyworld are in accordance with our conception of mundane reality. In contrast, the Storyworld of *The Lord of the Rings* is at a great distance from our reality and hence it is a fantasy. Reading it as a realist novel would lead to a misunderstanding of it. Conversely, reading Steinbeck's novel as a pure fantasy would hinder understanding it. So, determining the distance of the novel's Storyworld from our mundane world matters for the determination of its genre. Determining the Storyworld of a novel as an impossible one, or being far removed from the actual world, is a necessary part of determining its genre as being the surrealist one.

The implication of this is that referential relations to reality (including the Exworlds) play a role in the determination of the genre of novels.

It has to be emphasised that understanding a novel is not only the product of applying the External Model wisely, as the Internal Model plays a no less important role. Trivially, we have to know the Constitutive Scenario in order to understand the novel, and in addition we must scrutinise both its Storyworld and its Exworld. Understanding a novel is the product of a complex dialectic between the Litt-models, the Internal and the External one; the reader oscillates between the models. Reading Lermontov's *A Hero of Our Times* means at one moment figuring out that Pechorin is a psychopath with the aid of the Internal Model, at another moment contemplating one's own experience with psychopaths and theoretical knowledge of them, thanks to the External Model.

Now, where should we place the Litt-models? Are they the products of the author or of the readers or both? The correct answer is 'both'. They come into being through the interaction between the author and the readers. They can be likened to the products of interaction in the market, where the acts of both the seller (the author) and the buyers (the readers) play a role such that the result can be something not intended by either seller or buyers. The Litt-models exist at least partly independently from the intention of authors and readers, pretty much as unintended consequences of market interactions.

Litt-models are logically built into novels, such that, typically, a work is a novel because of it having both kinds of Litt-models built into it. There might be novels that do not have these models built into them, or perhaps only one of them. However, if it was not the rule rather than the exception that novels contain Internal Models, then it would be hard to delimit them from ornaments. Without External Models they would function much like chess problems, intelligent puzzles without any relation to reality. Moreover, there is clear difference between ornaments/chess problems and novels, hence, it must be the rule that they contain both models.

7. Lem's Solaris as an Example

Hitherto, I have only briefly mentioned some well-known novels. It is time to take a closer look at one particular novel, Stanislaw Lem's (1981, 7–195) science fiction novel *Solaris*. It is about a team of scientists who land on a planet where there is a strange oceanlike entity that seems to be some kind

of a lifeform, even a conscious one. They are not able to communicate with it, but it reacts to their attack on it by creating copies of dead people that have mattered to members of the crew. One of them, Kris Kelvin, is burdened with a troubled conscience due to the suicide of a girlfriend. The lifeform creates her anew, but she, like the other 'humans' created by the entity, is made entirely of neutrons. I call them 'neutron-beings'. These beings can be killed but nevertheless be created again.

All the depressing memories resurfaces for the astronaut as he becomes mesmerised by the creature. The other members of the crew have similar experiences.

At the end of the novel, the protagonist, Kelvin, sums up the experience with the creature: 'That liquid giant had been the death of hundreds of men. The entire human race had tried in vain to establish even the most tenuous links with it, and it bore my weight without noticing me any more than it would notice a speck of dust' (Lem 1981, 194–195).

This description of the novel's main traits is its Constitutive Scenario, a part of the Internal Model. That model filters out many implied facts, such as the mechanisms of the spacecrafts used to fly to Solaris. It is implied that they are much more advanced than modern spacecrafts.This Storyworld is a possible one, as it respects the laws of logic, but is at a great distance from our actual world. We have neither encountered anything resembling the entity nor 'humans' created solely of neutrons.

How can there be an External model in this story? To explore this, we must examine the references to the Foursome, commencing with the concept of action. The entity acts in a very strange manner, or perhaps it rather reacts than acts. If it acts, then the descriptions of its actions can enhance our understanding of the concept of action by showing that it might be something that utterly alien lifeforms can perform in a vastly different way from the mode in which humans act. The space travellers perform bona fide actions, but in a setting which is very different from the ones in the actual world. The descriptions of these actions are schematic/sketchy like other descriptions that are parts of models. They might help us get a better grasp of actions performed in completely unforeseen circumstances.

What about references to the concept of things? The references to the entity and the neutron-beings raise the question of whether they are mere things or living beings. Contemplating this might enrich our understanding of the concept of a thing and that of a living being.

What about subjectivity? Memory and imagination belong to the realm of subjectivity, and the External model can be understood as a means for grasping the often uncanny and destructive power of these faculties; how they can make people feel guilty.

As earlier said, we cannot exclude the possibility of the entity being endowed with consciousness, which must be very different from ours. Subjectivity requires consciousness; the entity might have some kind of thoughts and other subjective moments, but vastly different from human ones. Contemplating this possibility might enrich our understanding of subjectivity.

Communication essentially involves subjectivity (not least, thoughts). The External model can serve as a tool for grasping the difficulties we have in communicating with those who are radically different from us (the lifeform) and our insensitive behaviour toward them (the attack).

When it comes to situations, the space travellers are confined to a limited space; there are many situations in the real world of a similar nature. Besides, communication is also a situation.

In addition, the purported dangers of technology can count as possible situations. The External model can shine some light on them.

The essence of being human and that of life also count as situations. The External Model might be of help to contemplate the nature of humans, life, and consciousness. It can in addition help us address the following question: Do individuals, who are created suddenly out of neutrons, and can easily disappear, truly count as humans?

Why is this a model rather than an embedded theory? In the first place, because it is not stated in the novel that we shall use it this way, any more than scientific models state exactly how they should be used.

Secondly, it is a model because we use cues in the text to understand it as being about, among other things, memory and communication, just like we articulate scientific models through cues.

Thirdly, models can be understood as containing embedded theories, and the same holds for models found or created through interpretations of literary works. The theories are about memory, communication, technology, humans, living beings etcetera.

Fourthly, the novel concretises abstract ideas, just like models often (or even always), do. It is through the concrete experiences of Kris Kelvin and other astronauts on the planet Solaris that abstract notions are shown; for instance, those of action, memory, communication, and guilt.

What about emotions? The Internal model can generate Litt-emotions such as sympathy for Kelvin and the other space travellers, as well as awe when the reader contemplates the power of the entity and the sublime objects it creates in its 'ocean'. The External model can create such R-W-emotions as concern for the dangers of technology spiralling out of control, fear of alien beings, or even sympathy for them; after all, the space travellers attacked the entity even though they were not provoked by it.

In conclusion, Lem's novel can be fruitfully understood as containing an Internal and an External model.

8. Responses to Possible Rejoinders

A critic might ask whether the representations in novels are not, in the last analysis, mental ones and, therefore, not really literary.

My answer is that the human mind is so deeply suffused with language that it is hard to see that there can be any pure mental representations being created by such minds. Nevertheless, the human mind makes representations, often successfully, and seemingly using words as a means. This suggests that we cannot reduce possible representations in novels to mere mental representations. Their words can function like the water currents in Frigg's example of model representations.

Another critic might point out that in novels characters and settings are often described in concrete details while in models they are pure abstraction; witness the model of economic competition. Does not this show that novels and models are vastly different?

My first response is that there are significant limits to how concrete descriptions in novels can be. As Frigg points out, novels have quite a number of tacit implications, just as do models. As Cartwright suggests, models can serve as means for concretisation. The same applies to Litt-models.

Secondly, I have never said that novels are models, only that models are essentially involved in them. I have also emphasised that there is a concrete aspect of novels that tends to be absent in models, but that does not exclude the possibility of novels also having abstract aspects that they share with models. Indeed, I think that I have shown that this is the case in this article.

Yet another critic might ask: Why not just drop the External Model part and just focus on the novel's world, read it for enjoyment? My answer is that in a possible world where novels were only 'consumed' for enjoyment there would not be any difference between what readers gain from reading a novel and the enjoyment of beautiful ornaments, the taking of drugs, and the thrill of exciting sports. In such a world, novels might easily disappear, as other objects might better fulfill their role. Yet, they show no sign of disappearing in the real world, perhaps because they do not function solely as sources of enjoyment but also have cognitive functions.

The critic might respond by saying that novels can provide us with rich, intellectual, aesthetic enjoyment that has nothing to do with enjoying beautiful ornaments. Such rich enjoyment can be gotten by intense study of dense texts of novels. Thinking that novels can provide us with knowledge might be based on confusing knowledge with rich, intellectual enjoyment.

My answer is that chess problems can provide rich, intellectual, aesthetic enjoyment. Nevertheless, novels are obviously different from chess problems, perhaps partly because they have referential relations to slices of reality in contrast to such problems.

A fourth critic might invoke Gregory Currie's (2016, 296–310) criticism of the idea that scientific models and novels are logically related. Currie says that it is unclear whether novels have any major cognitive function and what those purported functions are. In contrast, it is clear that scien-

tific models have such functions and that they are different from any functions that novels have: they can provide computational tractability, have heuristic roles in developing theories, probe resources, or can even be explanatory and predictive.

The issue is that, while Currie acknowledges that models can have various kinds of functions, he overlooks the possibility of some of these functions being the same as those that novels have. While novels certainly do not provide any predictions or computational tractability, they can serve heuristic roles and aid in probing theories. Thus, *Crime and Punishment* can help us to develop theories about guilt, *Solaris* can be of aid in the development of theories about memory, and *Pride and Prejudice* probe theories about class systems. Novels can also redescribe reality in a similar manner as certain scientific models, including nineteenth-century kinetic models of gases. They helped redescribe the atomic constitution of matter as reality and not only a fruitful assumption.[4] In a similar fashion, Kafka's novels contain models that redescribe ordinary reality as uncanny, where inexplicable, unforeseen things can happen.

Even if it were true that novels do not play any major cognitive role, they still inevitably have some cognitive aspects due to their Minimal Mimesis.

9. Conclusion

Novels and, at least, an important class of ScS-models share ontological characteristics such as being schematic/sketchy, products of make-believe, and functional kinds. In addition, they share several functional aspects, which may also have ontological implications. In the first place, both essentially involve narration; secondly, both have cognitive functions; thirdly, both concretise abstract ideas; fourthly, both have representative functions without necessarily having truth values; in the fifth place, both essentially involve scenarios; in the sixth place, both are instruments for the filtering of experience. Furthermore, suspension of disbelief is required for the understanding of both novels and ScSs.

Novels cannot help but refer to instantiations of some or all of the Foursome of the concepts of actions, subjectivity, situations, and things; this reference is called 'Minimal-Mimesis'. Thus, this kind of reference is not only a reference to the world of the story; these concepts exist outside of that world. Through Minimal-Mimesis and the themes (including messages), the Storyworlds relate to their Exworlds, i.e., slices of reality outside of the Storyworlds, but which pertain to them.

Moreover, novels contain two kinds of Litt-models: Internal Models and External Models. The former contains a scenario that constitutes the Storyworld, while the External Model is a model of how it relates to its Exworld.

Litt-models filter and form emotions pertaining to the understanding of the Storyworlds of novels and their relations to reality. The Internal Model creates Litt-emotions and filters out R-W-emotions while the External Model does the opposite. The Internal one creates conditions for believability and filters truth out, while the External one does the opposite.

Novels are not monads, isolated from reality; they inherently involve models similar to scientific ones.

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Notes

[1] For a popular introduction to this theory, a part of the General Theory of Relativity, see for instance Hawking, 1988, 15–36.
[2] This does not exclude the possibility of it also being able to provide empirical knowledge.
[3] In her 1999 book, she only discussed fables but in her later writings she emphasised parables more; for instance in 2010, 19-31.
[4] According to an email from Roman Frigg, 25th of April 2024.

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