Quixotic Reasoning — Counterfactuals, Causation and Literary Storyworlds

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Abstract:

Bayesian probability calculus has recently emerged as a model for how the mind learns about fictional and cultural environments. The present article considers reading a narrative as a process of learning about the probabilities of the fictional world and explores two novels about Quixotic readers from a Bayesian perspective. The juxtaposition of the fictional and the real, which the standard understanding of the Quixote relies on, is replaced by an outline of the dynamics of the learning process in Quixotes who already know 'the rule', that is, the probabilities of their fictional environment, but need to use this knowledge with discernment. The conclusion draws connections between the Quixotic learning process and the ways in which fiction contributes to human mental, social and cultural development.

Keywords: fictionality, Don Quixote, Bayesian probability, reader representations, counterfactuals, Jane Austen, Eaton Stannard Barrett

'But when a young lady is to be a heroine, the perverseness of forty surrounding families cannot prevent her. Something must and will happen to throw a hero in her way.'[1]

'I was silent, but looked anxiously towards the door.

"Are you meditating an escape?" asked he.

"No," said I, "but just wait a little, and you shall see what an interesting turn affairs will take. (...)

I am only watching for the tall, elegant young stranger, with an oval face, who is to enter just at this crisis, and snatch me from perdition."

"Did he promise to come?" said the magistrate.

"Not at all," answered I, "for I have never seen the man in my life. But whoever rescues me now, you know, is destined to marry me hereafter. That is the rule."'[2]

The heroines in Jane Austen's Northanger Abbey (1818) and in Eaton Stannard Barrett's The Heroine (1813) are commonly considered as prime examples for the type of the female Quixote, that is, young ladies who read too many books, lose touch with reality, and thereby embody the cultural anxieties around the rise of the novel and the expanding readership of fiction in the eighteenth century.[3] Different as Austen's and Barrett's novels are, their Quixotic heroines share a number of significant features: they reason on the basis of fictional, not real-world probabilities; they are absolutely certain about the causal connexions they establish; and they do get the happy ending they expect.

At the beginning of Northanger Abbey, Austen presents the conventions of the sentimental and the Gothic novel in terms of a 'truth universally acknowledged'. Even if the storyworld is short of eligible bachelors (which constitutes the 'perverseness of forty surrounding families'), the heroine Catherine Morland is still certain to find a hero to marry. Barrett's heroine Cherubina de Willoughby, the daughter of a well-to-do farmer who elopes in order to experience the adventures she reads about in novels, trusts in the 'rule' of the fictional plot. In both instances, we are at the beginning of the narrative. The probability that Catherine will encounter a hero like Henry Tilney and the likelihood that Cherubina, standing before a magistrate indicted of theft, will be saved by a 'tall, elegant young stranger' seem

rather slim to readers. Austen's narrator and Barrett's heroine, however, reason on the basis of the probabilities of the outcome of the story, rather than those of its beginning.

Consider reading as a process of learning the probabilities of the storyworld. In the beginning of Northanger Abbey, nothing points to the naïve, handsome girl Catherine becoming sister-in-law to a viscount. As readers make new observations in the course of the story, such as Catherine's trip to Bath, Henry Tilney's admiration for her unpretentious behaviour and her invitation to the Tilneys' seat Northanger Abbey, they revisit and modify this initial probability distribution until the happy ending becomes likely and expected. Readers run Bayesian inferences, revising previous probabilities in the light of new observations, as they make sense of the plot. [4] In psychology, learning processes in areas as different as perception, language acquisition, reading comprehension and the identification of causal patterns have been modelled in terms of Bayesian inferences.[5] Arguably, if we learn about our natural and cultural environments through a reassessment of prior probabilities, a similar Bayesian calculus will also be at work when readers explore the fictional environment of storyworlds.[6] Understanding narrative as a process of adjusting probabilities, this article outlines the dynamics of the Bayesian learning process in novels in which Quixotic characters already know 'the rule', in other words, the probabilities of their fictional environment. In her discussion of Northanger Abbey, Casie Hermansson suggests that '[a]t every turn the novel's implied reader is encouraged to read using a priori expectations, or presuppositions'[7] because Austen juxtaposes fictional with real-world probabilities in her ironic negations. From a Bayesian perspective, it is not a priori expectations (which readers always work with) but a posteriori expectations are the trademark of the Quixote. Quixotes in Austen and Barrett work with the probabilities as they will have emerged at the end of the narrative, when the heroine is happily married or saved in the nick of time, rather than with the probabilities as they stand at this point in the plot. Therefore, Quixotes like Austen's

narrator and Barrett's heroine are always certain of their outcome and, surprisingly often, they turn out to be right in their inferences even though they are based not on real-world but on fictional probabilities. As Cherubina says to her husband-to-be at the end of The Heroine, '[y]ou see, (…) after all your pains to prevent me from imitating romances, you have made me terminate my adventure like a true romance — in a wedding.'[8]

Counterfactual Reasoning

In Cherubina's exchange with the magistrate, when the heroine expects that she will be rescued in the nick of time and the magistrate supposes that she will flee, the probabilities of their respective assumptions correspond to the distinction between the real and the fictional. The magistrate's probabilities seem more realistic to readers than Cherubina's probabilities, which are founded on the poetics of coincidence, of the paths of characters crossing at just the right moment, underlying much narrative fiction.[9] Quixotes operate on a set of probabilities that are taken from fiction, unlike the other characters or the general realist setting of many of these novels. The standard cognitive line of explanation for this feature of the Quixote is a defect in their capacity for 'decoupling'.[10] Decoupling is defined as the mental competence to divorce the information we process from our semantic memory, that is, our memory of what constitutes the real world.[11] Counterfactual scenarios such as storyworlds or planning scenarios are separate from our knowledge of the real world, because we attach a 'source tag' to them, such as 'in the future' or 'in Austen's Northanger Abbey', which marks them as not pertaining to the real world. Quixotes would not attach such source tags but instead will process all scenarios on the same level as the real world. According to this argument, Cherubina does not attach the tag 'in the sentimental novel' to her expectation of a handsome stranger coming to her rescue and expects the counterfactual rescue mistakenly.

However, there is another aspect to Cherubina's and the magistrate's reasoning, namely, the ways in which they establish causality. Both characters move through what Alison Gopnik and colleagues call 'counterfactual reasoning': they establish a counterfactual scenario, assess the likelihood that the change in the counterfactual scenario is responsible for a change in the outcome of the situation, and thereby judge causal validity.[12] An example much used by Gopnik for such counterfactual reasoning is the correlation between tobacco-stained fingers and lung cancer.[13] In one counterfactual scenario, you wash your fingers to get rid of the tobacco stain, but there is no consequent change in your susceptibility to lung cancer. In a second counterfactual scenario, you stop smoking and get rid of the tobacco stain, and this change is causally connected to the probability that you'll get lung cancer. In The Heroine, there is a correlation between Cherubina's glance towards the door and her escape from punishment. The magistrate assumes that Cherubina is looking at the door because she is searching for an escape route. In his counterfactual scenario, the way to make Cherubina stand trial is to ensure that she does not run out of the door. Yet, as Cherubina informs him, that was not her intention at all. She was looking at the door because she expects her rescuer to appear at any moment. In her counterfactual scenario, the way to ensure that she stands trial is to prevent anyone from entering the courtroom. In their counterfactual reasoning, both Cherubina and the magistrate think from the end, but Cherubina's most likely ending is that of the fictional narrative, while the magistrate's is that of the everyday courtroom.

Within this Bayesian perspective, Cherubina works on the probabilities of fiction as well, but the case is more complicated than simply leaving a source tag out. Cherubina is aware of the realist probabilities at the beginning of the novel, namely that, as a well-to-do farmer's daughter, she really has nothing to worry about. Early on, she writes in her letters, 'I am doomed to endure the security of a home, and the dullness of an unimpeached reputation. For

me, there is no hope whatever of being reduced to despair. I am condemned to waste my health, bloom and youth, in a series of uninterrupted prosperity.'[14] Barrett chooses to reevaluate the realist probability ironically, but Cherubina is quite capable of applying a source tag here, and she not only reasons but acts with an eye on the ending. She writes, 'in nine cases out of ten, were [heroines] to manage matters like mere common mortals, they would avoid all those charming mischiefs which adorn their memoirs.'[15] Cherubina's (and Catherine's) adventures take them out of their familiar worlds into places of counterfactual reasoning, where they have to learn not to attach source tags in the first place but to reassess their values. Her elopement is the only way to bring about the complications which constitute an adventure, to set in motion a Bayesian machinery for reassessing her world, and in this her judgement is correct.

Quixotic Certainty

Plot coincidences such as chance encounters, surprise recognitions and last-minute rescues should be unexpected by readers (and magistrates) and therefore propel their further exploration of the storyworld.[16] Cherubina, however, already understands which coincidences are the staple of the fictional plot and applies fictional probabilities in her counterfactual reasoning. This quixotic reasoning shows up the conventions of fiction because fictional probabilities already inform her thinking and do not have to be established in the course of the narrative.

Criticism of the conventions of the Gothic novel often foregrounds the genre's peculiar combination of improbability and inevitability: 'If a curtain is withdrawn, there is a bleeding body behind it; if a chest is opened, it contains a skeleton; if a noise is heard, somebody is receiving a deadly blow; and if a candle goes out, its place is sure to be supplied by a flash of lightning.'[17] Gothic heroines are quite likely to make such ghastly finds, and

often they expect nothing less. Whatever one has a strong emotional investment against seems to be the most likely consequence in the Gothic. In Ann Radcliffe's paradigmatic Gothic novel The Mysteries of Udolpho (1794), the heroine Emily draws back a curtain to reveal bloodstains and what seems to be a corpse.[18] Since the scene is presented in Emily's focalization, that is, the narrator limits the knowledge she communicates to that of the character, readers will not know for several hundred pages that the supposed corpse is in fact a wax effigy. Radcliffe plays up the Gothic conventions here in her own exploration of Emily's 'romantic imagination'.[19] In Northanger Abbey, Catherine Morland draws the same conclusion as Emily at first: when talking about the scene in Mysteries of Udolpho with her friend Isabella Thorpe, she says, 'I know it must be a skeleton, I am sure it is Laurentina's skeleton.'[20]

This quixotic certainty, this constellation of improbability and inevitability, is a feature of the Quixote because she (presumably) can reason from the probability distribution at the end of the narrative. Even though, as we have seen, this is generally true, there are instances when these novels undermine the certainty that comes from thinking through fictional probabilities: both Emily and Catherine Morland are mistaken about what is beneath the veil in the castle of Udolpho; and when Cherubina stands before the magistrate, she is in fact not rescued but has to use her own wits to exculpate herself.

Fictional probabilities are often shown to be false when taken at face value. Catherine Morland, for example, when she hears about the early death of Henry Tilney's mother, expects that General Tilney has locked up and killed his wife. Henry Tilney reprimands her sharply for drawing such a conclusion on the probabilities of a Gothic novel and stresses that his mother died of natural causes.[21] Catherine's quixotic certainty seems to be founded on delusion. Yet Austen introduces Tilney in terms similar to Radcliffe's villain Montoni,[22] and Tilney is just as controlling and materialist as Montoni. In the plot, Tilney turns out to

perform the function of a Gothic villain, when he throws Catherine out of his house the moment he learns that, as a potential bride for Henry, she will not bring money into the family:[23] 'Catherine, at any rate, heard enough to feel, that in suspecting General Tilney of either murdering or shutting up his wife, she had scarcely sinned against his character, or magnified his cruelty.'[24] Even though Catherine's inferences regarding the death of Tilney's wife are not literally true, her assessment of his character is apt, and not just to her own mind, as the previous quotation might suggest. The quixotic aspect of Catherine's reasoning is not her use of probabilities derived from fiction but her undiscerning application of these probabilities.

In the final scenes of The Heroine, Cherubina is visited by a group of characters from famous novels who press her to marry Lord Montmorenci, her professed lover. Readers at this point already suspect that Montmorenci is an actor and a fortune hunter, but Cherubina has to base her dislike of him on the 'law' that 'a complete set of teeth [which Montmorenci lacks] are absolutely indispensible to a hero.'[25] Montmorenci hopes to overcome this by having heroes like Samuel Richardson's Charles Grandison and Frances Burney's Cecilia endorse the marriage. Charles Grandison, himself aged in comparison to the character in Richardson's novel, gives Cherubina a glimpse beyond the happy ending: Frances Burney's Evelina is henpecking the heartthrob Lord Orville and Samuel Richardson's Pamela has eloped with Samuel Johnson's Rasselas. Grandison asks, 'Why do their biographers always conclude the book just at their wedding? Simply because all beyond it is unhappiness and hatred.'[26]

Grandison questions the basis of Cherubina's Bayesian inferences when the happy ending turns out not to be the end of the story. Grandison moves the ending of the plot and thereby suggests to the Quixote that she adapt her reasoning accordingly. In a second step, Grandison invites Cherubina to bet on the unlikely again: if it seems likely that Evelina and Orville will

be happy at the end of Burney's novel, it turns out not to be the case in the long run. If it seems unlikely that Cherubina can be happy with Montmorenci, it will turn out to be a great marriage. On his authority of being personally acquainted with the characters and their lives after the happy ending, Grandison tries to convince Cherubina that the probability distribution at the end of the plot is wrong, and that she should run another Bayesian inference to reconfigure the probabilities she works with. Cherubina, however, asserts her belief in familiar endings, and begins to see beyond the literal advice of the hero Charles Grandison. Soon after, she escapes from her entrapment.

The Socialization of the Quixote

Austen's Northanger Abbey and Barrett's Heroine juxtapose realist and fictional probabilities. Because Catherine and Cherubina start with the fictional probabilities that will have emerged at the end of the narrative, their reasoning seems quixotic and highlights fictional conventions. If the standard plot works as a Bayesian learning mechanism for reevaluating assumptions in the face of new observations, then the female Quixotes seemingly have no reevaluation to make. The dynamics of the quixotic plot and its learning process are different, as the questioning and reasserting of quixotic certainty demonstrates. Quixotes need to learn to move from the literal mapping of their fictional probabilities to a more differentiated application, which allows them to use fictional meaning-making in realist storyworlds.

Avrom Fleishman, in his astute discussion of 'The Socialization of Catherine Morland,' distinguishes between three stages of the heroine's development: 1) her 'unformulated openness to experience' (which she displays in the Bath episodes); 2) her 'naïve notion of the direct applicability of symbols' (when she accuses General Tilney of having locked up and killed his wife, like a Gothic villain); and 3) being able to 'see (...)

through the artificiality of all cultural symbols and yet remain(...) an active and skilful participant in the processes' (when she realizes that Tilney is not a Gothic villain but shares characteristics with the type).[27] Fleishman's trajectory of Catherine's development of discernment maps quite well onto the levels of causality which psychologists distinguish for counterfactual reasoning: 1) egocentric learning and behaviour, in which 'the agent [does not recognize] that the same relationship can be present even when it does not act, but other agents act similarly or when a similar relationship occurs in nature without the involvement of agents at all'; 2) agent-causal viewpoint, in which 'the agent grasps that the same relationship that it exploits in intervening also can be present when other agents act'; and 3) a fully causal viewpoint, in which 'the agent grasps that the same relationship that the agent exploits in intervening can also be present both when other agents intervene and in nature even when no other agents are involved.'[28] These different levels of causality seem to depend on the kinds of counterfactual scenarios that are considered and assessed for their causal probability.

The probability calculus of Bayesian counterfactual reasoning is not independent of the social fabric within which it unfolds, and indeed, it would be hard to conceive how it could be. The three stages of causation in counterfactual reasoning presented above are based on Tomasello and Call's Primate Cognition, in which the two anthropologists suggest that non-human primates do not grasp a fully causal viewpoint, but relate everything they perceive back to their own actions or to actions they could and would perform themselves.[29] According to Tomasello and Call, understanding tertiary relationships first evolved in the human social domain and establishes a web of possibilities in the psychological dimension of intentionality and motivation, which provides the basis for human social cognition and cultural learning. The development, in narrative and social terms, is one from first-person to third-person perspective and then to a 'bird's eye view', in which the relations between the

two previous perspectives becomes obvious as part of the normative commitment to a 'community of like-minded people'. [30]

Throughout Austen and Barrett's novels, the Quixotes develop their causal viewpoint from egocentric to fully causal, and they learn to discern between the different degrees of applicability of their fictional probabilities. In an egocentric viewpoint, the agent relates all the action back to him- or herself. Cherubina, for example, expects a hero she doesn't know to come to her rescue. This causality only applies because she is involved in it. As her suitor Betterton puts it, 'Nothing is impossible (...) when the charming Cherubina prompts our efforts.'[31] In an agent-causal viewpoint, the agents assume that everyone would act like him- or herself. Henry Tilney, for example, describes Catherine Morland's causal inferences in these terms:

Henry smiled, and said, 'How very little trouble it can give you to understand the motive of other people's actions.'

'Why? — What do you mean?'

'With you, it is not, How is such a one likely to be influenced? What is the inducement most likely to act upon such a person's feelings, age, situation, and probable habits of life considered? — but, how should *I* be influenced, what would be *my* inducement in acting so and so?'[32]

After her encounter with Charles Grandison, Cherubina is visited, in the tradition of Horace Walpole's The Castle of Otranto, by a ghost who threatens her with death unless she marries Montmorenci. This visitation plays into the egocentric bias of the Gothic, in which the heroine assumes that all events are causally related to her actions or presence, and which is reflected in the frequent, strongly embodied focalizations of the genre, as when Emily lifts

the veil in The Mysteries of Udolpho. After he sneezes, Cherubina suspects that the ghost is part of 'the ghosting system, so common in romances, for the purpose of frightening me into his schemes.'[33] Cherubina takes the probabilities of the Radcliffean 'explained supernatural', in which ghostly apparitions are always explained through hidden passages and human interference,[34] and draws the correct conclusion, namely that this ghost is an actor. The convention of the 'explained supernatural' allows Cherubina to move to the third level of causal inference: she now gets a glimpse of the 'web of possibilities' that does not depend on her own actions or actions that she would perform. Cherubina then becomes a more fully causal agent in this environment: she lays a trap for the ghost, throws a box of snuff in his face and escapes (fittingly) through the picture frame that served as a secret entrance for the ghost. Once she steps outside the picture frame, Cherubina sees that Montmorenci is an actor named Grundy and that the fictional characters are his associates. When they capture her, she is rescued in the nick of time by her future husband Stuart. Only after Cherubina has moved to the third level of causality does her rescue seem unlikely, and only then will the rescuer she was waiting for in the beginning of the novel appear.

Quixotic reasoning, then, is not often deceived as to the reality status of its counterfactual scenarios. Its fictional probabilities are not simply mistaken but rather serve as a heuristic tool that needs to be used with discretion. Austen's and Barrett's Quixotes learn to use the knowledge and experience that fiction affords. The reasoning processes of the Quixote are an instance of the more general counterfactual reasoning which informs causal learning, and which seems to be based on the mental mechanisms of pretend play and fiction.[35] Gopnik and colleagues assume that 'the free exploration of possibility in pretence helps human beings to construct wide-ranging causal models of the world and to reason from them',[36] and they argue that the long childhood of humans offers ample time for such exploratory learning.[37] If that is true, reading fiction, which serves as an exploration of environments other than the

real world, further extends our process of constructing possible causal models, as we configure and reconfigure our probabilities in the form of Bayesian inferences while exploring storyworlds. Quixotic narratives then address the question of how to integrate the causal models we configure through fiction into a fully causal viewpoint on the world. On the one hand, this means learning to navigate the 'web of possibilities' which is constituted by the cultural environment and by normative commitment to a community, which Tomasello mentions. Catherine Morland learns that to accuse General Tilney of playing the role of a treacherous Italian count is not acceptable, but she also learns that it is advisable to be as cautious around him as if he were one. On the other hand, integrating causal models from fiction in a fully causal viewpoint on the world means reconciling quixotic certainty with the necessities of the plot. In The Heroine, Barrett achieves this through the neat inversion of the last-minute rescue: when Cherubina relies on fictional probabilities, she expects to be rescued but has to rely on her own devices; when Cherubina takes a fully causal viewpoint and does not expect to be rescued, the hero appears on the scene and confirms the fictional probability in the conclusion to the novel.

Conclusion

In her discussion of Charlotte Lennox's The Female Quixote (1752), Catherine Gallagher suggests that the rise of the novel goes hand in hand with the acknowledgement of fiction as fiction. Around the mid-eighteenth century, fiction came to be seen as a category distinct from both history and lies.[38] As defined since Aristotle, fiction has a mimetic but not a historical truth. According to Gallagher, fiction is a tale about 'nobody' — realistic enough that readers can sympathize but not necessarily tied to historical record. When Jerry tells the story of his life to Cherubina, she first encourages him to shape his story as 'some striking, genteel little picture, to bespeak attention' and then reprimands him for his 'monstrous

untruths' when he strays too far from his actual biography.[39] The development of fiction as a category between history and lies seems to be reflected in Austen's and Barrett's heroines' education towards the judicious use of fictional probabilities in their assessment of the storyworld.

The debate around the uses of novel reading and the ridicule of readers too deeply immersed in storyworlds had been going on for well over a century by the time Austen published Northanger Abbey (1818) and Barrett published The Heroine (1813), but the rise of the Gothic novel, with its luxurious fictionality,[40] gave a new urgency to this debate, which both Austen and Barrett thematize. It seems that Austen and Barrett do not reject and ridicule novel-reading (and the Gothic) outright. On the contrary, they chart a path between naively real-world probabilities and the literal application of fictional probabilities, as their heroines develop a fully causal view of the world, and thereby present the potentially beneficial uses of fiction as fiction.

The evolutionary branches of cognitive approaches to literature have long worked towards an explanation of the evolutionary uses of fiction and literature. Arguments range from literature as an evolutionary side-product, like a cheesecake rich in pleasurable mental operations and ultimately of no purpose,[41] literature as an expensive signal, like the peacock's tail showing off evolutionary prowess and gathering sexual and social prestige,[42] to reading literature as taking our mind to the gym, providing a workout for our mental capacities.[43] Edward O. Wilson in Consilience[44] makes a much more general claim: literature helps humans cope with the complex, confusing and contingent view of the world that our highly developed intelligence gives access to. 'The arts were the means by which these forces [of the abundantly contingent environment, of the finiteness of personal existence and the shocking recognition of the self, etc.] could be ritualized and expressed in a new, simulated

reality.'[45] Literature and the arts are the key evolutionary achievements which ensure that humans actually benefit from their highly developed intelligence.

We would therefore do well not to reject fictional probabilities out of hand. In Austen's Northanger Abbey and Barrett's The Heroine, fictional probabilities are not based on actual events in the storyworld, and their discrepancy from real-world probabilities is often stressed, but the guidance for action which they give to Catherine Morland and Cherubina de Willoughby is highly pertinent to their success in the story. Once they have developed a fully causal perspective, Catherine and Cherubina can use fictional probabilities to account for the contingent, the unexpected, such as General Tilney's behaviour and the ghost's sneeze. In a larger evolutionary frame, it could well be that humanity's quixotic reasoning is similarly crucial for its survival.

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[1] Jane Austen, Northanger Abbey (Harmondsworth, Penguin, 2009 [1818]), 9.

[2] Eaton Stannard Barrett, The Heroine, or Adventures of a Fair Romance Reader, edited by Avril Horner and Sue Zlosnik (Kansas City, Valancourt Books, 2011 [1813]), 35.

[3] See Jacqueline Pearson, Women's Reading in Britain 1750–1832: A Dangerous Recreation (Cambridge, Cambridge University Press, 1999), in particular ch. 7, which discusses both Austen's and Barrett's novels.

[4] Bayesian inferences are mental operations based on Bayes's theorem: P (A|B) = P (B|A) * P (A) / P (B). Bayes's theorem relates the probability of a prior hypothesis (A) to the probability of a new observation (B) and to the probability of making this new observation B in an environment in which A is the case (P (B|A)). It describes an individual's developing predictions, based on the assessment of the probabilities of an environment.

[5] See Joshua Tenenbaum, Charles Kemp, Thomas Griffith and Noah Goodman, 'How to Grow a Mind: Statistics, Structure and Abstraction', Science 311 (March 2011), 1279–85, for an overview of this approach, and Dennis Norris, 'The Bayesian Reader: Explaining Word Recognition as an Optimal

Bayesian Decision Process', Psychological Review 113.2, 327–57, for reading comprehension in particular.

[6] See Karin Kukkonen, 'Bayesian Narrative: Probability, Plot and the Shape of the Fictional World' (in preparation).

[7] Casie Hermansson, 'Neither Northanger Abbey: The Reader Presupposes', Papers on Language and Literature, 36.4 (2000), 347.

[8] Barrett, The Heroine, 291.

[9] See Hilary Dannenberg, Coincidence and Counterfactuality: Plotting Time and Space in Narrative Fiction (Lincoln, University of Nebraska Press, 2008).

[10] See Barbara MacMahon, 'Metarepresentation and Decoupling in Northanger Abbey', English Studies 90.5 (2009), 518–44, and 90.6 (2009), 673–94, and Anna Uddén, 'Narrative and Counternarrative — Quixotic Hermeneutics in Eighteenth-Century England: Charlotte Lennox, The Female Quixote', Partial Answers 6.2 (2008), 443–57.

[11] Leda Cosmides and John Tooby, 'Consider the Source: The Evolution of Adaptations for Decoupling and Metarepresentations', in Metarepresentations: A Multidisciplinary Perspective, edited by Dan Sperber (Oxford, Oxford University Press, 2000), 53–111.

[12] Daphna Buchsbaum, Sophie Bridgers, Deena Skolnick Weisberg and Alison Gopnik, 'The Power of Possibility: Causal Learning, Counterfactual Reasoning, and Pretend Play,' Philosophical Transactions of the Royal Society, Biological Sciences, 367 (2012), 2202–12.

[13] Andrew Meltzoff, Anna Waismeyer and Alison Gopnik, 'Learning about Causes from People: Observational Causal Learning in 24-month-old infants', Developmental Psychology (Feb 2012; Advance Online publication).

[14] Barrett, The Heroine, 9.

[15] The Heroine, 25.

[16] See Kukkonen, 'Bayesian Narrative'.

[17] Anon., 'Terrorist Novel Writing', The Spirit of the Public Journals 1797, vol.2 (1802), 224.

[18] Ann Radcliffe, The Mysteries of Udolpho (Harmondsworth, Penguin, 2010 [1794]), 456–7.

[19] The Mysteries of Udolpho, 448.

[20] Austen, Northanger Abbey, 36.

[21] Northanger Abbey, 220.

[22] Count Montoni is described as 'an uncommonly handsome person (…) whose countenance exhibited, upon the whole, more of the haughtiness of command, and of the quickness of discernment, than of any other character' (Radcliffe, Mysteries, 32), and Austen presents General Tilney as 'a very handsome man, of commanding aspect' (Austen, Northanger Abbey, 85).

[23] With reference to domestic and economic relationships, not just Northanger Abbey but Austen's entire work has been considered as a continuation of the Gothic tradition. See for example, Judith Wilt, Ghosts of the Gothic: Austen, Eliot, Lawrence (Princeton, Princeton University Press, 1980); Nancy Armstrong, 'Gothic Austen,' in A Companion to Jane Austen, edited by Claudia Johnson and Clara Tuite (Oxford, Blackwell, 2009), 237–47.

[24] Austen, Northanger Abbey, 278.

[25] Barrett, Heroine, 239.

[26] Heroine, 266.

[27] Avrom Fleishman, 'The Socialisation of Catherine Morland', English Literary History 41.1 (1974), 666–7.

[28] Jim Woodward, 'Interventionist Theories of Causation in Psychological Perspective', Causal Learning: Psychology, Philosophy and Computation, edited by Alison Gopnik and Laura Schulz, (Oxford, Oxford University Press, 2007), 32.

[29] Michael Tomasello and Joseph Call, Primate Cognition (Oxford, Oxford University Press, 1997), 367–400.

[30] Michael Tomasello, Origins of Human Communication (Cambridge, MA, MIT Press, 2008), 87.

[31] Barrett, Heroine, 240.

[32] Austen, Northanger Abbey, 145.

[33] Barrett, Heroine, 268.

[34] See Emma Clery, The Rise of Supernatural Fiction, 1760–1800 (Cambridge, Cambridge University Press, 1995), in particular ch. 7.

[35] See Buchsbaum et al., 'The Power of Possibility'.

[36] 'The Power of Possibility', 2203.

[37] See Alison Gopnik, The Philosophical Baby: What Children's Minds Tell Us about Truth, Love and the Meaning of Life (London, Bodley Head, 2009).

[38] Catherine Gallagher, Nobody's Story: The Vanishing Act of Women Writers in the Marketplace, 1660–1780 (Oxford, Clarendon Press, 1994), 164–6.

[39] Barrett, The Heroine, 212.

[40] See Clery, The Rise of Supernatural Fiction, for a discussion of the reception of the Gothic as luxury goods — sensuous and potentially corrupting of social and economic morals.

[41] See Steven Pinker, The Blank Slate: The Modern Denial of Human Nature (Harmondsworth, Penguin, 2003) for this argument.

[42] Geoffrey Miller, The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature (London, Vintage, 2001), offers perhaps the strongest statement of the 'peacock's tail' argument for literature as an expensive signal giving the author an edge in the mating game. Ellen Dissanayake, Homo aestheticus: Where the Arts Come From and Why (Seattle, University of Washington Press, 1995) proposes the more moderate stance that art and literature respond to the human need to 'make special'. See also Brian Boyd, Why Lyrics Last: Evolution, Cognition and Shakespeare's Sonnets (Cambridge, Harvard University Press, 2012).

[43] This is the argument advanced by Lisa Zunshine, Why We Read Fiction: Theory of Mind and the Novel (Columbus, Ohio State University Press, 2007).

[44] Edward O. Wilson, *Consilience: The Unity of Knowledge* (London, Abacus, 1999). Wilson's theory is discussed in Joseph Carroll, Literary Darwinism: Evolution, Human Nature and Literature (New York, Routledge, 2004) and 'The Human Revolution and the Adaptive Function of Literature', Philosophy and Literature 30.1 (2006), 33–49.

[45] Wilson, Consilience, 251. The phrases in square brackets are taken from the same paragraph.