



The cognitive science of fiction

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Fiction might be dismissed as observations that lack reliability and validity, but this would be a misunderstanding. Works of fiction are simulations that run on minds. They were the first kinds of simulation. All art has a metaphorical quality: a painting can be both pigments on canvas and a person. In literary art, this quality extends to readers who can be both themselves and, by empathetic processes within a simulation, also literary characters. On the basis of this hypothesis, it was found that the more fiction people read the better were their skills of empathy and theory-of-mind; the inference from several studies is that reading fiction improves social skills. In functional magnetic resonance imaging meta-analyses, brain areas concerned with understanding narrative stories were found to overlap with those concerned with theory-of-mind. In an orthogonal effect, reading artistic literature was found to enable people to change their personality by small increments, not by a writer's persuasion, but in their own way. This effect was due to artistic merit of a text, irrespective of whether it was fiction or non-fiction. An empirically based conception of literary art might be carefully constructed verbal material that enables self-directed personal change. © 2012 John Wiley & Sons, Ltd.

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INTRODUCTION

In *Poetics*,¹ Aristotle said that poetry is more serious than history because it deals with possibility rather than with what has already happened. By 'poetry' he meant imaginative literature, which we might now call fiction. If we were to press Aristotle's thought into modern cognitive science, we might say that the psychology of imaginative literature is more serious than the psychology of memory because it deals with what is possible, with human intention and action, rather than with what is in the past.

The most important discovery in cognitive science is that the mind makes models of the world.^{2,3} These models are the mind, and planning depends on them. The cognitive science of fiction augments this idea. It is about how minds can create narratives that are externalized and communicable models of social worlds. It is about how minds can enter these models, and thereby understand more about other people and themselves, perhaps enabling them to be more conscious, and more playful, in interactions with others.

Theoretically, the cognitive science of fiction rests on relatively recent conceptualizations. One of these, derived from the reader-response movement in literary studies, is of how ordinary readers understand literary works. An important book here was Norman Holland's *Five readers reading*.⁴ A second significant book was *Actual minds, possible worlds*⁵ in which Jerome Bruner proposed that narrative is a distinct mode of thought about human agency and about how intentions meet vicissitudes. Bruner contrasts this mode with paradigmatic thinking, as used in science to explain how things work physically in the world. In a third book that offered new ideas, *Experiencing narrative worlds*,⁶ Richard Gerrig argued that reading narrative involved what he called transportation to fictional worlds. In a fourth book, *Such stuff as dreams*,⁷ I proposed that fiction is not description of the world of a kind that may be dismissed by psychologists as lacking validity or reliability. It is a kind of simulation.

In this article, I shall use the term fiction to mean what Bruner proposed: narrative about human (or human-like) agents' intentions in their interactions with others, and how these intentions meet vicissitudes. I will add that fiction is carefully constructed

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narrative for the purpose of engaging readers and audiences. Would not it be better, you might ask, simply to use the term ‘narrative’? Probably not, because ‘narrative’ includes much of what goes on in conversation, a more spontaneous and ephemeral mode. What I shall here call fiction includes some poetry, books in the fiction section of a library together with some in the biography and history sections, along with the films you see at the cinema, the plays you hear on the radio or see at the theater, and even some of the interactive, narrative-based video games you may play. Although fiction can mean ‘made up’, this indication of its construction is less helpful for understanding than its purpose, its subject matter, and its mode. Fiction has the purpose of engaging readers and audiences. Its subject matter is of selves, their intentions and actions in the social world, and the vicissitudes these intentions and actions meet. And, although authors typically strive for empirical accuracy, its mode is not empirical description but simulation of possible social worlds.

RELATION TO THE WORLD AND TO READERS

The central term in Aristotle’s *Poetics* was *mimesis*, which is invariably translated in English as ‘imitation’, ‘copying’, ‘representation’, or the like. This is the term from which derives the adage ‘art imitates life’. Halliwell,⁸ however, has shown that this was just one family of meanings of the term. In a second family, *mimesis* meant world construction or simulation. Thus, says Halliwell:

Reduced to a schematic but nonetheless instructive dichotomy, these varieties of mimetic theory and attitude can be described as encapsulating a difference between a “world-reflecting” [conception] (for which the mirror has been a common though far from straightforward metaphorical emblem), and, on the other side, a “world simulating” or “world creating” conception of artistic representation (p. 22).

It is not that the first family of meanings should be abandoned. It remains very important. Rather, the second family is the one to consider first and, if you read *Poetics* with this in mind, it is clear that it was on this second family that Aristotle concentrated. You can see this, for instance, in this passage.

A poetic *mimesis*, then ought to be unified ... since the plot is [a] *mimesis* of an action, the latter ought to be both unified and complete, and component events ought to be so firmly compacted that if any one of them is shifted to another place, or removed, the whole is loosened up and dislocated; for an element whose

addition or subtraction makes no perceptible extra difference is not really a part of the whole (p. 32).

In either interpretation the term *mimesis* is about the relation of a piece of literature to the world, and it has been on this relation that discussions in Western poetics have tended to concentrate. In India, there has been a parallel tradition of comparable antiquity that derives from Bharata.⁹ It emphasizes a different relation, which is between literature and readers or audience members. In this tradition, the term for poet, *kavi*, does not mean ‘maker’ (the etymology of poet and fiction writer) but ‘perceiver’¹⁰; the perceptions are not just of surface appearances, but of what is deeper, beneath the surface. These perceptions have moral implications (so life might imitate art). In this tradition, as its foremost interpreter, Abhinavagupta,¹¹ has shown, the soul of poetry is *dhvani*, meaning suggestiveness. In responding to suggestions, readers or audience members become makers of meaning, in collaboration with the writer.

The cognitive science of fiction takes up both Western and Indic traditions. It is about carefully constructed simulations of the social world, that run on minds, such that these minds can perceive for themselves meanings of movements beneath the surfaces of social life. In *Such stuff as dreams*, my idea was to explore the model making, meaning making, functions of mind, and questions of how consciousness can be augmented by art.

FICTION AS SIMULATION

Fiction was the first kind of simulation. Long before computers were invented, the *Epic of Gilgamesh*,¹² which is about 4000 years old, was a simulation which (as with modern instances) was conceived to explore how complexes of simpler elements could interact with each other. It was carefully constructed to run on minds.^{13,14} In relation to cognitive science, the advantage of this conceptualization is to put fiction-as-simulation in a category that is comparable with that of simulations of visual processes that have helped us understand perception.¹⁵ This conceptualization goes back to Helmholtz,¹⁶ who argued that to understand visual perception we must see it as a matter of cues picked up from two-dimensional retinal images, which address and guide three-dimensional mental models which are then projected onto the images in order to see the world in terms of objects to which actions can be directed.¹⁷ Comparably, in verbal art, words act as cues that address mental models that can be constructed into imagined scenes that we can then experience for ourselves.¹⁸

Whereas, visual perception is concerned with the construction of scenes containing objects (including objects that are human bodies), the world of fiction is concerned with agents, who we understand as similar to ourselves in that they have intentions and plans.¹⁹ Here again, Aristotle had it right in his *Poetics*: he said that in tragedy (the genre he was mainly discussing) the principal purpose is the *mimesis* of action—he might have said ‘interaction’.

A consequence of this is that in fiction there is a focus on emotions, which are monitors of our own and others’ goals and plans.²⁰ A fundamental element in literary simulations is the use of the day-to-day emotional simulation known as empathy. On the basis of functional magnetic resonance imaging (fMRI) studies, and the theory of mirror neurons.²¹ Frederique de Vignemont and Tania Singer²² propose that empathy involves (1) having an emotion, which (2) is in some way similar to that of another person, which (3) is elicited by observation or imagination of the other’s emotion, and that involves (4) knowing that the other is the source of one’s own emotion. A primary mode of engagement in fiction (although not the only mode) is empathetic and it extends de Vignemont and Singer’s scheme. As we read a novel or watch a film, we set aside our own goals and plans, take the goals and plans of a fictional character, and insert them into our planning processor, the device by which we usually construct our own planned actions in the world. The fictional work gives us cues as to what happens when each action is performed, and we then experience empathetically (within the simulation of the social world that we are running) the emotions that we would feel in relation to the outcomes of actions as depicted by the author.

FICTION AND EMPATHY

One effect of the empathetic process occurs generally with fiction, probably independently of the medium (stage, print, film), or of the literary quality of the work. It works because fiction invites us into the minds of others, invites us indeed to become those others. From its earliest appearance in the archaeological record art has, as Mithen²³ has argued, been based on metaphor, a mode in which something is both itself and something else: a certain cave painting is both marks on a wall and a rhinoceros. Fiction extends this metaphorical effect to ourselves: in fiction, we can be both ourselves and a literary character. In the theory on which I base this idea, people construct a simulation of the world of the story. As they run the simulation, they experience empathetic emotions. These are not those of the literary character (an abstract being).

They are the reader’s or audience member’s own, in the circumstances of the story. In this way, readers and audience members come to understand more about other people and circumstances they can find themselves in. In terms of the actor–observer effect,²⁴ fiction enables people to understand others from the inside, that is to say as agents like themselves, not just from a perspective of an outside observer. Of course, the inside view is not the only one available in fiction; some modernist and postmodernist modes are constructed to remind readers of the artificial nature of what they are reading or seeing. This involves, perhaps, alternately entering and leaving the simulation, as one moves through a narrative.

Rather than assuming, as a certain stereotype has it, that people who read a lot of fiction are social outcasts, based on the simulation theory Raymond Mar hypothesized that readers of fiction would have better social skills than those who read less fiction. We²⁵ tested this hypothesis by measuring the amount of fiction and non-fiction people read, measuring their empathy and theory-of-mind, and also measuring their skills in perceiving what was going on in video-recorded social interactions. We found that empathy and theory-of-mind were strongly correlated with the amount of fiction people read, and inversely correlated with the amount of non-fiction they read. Accuracy in perceiving what was going on in the video-recorded social situations was also correlated with reading fiction, but to a lesser extent. The differences were a matter of expertise²⁶; whereas fiction is about social interaction, non-fiction is about genetics or astronomy or whatever it may be. Subsequently, we²⁷ excluded the possibility that the effect was due to more empathetic people tending to read more fiction, and excluded also other explanations based on individual differences. More recently, Dan Johnson²⁸ confirmed in an experimental study that the causal direction of this effect is that reading improves empathy. He found that the greater readers’ degree of transportation into a story, the greater was their empathy for story characters. In an fMRI study by Nicole Speer and her colleagues,²⁹ brain activations were measured in participants who were reading a story. For instance, when in the story a character pulled a light cord, the part of the reader’s brain associated with grasping was activated: words in the story ‘pulled a light cord’ metaphorically become the reader’s inner action of grasping. In meta-analyses of fMRI studies, Mar and his collaborators^{30,31} found that some parts of the brain concerned with understanding narrative stories are the same as parts concerned with theory-of-mind.

Think of it like this. If you learn to fly a plane, you would do well to spend some time in a

flight simulator because, in the simulator, you can experience a wider range of contingencies, in a safer and more reflective way, than you could if you were aloft.³² Similarly, if fiction is a simulation of the social world, one can become more skilled in that world by engaging with more fiction.^{33,34} The physical world, of course, is not without its problems, but the world of agents who have different goals and plans than we do is more complex. We operate by making models (simulations) of such agents. The making of these models is a principal function of human consciousness.³⁵ In our models, we conceptualize these others as both like and unlike ourselves. We are good at operating in this way, but not that good. Engagement in the simulations of fiction enables us to improve our model making of others, and to become more skilled in our interactions.

LITERARY ART AND PERSONAL CHANGE

Exploration of a second kind of effect of reading imaginative literature has been led in our group by Maja Djikic. The question is this: can imaginative literature contribute to transforming our selfhood? In our first study on this effect,³⁶ we compared reading a short story by Anton Chekhov with reading a version in non-fictional style that had the same information, that was the same length, the same reading difficulty, and just as interesting, as the original Chekhov story. Before and after reading we measured people's Big-Five personality traits and their self-reported intensity of a list of emotions. We found that, as compared with those who read the non-fiction styled version, those who read Chekhov's story changed their personality by small amounts. The effect was mediated by emotions experienced during reading. Striking to us was that, unlike effects of persuasion in which everyone changes in a way designed by the author, in our study people changed idiosyncratically, in their own way. In this and our other studies of this kind, the personality changes that occurred were self-reported; they were readers' perceptions of their sense of self. The changes were short term. We hypothesize, however, that repeated changes of this kind, as may occur for habitual readers, may have longer term effects.

In a further analysis of the results of the study of reading the Chekhov story or a non-fiction styled version, we found that for readers who, in terms of their attachment style were avoidant (they tended to distance themselves from their emotions), the experiences of emotions when reading Chekhov's story were more intense than those of non-avoidant

readers. Chekhov's art was able to circumvent their defensiveness.³⁷

More recently,³⁸ we asked people to read an essay or short story from a set of eight literary essays and eight literary short stories, matched for length, reading difficulty, and interest. We measured Big-Five personality traits before and after reading. We found that the difference between reading an essay or a short story did not make a difference in change of personality. Rather, participants who judged the text they read to be more artistic reported greater change in their personality trait profile after reading, independently of whether the text was an essay or a short story. Participants' ratings of the artistic merit of the text were the main predictor of the amount of personality change they underwent. Changes of personality occurred particularly in those traits—agreeableness and openness—that are less subject to developmental change in young adulthood.³⁹

CONCLUSION

Understanding others and being able to change oneself are orthogonal; both are fundamental to the psychology of engagement with literary art. Improving one's understanding of others seems not to depend on the quality of the fiction that is read. Fiction of all kinds invites us to experience being different kinds of character in different kinds of situation than we usually encounter in day-to-day life. In contrast, for change of selfhood, the artistic quality of what is read seems critical.

The effect of fiction in enabling people to improve empathy and theory-of-mind has an implication beyond its immediate benefits. It is a step toward showing that fiction is a valid, epistemologically sound, enterprise. Philosophers have been troubled by the paradox of how fiction can be true if, according to their understanding, it is simply made up.⁴⁰ The hypothesis of simulation can lift them half way out their dilemma, helped by the fact that many fiction writers do a great deal of research on their subject matter, so that the *mimesis* of their work has a world-representing component as well as a world creating component. (Whether any element in a work of fiction is empirically true is somewhat independent of the question of how the work performs as a simulation.) Another lift is about extending the range of our experience of possible kinds of human interaction, about suggesting effects of interpersonal understanding, character, and aspiration. Simulations of the fictional kind enable us to experience whether this or that hypothesis about what goes on among people might be plausible. To lift fiction to a par

with laboratory effects (usually assumed to combine linearly with each other) the finding of improved theory-of-mind associated with reading fictional simulations closes a circle. Effects of fictional simulations show that there is validity in the way that intentions, character, and emotions are depicted in novels and short stories. If there were no validity, there would be no effect of reading fiction on empirically measured outcomes such as empathy and theory-of-mind.

The second kind of finding discussed here, that fiction can enable people to make their own changes of personality, implies a further conclusion. There has long been discussion of what constitutes literary art. The finding that art can enable changes of personality suggests a hypothesis: literary art (as opposed to pseudo-art⁴¹) contains an element that enables us to change, not as a result of persuasion, but in our own way.

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