

Karin Kukkonen
Turku1

Presence and Prediction: The Embodied Reader's Cascades of Cognition

Even if a literary theory is not expressly geared to reader response or the empirical investigation of what real readers do, every attempt to theorise interpretation models its ideal readers as it describes how meaning emerges from texts. Does the reader master a secondary system of literary expression on top of language, as the structuralists propose (see Culler)? Is the reader 'greedy,' her mindreading capacities gobbling up whatever mental states the narrative text offers, as proponents of theory of mind might suggest (see Zunshine)? Does he go along for a ride in the emotional rollercoaster of the narrative that speaks to his sentiments (see Warhol)? As second-generation approaches to narrative develop new models for the process of interpretation, partly on the back of empirical research into embodied responses to reading, the question of what a model for the 'embodied reader' might look like arises. At this point, no fully-fledged conceptualisation of the embodied, enactive, embedded, and emotional reader has been attempted, but accounts of interpretation in a second-generation vein give us a glimpse: In Guillemette Bolens' *The Style of Gestures*, readers responds to the gestures, movements and other kinesthetic features of the literary text. According to Marco Caracciolo, he lives vicariously through the embodied experiences evoked by the literary text. In this special issue, we have also seen this reader take different stances towards the embodied features of the text (Kuzmičová) and caught her adventuring on the traces which authors lay down for readers to follow (Bernini). In this article, I develop a model for the embodied reader, which draws on the insights of second-generation cognitive sciences into the embodied, extended, and embodied features of cognition. The model makes no empirical claims; rather, it combines empirical research and philosophical accounts of the experiential dynamics of presence with a consideration of the temporal and conceptual dynamics of literary text.² Whenever I speak of the *embodied reader*, this is shorthand for a model of the act of reading which takes into account readers' embodied responses.

Earlier critical reader models, such as Wolfgang Iser's "implied reader," have foregrounded the temporal and conceptual dynamics of anticipation and propositional meaning-making, but were not specifically interested in the embodied engagements of reading. Whenever I speak of the *implied reader*, this is shorthand for a model of the act of reading that disregards the embodied aspects of reading and focuses on abstract, propositional meaning making. In what follows, I aim to devise a critical model of the embodied reader in dialogue with earlier reader constructs, in particular, Iser's "implied reader."

Let us start by tracing what the second-generation cognitive sciences allow us to conclude about the reading process of the embodied reader in the following passage from the 1753 novel *The Adventures of Ferdinand Count Fathom* by Tobias Smollett. What are the textual features that might give the embodied reader a sense of 'being there' in the fictional world? The protagonist Ferdinand has just had a brush with death and escapes with a potentially treacherous landlady as his guide to the next town and safety:

Common fear was a comfortable sensation to what he felt in this excursion. The first steps he had taken for his preservation, were the effects of meer instinct, while his faculties were extinguished or suppressed by despair; but, now as his reflection began to recur, he was haunted by the most intolerable apprehensions. Every whisper of the wind through the thickets, was swelled into the hoarse menaces of murder, the shaking of the boughs was construed into the brandishing of poignards, and every shadow of a tree, became the apparition of a ruffian eager for blood. In short, at each of these occurrences, he felt what was infinitely more tormenting than the stab of a real dagger; and at every fresh filip of his fear, he acted as remembrancer to his conductress, in a new volley of imprecations, importing that her life was

absolutely connected with his opinion of his own safety. (136)

Presumably, the second-generation reader would be quite taken by the highly embodied description of Ferdinand's fear. The (anti-)hero of the novel makes his escape from an inn where he has found a guest murdered, disguised himself in the clothes of the corpse, and taken the landlady hostage. As Smollett puts it, Ferdinand experiences his fear as "more tormenting than the stab of a real dagger," it comes to him in the highly kinesic shape of "filips," and his own threats to the landlady eject themselves in "volleys." The forceful kinesic language of the effects that fear has on Ferdinand, and how he passes it on to the woman who is with him, give the embodied reader a fairly precise idea of Ferdinand's state of mind, and this idea is replicable in the reader's own embodied resonances to the kinesic shape and directedness of the words she reads (see Bolens for a discussion of "kinesic effects" in written texts). "Stabs," "filips," and "volleys" impinge on the mind of the hero, and in extension on that of the embodied reader, as Ferdinand makes his escape from the inn.

This embodied experience corresponds to the ways in which the hero perceives his environment while he is on the run. Whispers "swell," the movement of the branches turns into the "brandishing of poinards," and shadows morph into "ruffians eager for blood." Incorporeal, insignificant occurrences gain physical shape and threatening salience. Ferdinand's relationship with his environment, as I have described it here, neatly illustrates second-generation, embodied, and enactive approaches to perception. This *enactive* account of perception understands vision as "a mode of exploration of the world which is motivated by what we call sensorimotor contingencies" (O'Regan and Noë 941; original in italics). In other words, in order to make sense of an environment, structures of changes gain salience for our mind-body as they coincide with our exploratory movement in this environment. Our bodies relate to interaction potentials of our environment and, as our sensorimotor system gives us information about what it would be like to interact with this environment, we perceive it in these terms. We have a strongly embodied sense of what we perceive with our eyes because we make sense of the information on the retina by relating it to the *sensorimotor contingencies* of interacting with the world. As Alva Noë puts it, we think of the world in terms of how it is "available" to us. This hypothesis seems to work for relating to a real-world environment, and for relating to a represented environment. Shapes in a painting can create "visual action" in observers, because they know what it would be like to interact with them (see Arnheim). Arguably, also Ferdinand's environment gains shape through the interaction potentials it presents to sensorimotor exploration. In the linguistic representation of the novel, one of the embodied engagements of readers³ is a resonance of Ferdinand's experience as it is described in and evoked by the passage above through mirror neurons (see Glenberg and Gallese), motor-resonance (see Zwaan and Taylor), or other embodied features of human cognition (see the introduction to this volume for a more detailed exposition).

The interaction potentials to which Ferdinand relates himself are significantly more threatening than the shapes and round tomatoes that usually serve as examples (see Noë for the tomatoes). The ways in which Ferdinand relates himself to his surroundings, the embodied experience of emotions and the kinesic shape that this experience takes in this passage are relayed to the embodied reader, and they create an enactive and emotional experience. The environment that Smollett conjures up here offers no safe ground to retreat to, leaving a resonance of fear. As it gains shape in Ferdinand's enactive perception, his environment turns into a house of horrors, with blood-thirsty robbers lurking behind every tree.

Wolfgang Iser's implied reader, perhaps the most famous of all reader constructs, would find different aspects to be of interest in the Smollett passage than our construct of the embodied reader. However, she would not so much focus on what is there in the text and rather would consider what is left unsaid: the gaps. As Iser puts it in his essay "The Reading Process: A Phenomenological Approach" in *The Implied Reader*, "it is the unwritten part [of the text] that give us the opportunity to picture things; indeed, without the elements of indeterminacy, the gaps in the text, we should not be able to use our imagination" (283). In Iser's account, texts only gain shape in our minds when we supply what they omit. "This means that the formulated text must shade off, through allusions and suggestions, into a text that is unformulated though nonetheless intended" (*Implied Reader* 31).

Smollett's omission of crucial information -Is Ferdinand actually being followed? Is he on the right path to town? -give the passage its urgency for the implied reader and leads him to imagine the whole situation.

Readers of Smollett's novel also know that Ferdinand Count Fathom is by no means a flawless hero: he only pretends to be nobility; he lies, cheats, and steals; he whores and murders; and he betrays his best friend's trust. In the much-discussed dedication to the novel, Smollett presents his vicious hero as an experiment designed to "teach us to relish the disgrace and discomfiture of vice, which is always an example of extensive use and influence, because it leaves a deep impression of terror upon the minds of those who were not confirmed in the pursuit of morality and virtue, and while the balance wavers, enables the right scale to preponderate" (43). Ferdinand's experience of fear is the direct consequence of his violent and treacherous character, and even if Smollett does not remind us of his intentions in this passage, the implied reader will no doubt understand what she reads here in the framework of Smollett's design for his novel as an instance of "the disgrace and discomfiture of vice." Moreover, Ferdinand's experience of fear can be understood as a reflection of the threats which he himself poses — to the landlady in this instance, but also more generally to other characters in the novel — and the comeuppance for which his actions qualify him. Just as Iser discusses for Henry Fielding's novels in *The Implied Reader*, there is a negotiation of different worldviews and social norms going on in the novel, and to this negotiation the implied reader is invited to relate himself.

The implied reader considers how this passage fits into the larger patterns of inference and plot, what she knows and does not know about the fictional world and this story, and she integrates what she reads here in her understanding of how the novel conveys and contrasts different worldviews.

An Encounter

If the implied and the embodied readers were to meet one day and compare notes on the Smollett passage, they would find much to talk about. The embodied reader would have a more fine-grained sense of the experience of reading the passage, drawing on the overall kinesic shape of the motions described and the import of the environment on the mind of the hero. She would also quite likely be able to provide a first-person account of the particular experience, a thick description, of the emotion of fear that the hero undergoes here.⁴ The implied reader would not step into the hero's shoes but would consider the emotional experience that this passage evokes as part of the overall design of the novel, which works to introduce readers to a particular worldview conveyed in the entire set up of the novel. Literature, to Iser, invites the implied reader to develop the structure of intended inferences from the text, which in turn constitutes a particular way of conceptualising the (cultural) world. Reading is a process that relates closely to the way in which we make sense of the real world (see *Implied Reader* 278-9), but the "virtual dimension" of the reading experience of the implied reader remains on the level of propositional statements and the emergent conceptual structure of the literary text. Such an approach does not deny that readers can have embodied experiences and be immersed in the storyworld, but it means that the implied reader generally takes more of a distanced, outside perspective on this passage, relating herself to the normative perspectives offered to her by the text (see *Akt des Lesens* 64-5).

From this rather general comparison of the interests that the models of the embodied and the implied reader address, it seems obvious that the implied reader could profit from the observations of the embodied reader. If the embodied reader takes into account the embodied emotional experience of Ferdinand, then this experience surely contributes to the larger patterns of meaning-making on which the model of the implied reader focuses. The "stabs," "filips," and "volleys" Ferdinand feels yield an unpleasant experience that reinforces Smollett's design to present a villain-hero in such a way as to discourage his readers from attempting similar exploits. Even if the implied reader is more interested in filling the gaps, what is there in the text, the embodied language of Ferdinand's escape from the inn, offers the necessary point of departure for making such inferences.⁵

In turn, however, also the embodied reader could profit from this encounter with the implied

reader, and we could develop its implications by integrating issues of textual dynamics and cultural relevance into the rather simple model of the embodied reader that I have sketched so far. Iser's model reader levels two challenges in particular at this embodied reader and the features of reading on which second-generation approaches to literature focus: (1) Unlike the implied reader, who is constantly involved in the temporal dynamics of the "anticipation and retrospection" that Iser puts centre-stage in his theory, the embodied reader seems to remain grounded in the here and now of the string of words in front of him. (2) Second-generation approaches, generally speaking, favour immersive states of reading. The implied reader, on the other hand, moves between immersive involvement and detached observation in the gap-filling process. If we stopped developing the model of the embodied reader at this point, it might seem that the implied reader were a much more flexible and self-reflexive reader construct than her embodied counterpart.

Presence and Prediction

However, if we integrate recent developments in the enactivist strand of the second-generation approaches into our embodied reader model, we can take this encounter to round two. These new accounts in second-generation cognitive science foreground that embodied cognition is profoundly informed by sensing how actions are going to develop. How else would you know not only the weight and delicacy of the dart that your opponent weighs in his hand but also that your throw has missed its target before your dart reaches the board? Such predictive embodied thinking also traces our confidence in the actions we have taken and thereby moves towards a metaperspective on embodied cognition.

In a 2013 target essay for the journal *Brain and Behavioural Sciences*, the philosopher Andy Clark summarises these new, probability-informed strands of second-generation approaches to cognition and proposes his own account of "action-oriented predictive processing." In what follows, this article draws on Clark's work in predictive processing of embodied actions (in particular by Karl Friston) and in their precision — that is, the confidence in embodied actions (in particular by Chris Frith) — in order to add features of temporality and metaperspectives to our construct of the embodied reader.

Ferdinand's mental state in the Smollett passage is the result of "the most intolerable apprehensions" that he experiences. "Menaces of murder," "brandishings of poinards," and "ruffians eager for blood" suggest that an act of violence is to ensue, and Ferdinand relates these motions to his own body with the "stabs" and "filips" he experiences. On the one hand, Ferdinand's experience of fear is predictive in the sense that he apprehends being attacked by these elements that gain embodied shape in his perception. On the other hand, all of this is only in his mind. His apprehensions are the consequence of moving from acting on "meer instinct" to a "reflection" of his environment. Ferdinand needs to shift his focus from action to perception of the fictional environment in order to "construct" the "brandishing of poinards" and the "apparition" of the "ruffian." And, in turn, even as they get a first-person experience of the fear of the hero, readers know that this is a reflection of Ferdinand's state of mind, not of the actual state of affairs in the storyworld.

Let us start to get a conceptual grip on all this by considering the predictive features of these embodied interactions. Already the well-established enactive descriptions of interaction potentials, as the mind-body relates itself to its environment, feature an element of prediction: O'Regan and Noë seem to imply this in their discussion of the "laws" of sensory contingencies (942-5). Noë argues that our sense that the tomato is round is based on our judgement of what it would feel like if we touched it and turned it around. Rizzolatti and Sinigaglia, in their outline of a model for cognition based on mirror neurons, similarly propose that our perception relates to the interaction potentials of the environment, and — depending on what we consider, pre-consciously, likely to be the outcome of an action — we take this action or we do not. In the research of Karl Friston and colleagues on the brain processes underlying our embodied engagement with the environment, these predictive features take centre-stage. Bayesian predictive models consider cognition as a continuously developing process in which our minds relate the prior hypothesis we have about our environment to new observations we make and to the likelihood of making these observations in an

environment for which the prior hypothesis holds true.⁶ New observations therefore lead us to constantly modify the perception of the state of affairs in our environment. In other words, cognition is a constant process of learning, and according to Friston, Frith, and colleagues, this is true for the embodied features of cognition, too (see Brown, Friston, and Bestmann; Friston, ‘Prediction’; Friston, Mattout and Kilner; Frith).⁷

If we take a general second-generation account of emotion, we can see how such embodied predictions relate to Ferdinand’s fear. Roughly speaking, emotions work as appraisals of the situation we find ourselves in, constitute our investment in them, and outline courses of action open to us. These emotional appraisals are experienced through bodily states.⁸ Ferdinand’s fear appraises the situation as threatening; this is traced in his embodied experience as at the same time he feels he needs to flee for safety. What is a rather technical description in my prose becomes dramatised and embodied to great effect in the Smollett passage, as the environment itself turns into threatening features getting ready to attack Ferdinand, and as his perception is mirrored in his embodied experience of the “stabs” and “filips.” Even though Friston (to my knowledge) considers the emotional dimension of predictive cognition only in the rather abstract, utility-related term of the “value” that our minds give to different predictive options (see Friston and Ao), the second-generation theory of emotions and predictive actions seem eminently compatible. For the embodied reader, emotions serve as a second track to the predictive embodied exploration of the fictional environment in general perception, one that imbues the latter with a sense of urgency and investment.

Friston’s model diversifies the basic Bayesian process of prediction into what has been described as “the predictive coding cascade” (Clark, “Whatever” 185).⁹ A probabilistic causal grasp of the environment, that is, the conceptual shape of (pre-conscious) expectations which it takes in our mind, form the basis of sensorimotor and perceptual cognition. In turn, the immediate input from the environment in response to our actions and perceptions feeds back into the probabilistic causal structure. At each step of the cascade of cognitive levels, a Bayesian recalibration of the probabilistic predictions takes place in exchange with the environment. The coupling between mind-body and environment, which second-generation approaches posit, can thus be diversified across different levels of cognition and gains a temporal feature of prediction and correction.

A Bayesian model of coupled cognition, as I have attempted to schematise in Fig. 1, allows our embodied reader to move beyond the individual moment and into a consideration of the plot. Ferdinand’s apprehensions lead him to perceive, on an escalating scale, sounds “menacing” murder, daggers being “brandished,” and the full-blown “apparition of a ruffian eager for blood.” Each feature of the environment reinforces and confirms his apprehension that he is being followed and that his life will be ended soon. The feedback loop between environment and individual mind works in increments: Ferdinand’s embodied experience, the “stabs” and “filips,” feed themselves directly from his perception of the environment. In turn, they also lead to Ferdinand’s action through a “volley of imprecations,” of threats and curses, directed at the landlady. On the basis of this embodied evidence, the embodied reader then makes predictions about the further development of the scene — Is Ferdinand actually being followed? Will he do harm to the landlady? — and about the plot of the novel at large — Will Ferdinand’s depravity find its end here? Will he get more dangerous? Such predictions are usually not formulated in inner speech because the probabilistic Bayesian calculus of preconscious embodied cognition does not necessarily feature in the conscious thinking processes that readers experience (see Clark, “Whatever next,” 196). However, for the model of the embodied reader, these questions are quite similar to the questions which Iser’s implied reader would ask, connecting the past and the future events of the narrative in her web of inferences. Different from the implied reader, an embodied model of literary reading treats these predictions not simply as propositional abstractions, but as inferences emerging from the embodied texture of the passage.

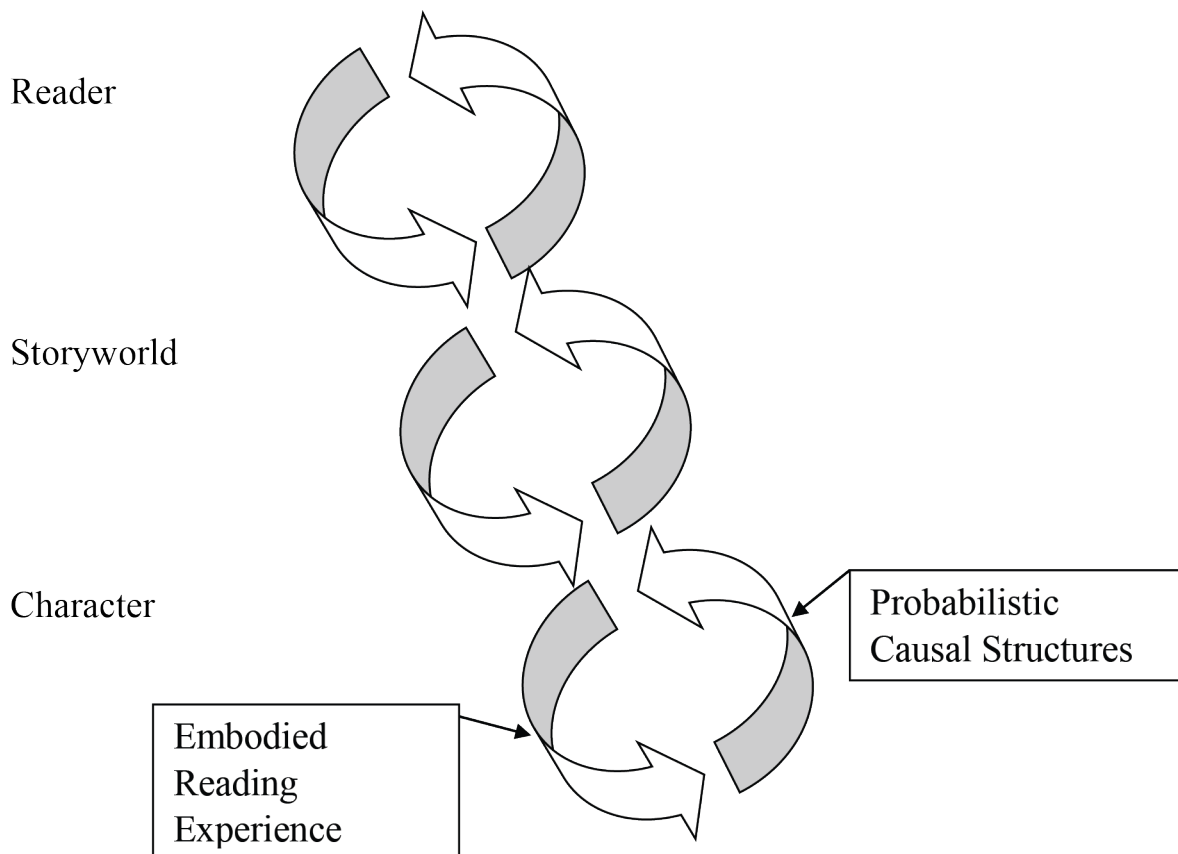


Fig.1 The Reader's Cascades of Cognition.

(Adapted from Friston, 'Prediction' 250; see Friston, 'Learning' for a more detailed account of predictive coding and its hierarchical models)

Precision

Ferdinand's embodied predictions are of course delusional, and readers are well aware of this. Even though the embodied effects of fear feel "infinitely more tormenting" than actual stabs from daggers, Smollett's narrator makes it quite clear that the daggers and ruffians are "construed" by Ferdinand's mind and nothing more than "apparitions." Such changes between internal perspectives, in which the character feels the stab of a dagger, and external perspectives, in which this stab is nothing but a figment of the characters' imagination, are easily distinguished by readers. Iser conceptualises a similar phenomenon in terms of the "wandering viewpoint" of the implied reader. Texts create such a wandering viewpoint, as they organise changes of perspective and juxtapose their normative systems (*Akt des Lesens* 172). The implied reader is immersively involved in one perspective but also capable of observing its workings when it is thrown into relief by a competing perspective. What about our embodied reader? How can this model accommodate the dynamics of immersion and observation?

Of course, the embodied experience in reading itself is virtual in the first place. The embodied reader does not actually get "stabs" and "filips," as she makes her way through the Smollett passage, but experiences something like a bodily echo of such experiences. However, for the purposes of reading the passage, it is as if the embodied reader were experiencing these sensations. They constitute her 'presence' in the fictional world and enable her tracing the experience of Smollett's protagonist (see Kuzmičová for a discussion of presence on the basis of the empirical study of reading experience).

The predictive, Bayesian take on cognition foregrounds that the embodied experience of reality is something virtual as well. If perceiving an environment involves that you know what it would be like to interact with its features, and if you get an embodied sense of the action you take because you have a sense of how it will turn out (in all probability), then embodied predictions are quite

clearly non-actual. In other words, our embodied thinking might be mistaken (an aspect that is not usually discussed in the philosophical or neuroscience literature on second-generation approaches). The Bayesian model, however, relies on the correction of mistaken hypotheses on the basis of new observations and has therefore prediction errors as an in-built feature. Indeed, prediction errors are what gets the feedback loops of the cascading levels of cognition working. If our proprioceptive, sensorial perception of the environment (in Fig.1, the arrows directed forward) contradicts the probabilistic, causal model of our environment (in Fig.1, the arrows directed backward), then our mind needs to recalibrate this model in light of the new evidence.

Ferdinand's assessment of both his embodied states and his environment relies on a profound prediction error, which he does not correct and which leads the hero to perceive his environment in a way that does not correspond to the actual state of affairs in the storyworld. While there is a (mistaken) feedback loop between Ferdinand's embodied experience and the probabilistic, causal structure he has of this environment, the embodied reader recognises this prediction error and can therefore correct her own model of the fictional world. The embodied experience of the hero features only in the probabilistic causal structure of Ferdinand's perspective on the storyworld, not in the probabilistic causal structure that the embodied reader herself is constructing for the storyworld at large.

The feedback loops of cascading cognition are modulated by what Bayesian cognitivists call "precision" (see Clark, "The Many Faces"). Precision is a measure of the confidence which we have in the predictions of our embodied cognition. Technically speaking, it constitutes the inverse variance of prediction error — that is, how likely we think it is that we are *not* wrong in our hypothesis about the environment. If we think it is very likely that we are mistaken about an experience, then the precision of its feedback into the probabilistic causal structure is low (as is our confidence in this observation). If we think it is very likely that we are correct about an experience, then the precision of its feedback is high (as is our confidence in this observation). In terms of the schema sketched in Figure 1, imagine that the loops are in bold black whenever precision is high and shaded into a pale grey whenever precision is low. When we perceive an action, then our mind-body still draws on predictive levels of somatosensory processing, but the immediate proprioceptive prediction does not feed back into these higher levels — that is, they are "muted" (Clark, 'The Many Faces'). Schizophrenia patients, on the other hand, do not update their beliefs about an environment in the light of contrary evidence, and yet they assign a very high precision to illusory predictions and conceptualisations about their environment (Fletcher and Frith). In other words, the lowest forward-directed arrow remains bold even though it should be shaded into pale grey. The notion of precision hence allows for "patterns of effective connectivity" between the levels to be reconfigured continuously (Clark, "The Many Faces" 4). The embodied reader can use the kinesic, enactive features of a character's experience in order to develop probabilistic, causal structures for it and yet be observant about its truth status in the framework of the storyworld, depending on the precision she assigns to these feedback loops.

As different levels of the cascades of cognition in the embodied reader are shaded black or grey, precision is shifted amongst levels in these feedback loops: It is located on the lower level of the embodied experience of characters for as long as readers take a first-person stance with the characters' bodily experience.¹⁰ If the embodied reader then judges that the character's experience reflects the state of affairs in the storyworld accurately, it feeds directly into the construction of the probabilistic causal structure of the storyworld that readers establish as they read. If the embodied reader judges that the character's experience is delusional, as is the case with Ferdinand's experience, she shifts the weight of precision to her higher-level probabilistic causal structure of the storyworld and does not modify it in light of the character's embodied experience. This does not mean that the embodied reader ignores the evidence of the embodied experience of characters if it has low precision (in fact, she integrates them into her predictions for the actions of individual characters, as we have seen in the previous section), but it does not feed back into the overall construction of the storyworld, as she continues to take an outside perspective.

By assigning precision, the embodied reader can move between different feeds of embodied

experience, and she can distinguish between their relative import on the construction of the storyworld. Precision can be reassessed as the narrative develops and its plot reveals new details about the reliability of characters' embodied experiences and the intentions of narrators.

Conclusion: Reading as a Learning Process

Drawing on treatments of second-generation cognitive sciences, this article has developed a model for the embodied reader. Our new-model embodied reader does not only experience an echo of the protagonist's embodied experience but also translates this experience into predictive inferences about the storyworld and the development of plot, and she judges the degree of confidence she assigns to each of these embodied predictions. As she makes her way through a narrative, it is the very embodied encounter between mind-body and the text that leads her to revise the causal, probabilistic structure of the storyworld.

In his introduction to *The Implied Reader*, Iser describes "discovery" as the key theme of his theory. "The reader discovers the meaning of the text, taking negation as his starting point; he discovers a new reality through a fiction which, at least in part, is different from the world he himself is used to; and he discovers the deficiencies inherent in the prevalent norms and in his own restricted behaviour" (xiii). The question of what we can discover about reality through fiction is one of the great themes of Iser's work, accompanying him from his earlier works in reader-response theory to the later works in literary anthropology (such as *Prospecting* and *The Fictive and the Imaginary*).¹¹ The model of the embodied reader can clearly profit from further encounters with her implied counterpart as we develop the reader concept of second-generation cognitive approaches to narrative because, also for her, the reading process becomes a journey of discovery.

We can understand reading a narrative as a learning process about the storyworld. As I discuss elsewhere in greater detail, the plot of a narrative and the ways in which it sequences the information about the storyworld it makes readers privy to guide the development of probability assessments about a storyworld. New observations lead readers to recalibrate their prior hypotheses, and, in turn, these new hypotheses reflect the changing shape of the storyworld in the Bayesian reading process. However, unlike Iser's implied reader "discovering the meaning of the text," the embodied Bayesian reader is not tied to "meaning" and propositional "worldviews" to be recovered and renegotiated in the encounter with the text. The work of this model begins at a very different level of reading, on the basis of how readers' mind-body establishes a feedback loop of coupled cognition with the embodied features of the text. There is a continuity from the bodily resonances of gestures and embodied experiences of characters, to the perception and predictive emotional appraisal of the environment that characters find themselves in, to the predictive inferences of plot developments and the assessment of the relevance of this particular passage in relation to the narrative and thematic whole of the literary text. They are all linked by cascading levels of cognition, one predicting and recalibrating the other, and at each step, embodied readers can decide to shift or modify the precision they assign to the level. The cascading levels of cognition thereby yield a flexible and individual model of the embodied reader.

To some extent, the probabilistic causal structure that emerges out of the reading process of the embodied reader can lead to her reconsidering the "the deficiencies inherent in prevalent norms" and her "restricted behaviour," as Iser posits for the implied reader. As a counterfactual scenario to the real-world experience of the embodied reader, the fictional world can elicit comparisons and propose alternative courses of action (see Gopnik and Tenenbaum). Indeed, speculations (in a Bayesian vein) about the evolutionary function of literature suggest that one of the functions of fiction is to extend the learning process about the real world by presenting the mind with as many alternative scenarios as possible to recalibrate and specify our probabilistic understanding of the real world (see Buchsbaum et al.).

Yet, as far as fictional narratives are concerned, it seems that the conceptual probabilistic pay-off relies on the embodied and emotional features of the narrative and on the ease with which the embodied reader can construct a feedback loop between their mind-body (with its physical and cultural features) and the new environment that the storyworld constitutes. If we read the Smollett passage with the strict detachment of the implied reader — that is, working through the gaps and

comparing Ferdinand's transgressive depravity with the parameters of action that our own social mores circumscribe — then our model reader easily becomes more concerned with himself than with the text. Considering the model reader as embodied, in turn, shifts the balance back from this distinction to considering the feedback loop between text and reader.

The embodied features of the text evoke the responses and resonances of readers. Very general features of embodied cognition enable us to cross the 250-year gap between Smollett's days and our own. The Smollett passage does not gain its primary salience from Smollett's experiment with his villain-hero or from the comparison of eighteenth-century morals with those of the twenty-first century. In the first place, Ferdinand's plight engages us through the embodied resonances of his experience, and this engagement gains its urgency through the emotional investment it elicits. This, then, might feed into a consideration of Ferdinand's morals (in comparison with our own accepted models of behaviour) or indeed into an evaluation of Smollett's character experiment as a precursor of the Romantic antihero (who still represents a strangely desirable yet unattainable template for designing male identity). Considering the reader as embodied, as the second-generation approach suggests, therefore does not mean that she is tied to the here and now of the current point in reading the text, and it does not mean that she cannot think conceptually or in relation to cultural conditions. In fact, these cultural and social dimensions of fiction cannot be divorced from the embodied experience of reading, which gives rise to them; in turn, this experience sets the cascading levels of cognition in motion, leading the embodied reader to compare and recalibrate higher-level conceptual models about both the fictional and the real world. The embodied reader learns first and foremost about the fictional world, but sometimes, he learns about himself.

Notes

1 My research has been supported by the Balzan Interdisciplinary Seminar (University of Oxford) and by the Academy of Finland and the University of Turku. I would like to thank Marco Caracciolo for his thoughtful comments on earlier versions of this article.

2 Conceivably, the model I propose could be tested empirically in turn, but it is not the purpose of this article to devise such experiments.

3 Even though I privilege motor resonance here, this is of course not the only kind of embodied engagement of readers (see Kuzmičová's contribution to this issue).

4 For the purposes of this article, let us accept that literary texts can evoke a sense of a non-actual emotional, embodied, and qualitative experience. To my mind, the debates around whether qualia can be represented through literary texts or not tend to go too far away from the literary experience. While I might not actually know what it is like to be Ferdinand Count Fathom, this passage gives a good enough approximation of this experience through the ways in which it interacts with my embodied responses to written texts. For a more extensive discussion of this issue, see Herman ch.6. Similarly, I do not propose to take a stand in the debate whether the embodied resonances that allow readers to get a sense of what Ferdinand feels depend on what Gallese calls "embodied simulation" or on a more direct empathy as posited by Dan Zahavi and others (see Zahavi, "Basic Empathy" for a brief outline and further references).

5 Iser himself is of course well-aware of this point. In fact, it constitutes part of the debate between him and Fish (see Fish and Iser, “Talk Like Whales”): while Fish insists that all interpretation is due to the reader and her “interpretative community,” Iser retains the text as having a share in the reading process (see also De Bruyn). Iser’s inaugural lecture at the University of Constance treated of “Die Appellstruktur der Texte” (perhaps best translated as “the structured appeal of texts”), textual features inviting readers to fill the gaps, as a constituent of the reading experience. The notion recurs in the German version of *The Act of Reading*.

6 Bayes’ theorem takes the mathematical form $P(A|B) = P(B|A) \cdot P(A) / P(B)$, with A being the observation and B being the prior hypothesis about the environment.

7 Bayesian approaches to cognition have broad appeal in the cognitive sciences, in particular developmental psychology (see especially the work of Alison Gopnik). Because of its focus on calculation and probability, Bayesian approaches are usually connected with the computational, first-generation cognitive sciences. However, as Friston’s work goes to demonstrate, the probabilistic approach is not irreconcilable with second-generation, embodied approaches.

8 For a general account of the second-generation take on emotions, see Colombetti and Hogan, *Affective Narratology* ch.2. Patrick Colm Hogan’s *Affective Narratology* and *What Literature Teaches Us About Emotion* provide a comprehensive model of emotions in narrative. Hogan posits in his “minimal” account of emotions that perceptions, imaginations, and emotional memories can trigger emotions. Hogan distinguishes this strictly from the conventional appraisal theory of emotions, because it is not the situation and its appraisal through proposition, cognitive-level judgements, but perception itself (real or imagined) that leads to emotions (*What Literature* 46). Appraisals still run through the experience of emotions (on a level different to, but interacting with sense perception), and it is in this respect that I consider appraisals and emotional investments as crucial for my account of enactive and embodied emotions here.

9 Note that Friston’s model is located on the neural level, whereas Clark develops the connections with cultural and social aspects.

10 Of course, the actual lower, proprioceptive levels of the embodied reader would be already ‘muted’ because she is partaking in an imaginative experience in reading.

11 In his late work in literary anthropology, Wolfgang Iser becomes interested in the recursive loops of cybernetics and the feedback loops of the precursors of second-generation approaches, such as Varela, as models for the relation between fiction and the real world (see *Range of Interpretation* and “What Is Literary Anthropology?”). For this article, I have focused on Iser’s modelling of the reader, but the dialogue between his theory and second-generation approaches to literature is only just beginning.

Works Cited

- Arnheim, Rudolf. *Art and Visual Perception: A Psychology of the Creative Eye*. New version. Berkeley: U of California P, 1974. Print.
- Bolens, Guillemette. *The Style of Gestures: Embodiment and Cognition in Literary Narrative*. Baltimore, Md; London: Johns Hopkins UP, 2012. Print.
- Brown, Harriet, Karl Friston, and Sven Bestmann. “Active Inference, Attention, and Motor Preparation.” *Frontiers in Psychology* 2 (2011): n. pag. *PubMed Central*. Web. 2 June 2013.
- Buchsbaum, Daphna et al. “The Power of Possibility: Causal Learning, Counterfactual Reasoning, and Pretend Play.” *Philosophical Transactions of the Royal Society B: Biological Sciences* 367.1599 (2012): 2202–2212. *rstb.royalsocietypublishing.org*. Web. 26 Sept. 2012.
- Caracciolo, Marco. “The Reader’s Virtual Body: Narrative Space and Its Reconstruction.” *StoryWorlds: A Journal of Narrative Studies* 3.1 (2011): 117–138. Print.
- Clark, Andy. “The Many Faces of Precision (Replies to Commentaries on “Whatever Next? Neural

- Prediction, Situated Agents, and the Future of Cognitive Science”).” *Frontiers in Theoretical and Philosophical Psychology* 4 (2013): 270. *Frontiers*. Web. 2 June 2013.
- . “Whatever Next? Predictive Brains, Situated Agents, and the Future of Cognitive Science.” *Behavioral and Brain Sciences* 36.03 (2013): 181–204. *Cambridge Journals Online*. Web.
- Colombetti, Giovanna. “Enaction, Sense-Making and Emotion.” *Enaction: Towards a New Paradigm for Cognitive Science*. Cambridge, Mass: MIT Press, 2011. 145–164. Print.
- Culler, Jonathan. *Structuralist Poetics: Structuralism, Linguistics and the Study of Literature*. London: Routledge & Kegan Paul, 1975. Print.
- De Bruyn, Ben. *Wolfgang Iser: A Companion*. Companions to Contemporary German Culture 1. Berlin: De Gruyter, 2012. Print.
- Fish, Stanley. “Why No One’s Afraid of Wolfgang Iser.” *Diacritics* 11.1 (1981): 2–13. Print.
- Fletcher, Paul C., and Chris D. Frith. “Perceiving Is Believing: a Bayesian Approach to Explaining the Positive Symptoms of Schizophrenia.” *Nature Reviews Neuroscience* 10.1 (2009): 48–58. *www.nature.com*. Web. 21 May 2013.
- Friston, Karl. “Learning and Inference in the Brain.” *Neural Networks* 16 (2003): 1325-1352. Print.
- . “Prediction, Perception and Agency.” *International Journal of Psychophysiology* 83.2 (2012): 248–252. *ScienceDirect*. Web. 12 Dec. 2012.
- Friston, Karl, and Ping Ao. “Free Energy, Value, and Attractors.” *Computational and Mathematical Methods in Medicine* 2012 (2011): n. pag. *www.hindawi.com*. Web. 30 Sept. 2013.
- Friston, Karl, Jérémy Mattout and James Kilner. “Action Understanding and Active Inference.” *Biological Cybernetics* 104 (2011): 137-160. Print.
- Frith, Christopher D. *Making up the Mind : How the Brain Creates Our Mental World*. Malden, Mass; Oxford: Blackwell Publishing, 2007. Print.
- Glenberg, Arthur M., and Vittorio Gallese. “Action-based Language: A Theory of Language Acquisition, Comprehension, and Production.” *Cortex* 48.7 (2012): 905–922. *CrossRef*. Web. 28 Aug. 2012.
- Gopnik, Alison, and Joshua B. Tenenbaum. “Bayesian Networks, Bayesian Learning and Cognitive Development.” *Developmental Science* 10.3 (2007): 281–287. *Wiley Online Library*. Web. 26 Sept. 2012.
- Herman, David. *Basic Elements of Narrative*. Oxford: Wiley-Blackwell, 2009. Print.
- Hogan, Patrick Colm. *Affective Narratology : the Emotional Structure of Stories*. Lincoln, Neb; London: U of Nebraska P, 2011. Print.
- . *What Literature Teaches Us About Emotion*. Studies in Emotion and Social Interaction. Cambridge: New York: Cambridge UP, 2011. Print.
- Iser, Wolfgang. *The Act of Reading : a Theory of Aesthetic Response*. London: Routledge & Kegan Paul, 1978. Print.
- . *Der Akt des Lesens: Theorie ästhetischer Wirkung*. München: UTB Taschenbücher, 1976. Print.
- . *The Fictive and the Imaginary : Charting Literary Anthropology*. Baltimore ; London: Johns Hopkins UP, 1993. Print.

- . *The Implied Reader : Patterns of Communication in Prose Fiction from Bunyan to Beckett*. Baltimore: Johns Hopkins UP, 1978. Print.
- . *Prospecting: from Reader Response to Literary Anthropology*. Baltimore ; London: Johns Hopkins UP, 1989. Print.
- . *The Range of Interpretation*. New York: Columbia UP, 2000. Print.
- . “Talk Like Whales: A Reply to Stanley Fish.” *Diacritics* 11.3 (1981): 82–87.
- . “What Is Literary Anthropology? The Difference Between Explanatory and Exploratory Fictions.” *Revenge of the Aesthetic: The Place of Literature in Theory Today*. Ed. Michael P. Clark. Berkeley: U of California P, 2000. 157–79. Print.
- Kukkonen, Karin. “Bayesian Narrative: Probability, Plot and the Shape of the Fictional World” *Anglia: Journal of English Philology* (forthcoming).
- Kuzmičová, Anežka. “Presence in the Reading of Literary Narrative: A Case for Motor Enactment” *Semiotica* 189 (2012): 23-48.
- Noë, Alva. *Action in Perception*. Cambridge, Mass: MIT P, 2004. Print. Representation and Mind.
- O’Regan, J. Kevin, and Alva Noë. “A Sensorimotor Account of Vision and Visual Consciousness.” *Behavioral and Brain Sciences* 24.05 (2001): 939–973. *Cambridge Journals Online*. Web.
- Rizzolatti, Giacomo. *Mirrors in the Brain : How Our Minds Share Actions, Emotions, and Experience*. Oxford: Oxford UP, 2008. Print.
- Smollett, Tobias. *The Adventures of Ferdinand, Count Fathom*. London: Penguin, 1990. Print.
- Warhol, Robyn R. *Having a Good Cry: Effeminate Feelings and Pop-Culture Forms*. Columbus: Ohio State UP, 2003. Print.
- Zahavi, Dan. “Comment: Basic Empathy and Complex Empathy” *Emotion Review* 81 (2012): 81-82.
- Zunshine, Lisa. *Getting Inside Your Head: What Cognitive Science Can Tell Us About Popular Culture*. Baltimore: Johns Hopkins UP. Print.
- Zwaan, Rolf A., and Lawrence J. Taylor. “Seeing, Acting, Understanding: Motor Resonance in Language Comprehension.” *Journal of Experimental Psychology* 135.1 (2006): 1–11. Print.