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# Spider-Man? Sure! The neuroscience of suspending disbelief

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When ‘transported’ by stories or plays or movies, we feel no skepticism at, say, Spider-Man’s webbing his way among the skyscrapers. Following Coleridge, we have called this phenomenon, the ‘willing suspension of disbelief’. Psychological experiments show, however, that during our experience of *any* narrative, we do not suspend disbelief. We believe, and then we partly disbelieve. Our brains link reality-testing to action and the possibility of action to change what we are perceiving. If we cannot change it, our brains need not test its reality, and they don’t. When responding to works of art, Kant and other aestheticians point out, we are ‘disinterested’. We know that we cannot or will not act to change artworks. We therefore accept such unrealities as Spider-Man. In situations where we must act (hypertext) or can act (watching DVDs), we may not experience the same lack of skepticism.

Rapt – ‘transported’ is the term psychologists use – in a literary work, we do not doubt that Spider-Man can web himself over tall buildings, that the Three Bears can talk, or that Sherlock Holmes can tell all about people from the mud on their boots. For those moments when we are really ‘into’ a poem, story, movie, play, or even a comic book, we simply don’t bother about likelihood and lifelikeness. We don’t because our brains tie reality-testing to action, and, experiencing literature or art, we cannot or will not act on what we are perceiving.

## POETIC FAITH

Coleridge invented the term we use to describe this credulous aspect of our trance-like state of mind when ‘transported’ by a literary work. He was justifying his writing about ‘persons and characters supernatural’, or at least ‘romantic’ (in the older sense of the word, extravagant or fantastic): ‘Kubla Khan’, ‘Rime of the Ancient Mariner’, or ‘Christabel’ (Coleridge 1907 [1817], ch. xiv). He asked that his readers grant him ‘*that willing suspension of disbelief for the moment that constitutes poetic faith*’. He asked us *not to disbelieve, at least for the brief period of experiencing the poems*, the improbabilities that he had written and that his readers were about to read. That stance, he said, constitutes a kind of imaginative or empathic belief, which he called ‘poetic faith’.

Coleridge’s phrase, ‘willing suspension of disbelief’, has lasted more than two centuries, probably because it describes very well what we *feel* is happening in a lot of situations that Coleridge could never have imagined, like Spider-Man webbing his way among skyscrapers. When we read that some ‘rough beast, its hour come round at last,

/ Slouches towards Bethlehem to be born', we don't doubt. We have 'poetic faith' in what we are reading or seeing. How can that be?

### ANOMALOUS SUSPENSE

Psychologist Richard Gerrig rewrites Coleridge's 'willing suspension of disbelief'. He notes that we take away only some information from a fiction. That is, if I am reading Sherlock Holmes stories, I will take away information about London neighborhoods and hansom cabs and gazogenes as part of my permanent knowledge. But I will not believe that there was a Sherlock Holmes or a Dr Watson or even a Mrs Hudson as I was doing when transported by the story. One can explain this phenomenon by saying we believe it all and then we disbelieve some.

To support this position, Gerrig introduces an idea from philosophy. Descartes believed that we judge the truth of an idea in a two-stage process. First we comprehend it, and then we judge it true or false. Then, following later philosophers, Spinoza and Daniel T. Gilbert, Gerrig asserts that *simply comprehending something automatically includes belief*. Gilbert defines belief in this context as 'propensity to behave' (Gilbert, Krull, and Malone 1990; Gilbert 1991). People automatically accept what they perceive, get ready to act on it, and only on second thought, with a little extra effort, 'unaccept' it, according to Gilbert. He cites research showing that 'people are particularly poor at ignoring, forgetting, rejecting or otherwise failing to believe that which they have comprehended' (Gilbert, Krull, and Malone 1990; Gilbert 1991; Gerrig 1998 [1993], ch. 6).

Gilbert and Gerrig are asserting a phenomenon common in our brains: dual systems for accomplishing the same thing. One is fast and uncritical, the other slower and more judicious. For example, for perceiving our relation to the objects around us, we have 'where' and 'what' (or 'dorsal' and 'ventral') visual systems. The upper or dorsal system is a 'where' pathway. It passes from the visual cortex in the occipital lobe under the dome of the skull into the parietal lobe and projects to the motor regions of the frontal lobe. This 'where' system specialises in spatial awareness and the guidance of rapid spatial actions, like dodging a truck or catching a ball. The lower stream, usually called the 'what' pathway, projects to areas in the temporal lobe specialised in recognising objects.

The two streams function differently. The 'where' system is, as neurologists say, 'quick and dirty', useful for rapid, life-preserving actions. It operates rapidly and uncritically and enables us to run around obstacles and catch softballs and dodge trucks bearing down on us. 'Where' is crude; there is, for example, no perception of colour in the 'where' path. Having this fast 'where' path considerably improves our chances of survival. The 'what' system is more thoughtful (so to speak). It operates more calculatedly (so to speak) – it does have colour, obviously – and this ventral pathway allows us to correlate (probably in the inferior temporal lobe) our immediate sensory data with what we already know. We can identify objects and, most importantly, people. It too is evolutionarily useful for identifying objects in the world as chickens or lions, friends or enemies, things that are likely to aid or end survival (Mishkin and Ungerleider 1982; Ungerleider and Mishkin 1982).

Neuroscientists increasingly think of the 'where' pathway as a 'how' pathway because the dorsal or upper path is specialised for setting up motor actions in response to perceptions. This dorsal stream contains a comparatively extensive representation of

the outer edges of the visual field, and it is specialised for detecting and analysing moving visual information. This upper stream also projects ultimately to the regions in the frontal cortex that program actions (Goodale et al 1991; Carnahan and Marteniuk 1993; Goodale and Milner 1992) and, in the process, the brain filters out information that has no relevance to moving its body. *Movement – action – is the crux.*

Joseph LeDoux has famously identified another dual system, this one for fear (LeDoux 1998). Perceptions going to and from the amygdala arouse feelings of fear, but the amygdala has two kinds of output. One creates a rapid response by projecting directly to the hypothalamus (to set the body's autonomic system for fight or flight) and then on to the brainstem and spinal cord to move the body. In the dim light of dawn – I am writing in Florida – I see a snake on the closet floor, and I jump back. A fraction of a second later, I realise my heart is pounding. Another fraction of a second later I realise that it is a belt that has fallen off a pair of trousers. This second, later process is more cognitive. The amygdala's other signal has gone more slowly to the frontal lobes, which evaluated the stimulus and composed a less rapid reaction. One can easily see the evolutionary advantage in having a self-preservative system that reacts very, very fast and only evaluates the threat later. It is better that I should jump back and it not be a snake than that I wait to decide if it is a snake and get bitten. Again, movement or action is crucial.

It is in this same vein that Gerrig proposes a dual system for our response to fictions and narratives. Gerrig asserts that, when we read or hear a narrative, we presume that all the information that comes our way is true until we deliberately 'unaccept' some. We process fiction (and plays and movies), he claims, by two different systems. One is 'unsystematic'. It simply perceives and *believes what it perceives*. The other system is, in Gerrig and Gilbert's term, 'systematic', and it assesses the reality of what we are sensing in terms of whether to act on it or not. This second, planning system we turn off for moments or minutes by our knowledge that what we are watching is in fact 'only a story', 'only a play', or 'only a movie'. 'Fictional information is persuasive because it is processed via some nonsystematic route.' 'Belief in fiction [that is, in the factual information represented in a fiction] is determined not by a critical analysis . . . but instead by the absence of motivation or ability to perform such an analysis' (Prentice and Gerrig 1999, 542). Responding to a work of art, we have no reason to invoke the second, slower, analytical system to compose responsive actions. Thus readers, he claims, will have to 'expend explicit effort to understand [fictions] as fictional' (Gerrig 1998 [1993], 240). With Spider-Man, the first system buys in, the second buys out a few milliseconds later (if one ends the 'transport') or an hour later after the movie lets out.

Gerrig had his subjects (Yale students) read (on a computer, sentence by sentence) a little story. At the end of the story Gerrig would ask the subject to say whether a certain sentence was true or false. One version was called the 'no suspense' version. Here is one of them:

George Washington was a famous figure after the Revolutionary War. Washington was a popular choice to lead the new country. Few people had thought that the British could be defeated. The success of the Revolutionary War was attributed largely to Washington. His friends worked to convince him to go on serving his country. Washington agreed that he had abundant experience as a leader.

The other version of the story was designed to create a little uncertainty about the outcome. In other words, this second version was designed to create suspense. Here is one of those:

Washington was a popular choice to lead the new country. Washington, however, wanted to retire after the war. The long years as general had left him tired and frail. Washington wrote that he would be unable to accept the nomination. Attention turned to John Adams as the next most qualified candidate.

Gerrig then asked the Yale students to say whether this sentence, ‘George Washington was elected first president of the United States’, was true or false.

What Gerrig found was that the response time was significantly longer for subjects who had read stories that created some suspense, some uncertainty, as to whether Washington would be our first president or not. Gerrig called this phenomenon ‘anomalous suspense’. The suspense is anomalous because the Yale students knew perfectly well that in fact George Washington was elected the first president. So why the slight hesitation? Gerrig concluded that the answer came more slowly because the suspense, the uncertainty in response to the narrative, made the subjects believe in some temporary way that maybe George Washington *didn’t* become America’s first president.

You can see the same phenomenon in children. They have heard the story of Jack and the Beanstalk a zillion times, but every time, when the giant chases Jack, they get excited – will the giant catch him? Will he escape? When I was a child, one of my favorite stories was *The Little Engine That Could*. I can distinctly remember heightening excitement and suspense as the engine neared the top of the mountain. Yet I knew all the time that this was the little engine that ‘could’ *and did*. As adults, we experience anomalous suspense when we see a movie like *Casablanca* for the umpteenth time. Will Rick put Ilsa on the plane with Laszlo? We know at one level of our minds that he will, but we still feel suspense. As Gerrig says, *you have to actively construct disbelief*.

Notice too that the narratives Gerrig used were *non-fiction*. They were factual stories about American history and pop culture and other things his Yale subjects would know. And this anomalous suspense happens in daily life. For example, a friend tells me about her nearly having a catastrophic automobile accident. I know perfectly well that the accident did not happen, for my friend is standing there before me. Yet I will feel fear and worry and suspense about the fatal possibility. Such suspense is indeed ‘anomalous’. It doesn’t make sense in the light of what we really know, but I grant what Coleridge called ‘poetic faith’ to the story, be it fiction or non-fiction. If I am transported by the narrative, I grant poetic faith to a biography as to a novel.

What Gerrig’s experiments imply is: if you subject yourself to *any* narrative, you believe it for the time you are making coherent sense of that narrative. In Spinoza’s terms, comprehension entails belief. Following a narrative brings anomalous suspense, whether the story is fiction or non-fiction. We momentarily believe with both. You have to construct disbelief actively, deliberately, and usually after the narrative is over.

Gerrig therefore disagrees with Coleridge. ‘This phrase [“willing suspension of disbelief”] is widely cited to stand for some cluster of special processes that readers are supposed to undertake when they know themselves to be experiencing fiction. If we contrast fiction and non-fiction, the implication is that there is a toggling back and forth

between suspension and nonsuspension of disbelief' (Gerrig 1998 [1993], 201–2). Gerrig rejects this toggling: we believe stories unless we make an effort to disbelieve. He speaks repeatedly of the 'construction of disbelief'.

Evidently, one problem is Coleridge's word 'willing'. Some people understand that as a deliberate, conscious decision during reading. I think, though, that, read properly, 'willing' means no more than that I am willing to pick up the book or read the poem or buy the theatre ticket. I do not think it means a conscious invoking of belief or disbelief or suspension of disbelief, which is probably impossible.

Similarly, I think the toggling is real enough provided, again, that we do not think it is deliberately 'willing'. Often, something distracts us from a narrative. The telephone rings while I am reading a novel. The person next to me in at the theater makes too much noise unwrapping a cough drop, and I am taken 'out' of the play. I lose the feeling of being 'rapt', transported and I have to make an effort to focus on the novel or play and get that state back. In that sense, I have to 'will' myself back 'into' it. That is, I refocus my attention. But that is not deliberately deciding to suspend disbelief, which is, I think, impossible.

### THE NEUROSCIENCE OF IT

Gerrig's work, however, raises a question. Why should this be? Why should we grant poetic faith to improbable narratives merely because we are hearing or reading them? Why should comprehension entail belief? Today's neuroscience tells us that the turning off of systems for planning actions in relation to the literary work also turns off our systems for testing its reality and for disbelieving.

We bring to a narrative a certain 'set'. We know, cognitively in our frontal lobes, that we cannot or will not change the art we will be sensing during the time we are sensing it. With a work of art, we would be making it into something other than the work of art we want to enjoy. Even if I am listening to someone telling me about a bomb five blocks away, *during the time I am comprehending that information*, I do not act or even plan to act. A plan to act comes later. That passive, receptive set in the frontal lobes reduces incoming information from the posterior lobes about the body and environment. We go into a kind of trance. We are 'transported' or 'entranced' or 'rapt', wholly intent upon the narrative. And this state of mind is paradoxical.

The primary business of any brain is to move its organism in the real world so as to ensure that organism's survival and reproduction. From the neurological point of view, we begin to test reality when we act or plan to act in response to a stimulus (Hobson 1995, ch. 6; Chelazzi et al. 1998). 'Perception', asserts Andy Clark, 'is itself tangled up with specific possibilities of action – so tangled up, in fact, that the job of central cognition often ceases to exist' (Clark 1997, 51). Another neuroscientist, Rodolfo Llinás, writes, 'What I must stress ... is that the brain's understanding of anything, whether factual or abstract, arises from our manipulations of the external world, by our moving within the world and thus from our sensory-derived experience of it' (Llinás 2001, 58–59). Two specialists in frontal lobe function, Robert T. Knight and Marcia Grabowecky, say, 'Reality checking involves a continual assessment of the relation between behavior and the environment'. (Knight and Grabowecky 1995). And so on.

Without movement or the impulse to act on what we are sensing (the narrative), we need not check the reality of what we might act toward, *and we don't*. If we know that we aren't going to act on a narrative, it doesn't matter whether it's real or not real. And that is what we mean by a fiction, that it doesn't matter whether it is true or not.

That is why, then, we are not concerned with whether things are true or false when we are transported by a literary work. We believe because we do not reality-test, and we do not reality-test because we are not composing an action on the stimulus. Once we do plan to act, once the experimenters ask the subjects to say whether Washington was America's first president or not, once we decide to run from the bomb we are being told about, then we reality-test. They and we take a few extra milliseconds to return to our prior, systematic system, and we bring to bear relevant-to-action knowledge (from semantic or episodic memory).

### DISINTERESTEDNESS

Action delimits the art of literature, fiction, poetry, or non-fiction. Throughout the history of aesthetics, philosophers have generally agreed that what we bring to art is a special way of attending to works of art, an 'aesthetic attitude'. They have offered many ways of describing it: aesthetic contemplation, being not personally involved, being disinterested, concentrating only on the aesthetic object, being 'distanced', viewing in a non-practical way, paying attention only to the perceived characteristics, detachment, and many others. For example, 'We are detached [from *Oedipus Rex*] only in the sense in which we know that it is a drama and not real life . . . and that what is on the other side of the footlights is a different world, to which we are not supposed to respond as we do to the practical world around us' (Hospers 1967, 1: 37).

Better than 'detachment' or 'distance', then, what makes art art is that *we agree not to be practical*. We will not act or plan to act in order to deal with what is represented in the work of art while we are enjoying it. We may cry or laugh in response to what we are reading or watching, we may turn pages or look through our opera glasses, but we don't plan to do anything to the work of art itself. I see Spider-Man grappling with Doc Ock, and I do not jump up to help the web-slinger. I watch Othello strangling Desdemona, and I do not rush to the stage to stop him. I probably do not even feel an impulse to do so. Many theorists have observed this phenomenon, but it was Kant who enlarged the idea and established 'disinterestedness' as a cardinal criterion for our appropriate response to artistic works.

Kant's idea has become a commonplace among theorists of the arts. Thus, the *Encyclopædia Britannica*: 'Can we then single out a faculty, an attitude, a mode of judgment, or a form of experience that is distinctively aesthetic?' 'Taking their cue from Kant, many philosophers have defended the idea of an aesthetic attitude as one divorced from practical concerns, a kind of "distancing", or standing back, as it were, from ordinary involvement'. Were we involved ordinarily, we would at least think about trying to save Desdemona. Kant enlarged the idea, though, beyond immediate impulses to act. 'Kant . . . described the recipient of aesthetic experience not as distanced but as disinterested, meaning that the recipient does not treat the object of enjoyment either as a vehicle for curiosity or as a means to an end. He contemplates the object as it is in itself and "apart from all interest"' ('Aesthetics'. *Encyclopædia Britannica Online*. 2003).



Kant's word was *Interesselosigkeit*, lack of interest. 'Interest' in this context means having an aim or purpose, like having a business 'interest' in what is happening or an investment in one's critical opinion. (*Disinterested*, one must sometimes remind students, does not equal *uninterested*.) Experiencing aesthetically, we do not try to save Desdemona or Spider-Man. Neither do we desire to possess the work of art or to take up any particular attitude or purpose toward it. We are not studying it or planning a critical article or observing our own admiration. Our 'delight', in Kant's words 'is not based on any inclination of the subject (or any other deliberate interest)'. We feel 'completely free in respect to the liking which [we accord] to the object' (Kant 1790, Part I, bk. 1.2). As psychologist Victor Nell notes, on the basis of his experiments with reading for pleasure, 'Indeed, the moment evaluative demands intrude, as in the case of an absorbed reader suddenly told that he or she is to produce a critical review of the book, ludic reading [reading for pleasure] . . . at once becomes work reading: the response demand triggers a perceived effortfulness' (Nell 1988, 75). This is not to say that the act of developing a critical viewpoint or even imagining a critical article as you read a novel does not give pleasure. It does. I should know. But that pleasure differs from simply enjoying a work of art for its own sake and does not entail 'poetic faith'.

According to Kant, we enjoy the free play of imagination and understanding in relation to the object, and the harmony between these usually conflicting faculties leads to our pleasure. *Kant thus grounds aesthetic pleasure, not in the work of art as such, but in the observer's mental state, namely, our not acting or planning to act in relation to it.*

### THE ISSUE OF CONTROL

Claims of the 'power' of literature or cinema or drama oversimplify and misstate the case. The issue is control as established by the form of the work. We set our most basic relation to a literary work even before the curtain rises, even before we turn the first page or read the first line. Sometimes we are in control, sometimes the work is. We can see the difference in the way we respond to a movie when we see it in a theater as opposed to the way we see it, playing a DVD on the television screen at home. Film critic Anthony Lane describes that difference. Writing about films that have improbabilities, he observes, 'Watch [them] on DVD and you find yourself scoffing at the unlikely curves and switches in the plot, whereas the same setups, viewed in the dreamy imprisonment of a movie theatre, feel like the machinery of fate' (Lane 2008, 88).

At home, we are in control. We can act. We can stop the DVD, get up and get a glass of wine, and resume where we left off. In a theater, the movie or play is in control. It continues regardless of what we do. Listening to a poet read, the poet is in control. But reading a book of poems, we are boss. We can put the book down any time we feel like it. Victor Nell speaks of the 'sovereignty' of the reader over the book. It is this fundamental difference in control that leads to the wholly different 'feel' of television from movies, even when the television program simply shows a movie. We can switch channels with television, not with a movie or a play.

There is, I believe, an interesting exception: literature in which we have to act on the work. With the advent of computers came hypertext or 'interactive' fiction in which the reader must continually choose one path among many possible through a long-ish

narrative in prose or verse. Because the reader constantly acts on the work, it seems probable that the experience of being transported and poetic faith become impossible (Niesz and Holland 1984). The world cannot evaporate nor can we feel transported into the world of the story. I suspect this is why hypertext has never caught on with the reading public. We want that trance-like experience of poetic faith. Perhaps the fans of hypertext will contradict me. If so, hypertext offers a testable hypothesis. Would the change in response time that Gerrig found with his narratives also occur with hypertext? If I am correct, it would not. And perhaps it would not with DVDs, as Anthony Lane's experience suggests.

## IN SHORT

To sum up, we can understand the phenomenon Coleridge described as a 'willing suspension of disbelief' or 'poetic faith' that allows us to enjoy the unrealities of art or literature. It involves a combination of psychological, neurological, and aesthetic moves.

Aesthetically, we give up control to art. We become 'disinterested' in Kant's sense. We do not plan to act in relation to the literary work. Neurologically, because we do not plan to act on what we are paying attention to, our brain's reality-testing systems shut down. We don't doubt. Psychologically, mere comprehending entails belief. We experience 'anomalous suspense', believing, for the nonce, things that we know perfectly well are not true and could not be true. In short, transported by a work of art, we can believe even in Spider-Man. And, believing in Spider-Man, we are transported even as he is (so to speak).

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