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# Neuroscience and the Social Powers of Narrative: How Stories Configure Our Brains

Paul B. Armstrong

## I. Introduction

Can narratives promote social justice? The answer to that question depends, among other things, on the powers of narrative to engage and reconfigure the habitual patterns of embodied cognition that govern our interactions with the world. The ability to tell and follow a story requires cognitive capacities that are basic to the neurobiology of mental functioning, and so it would stand to reason that our experiences with stories would draw on and re-shape patterns of interaction that extend beyond the immediate experience of reading or listening to a narrative. Stories are important instruments for configuring our cognitive and social worlds.

Exactly how they do this, however, and what powers stories have to inculcate positive moral attitudes and pro-social behaviors are not simple and straightforward matters. Philosophers and cognitive scientists often make broad claims about how reading literature can enhance our ability to understand and empathize with others, pronouncements that may seem naive and overly optimistic to literary critics and theorists who know that literary works can have a range of disparate, even contradictory effects on readers that are not easily reduced to formulaic summary.[1] Writers and readers activate their cognitive capacities for imagining other worlds

[1] For example, see Suzanne Keen's critique of Martha Nussbaum's claim that reading novels may create "better world citizens capable of extending love and compassion to unknown others" and of Stephen Pinker's assertion that storytelling is a "moral technology" that "has made the human species 'nicer'" by extending "the 'moral circle' to include 'other clans, other tribes, and other races'" (xviii-xix). "Well, it depends," Keen observes, noting many "examples of stigmatized characters who are held up for ridicule and humiliation, to the delight of protagonists and implied readers alike" (xix). Keen, one of the most astute theorists of narrative empathy, argues that "simple accounts of the utility of novel reading . . . should be replaced by more nuanced study of the consequences of experiencing aesthetic emotions" (xxv). That is one of the goals of this essay.

when they exchange stories, but there is much evidence in the literary and academic worlds that this does not necessarily make them more caring or less aggressive and self-involved. Neuroscientific research on the so-called "social brain" won't change this, but it can help to explain the powers as well as the limits of stories to promote pro-social behavior, including empathy and mutually beneficial collaboration. What we need are not overly grand, simplistic assertions about the powers of narrative to facilitate empathy and social understanding but, rather, subtle and nuanced analyses of how the contradictory effects of stories relate to the complex, often paradoxical characteristics of embodied cognition.

Specious, overly simplistic claims about the powers of literature to improve social cognition abound in the psychological literature. The most notorious instance is the much-publicized study by David Comer Kidd and Emanuele Castano that purported to find that "reading literary fiction improves theory of mind"—a claim that led the *New York Times* to recommend reading "a little Chekhov" to "get ready for a blind date or a job interview" (Belluck). This claim has already become "accepted as conventional wisdom," as the authors of a less-publicized multi-institutional replication study note (Panero e47). A recent survey of the neurobiological bases of morality concludes, for example, with a ringing endorsement of this work: "Research indeed demonstrates that reading literary fiction can improve the capacity to identify and understand others' subjective affective and cognitive mental states (Kidd and Castano, 2013)" (Decety and Cowell 295). Whether this is true and, if so, how fiction does this are not at all clear, however. For one thing, the replication study failed to verify Kidd and Castano's results: "In short, we found no support for any short-term causal effects of reading literary fiction on theory of mind" (e52). Not surprisingly, this finding did not make the *Times*. In a similar vein, Raymond Mar and Keith Oatley have published several much-cited studies claiming that "fiction is the simulation of social worlds" and that, "similar to people who improve their flying skills in a flight simulator, those who read fiction might improve their social skills" (Oatley 619). Mar even asserts, for example, that "bookworms" who are "frequent fiction readers" may perform better on various "empathy / social-acumen measures" than "nerds" who prefer non-fiction (694). Widely respected cognitive scientist of reading Richard Gerrig faults these studies for failing to explain in any detail how "simulation" works, however, and he calls for more specific analyses of the particular "processes of learning and memory" engaged by "readers' social cognition" (1). The authors of

the Kidd-Castano replication study similarly argue that "we should move from asking whether reading fiction increases theory-of-mind skills to asking under what circumstances reading may do this, and how, and for whom" (Panero e52). Analyzing in detail the neuroscientific and phenomenological processes entailed in telling and following stories, as I attempt to do here, is one way of meeting this need for a more specific, detailed account of the social powers (and limits) of narrative.

## II. Balancing Consonance and Dissonance

Stories help the brain negotiate the never-ending conflict between its need for pattern, synthesis, and constancy and its need for flexibility, adaptability, and openness to change. The brain's remarkable, paradoxical ability to play in a to-and-fro manner between these competing imperatives is a consequence of its decentered organization as a network of reciprocal top-down, bottom-up connections among its interacting parts. Narrative theorist Seymour Chatman attributes plot-formation to "the disposition of our minds to hook things together"; as he notes, "our minds inveterately seek structure" (47, 45). This is, indeed, a basic axiom of contemporary neuroscience. Against the cognitive need for consistency, however, the psychologist William James describes the brain as "an organ whose natural state is one of unstable equilibrium," constantly fluctuating in ways that enable its "possessor to adapt his conduct to the minutest alterations in the environing circumstances" (1:139). The brain knows the world by forming and dissolving assemblies of neurons, establishing the patterns that through repeated firing become our habitual ways of interacting with the environment, even as ongoing fluctuations in these syntheses combat their tendency to rigidify and promote the possibility of new cortical connections. The brain's ceaseless balancing act between the formation and dissolution of patterns makes possible the exploratory play between past equilibria and the indeterminacies of the future that is essential for successful mental functioning and the survival of our species.

Stories contribute to this balancing act by playing with consonance and dissonance. Borrowing Frank Kermode's well-known terms, Paul Ricoeur describes emplotment as "concordant discordance"—"a synthesis of the heterogeneous" that configures parts into a whole by transforming the "diversity of events or incidents" into a coherent story (*Time* 65-66). According to Ricoeur, the act of "composing plots" converts "the existen-

tial burden of discordance" into narrative syntheses that give meaning to life's imbalances by constructing patterns of action (33, 31). Even in the simplest narratives that approach what Gérard Genette calls the hypothetical "zero degree" (35-36) of difference between the order of events in the telling and their order in the told, the conjunctions that join together the elements of the plot are invariably disrupted by twists and turns on the way to resolution. What Genette calls temporal "anachronies" (flash-forwards and flash-backs, for example, that disrupt the temporal correspondence between the telling and the told) further play with the competing impulses toward consonance and dissonance that are basic to narrative (see 33-85). The imbalances between pattern-formation and dissolution in the brain make possible this narrative interaction between concord and discord, even as the construction and disruption of patterns in the stories we tell each other help the brain negotiate the conflicting imperatives of order and flexibility. The neuroscience of these interactions is part of the explanation of how stories give shape to our lives even as our lives give rise to stories.

Stories can draw on experience, transform it into plots, and then reshape the lives of listeners and readers because different processes of figuration traverse the circuit of interactions and exchanges that constitute narrative activity. First, the neural underpinnings of narration start with the peculiarly decentered temporality of cognitive processes across the brain and the body—disjunctions in the timing of intra-cortical and brain-body interactions that not only make possible but also actually require the kind of retrospective and prospective pattern-formation entailed in the narrative ordering of beginnings, middles, and ends. Next, the strangely pervasive involvement of processes of motor cognition not only in the understanding of action and gesture but also in other modalities of perception suggests why the work of creating plots that simulate structures of action can have such a profound effect on our patterns of configuring the world in areas that might seem remote from problems of motor control. Finally, if stories can promote empathy and otherwise facilitate the co-intentionality required for the collaborative activity unique to our species, the power and the limits of their capacity to transform social life ultimately depend on embodied processes of doubling self and other through mirroring, simulation, and identification, processes whose constraints and imperfections are reflected in the strengths and weaknesses of narratives as ethical and political instruments. In each of these areas, narratives configure lived experience by invoking brain-based processes of pattern-for-

mation that are fundamental to the neurobiology of mental functioning.[2]

## III. "Doubling" and Embodied Intersubjectivity

Our intuitive, bodily-based ability to understand the actions of other people is fundamental to social relations, including the relation between story-teller, story, and audience, and it undergirds the circuit between the representation of a configured action emplotted in a narrative and the reader's or listener's activity of following the story as we assimilate its patterns into the figures that shape our worlds. In an illuminating analysis of the "kinematics" of narrative, literary theorist Guillemette Bolens distinguishes between "kinesic intelligence" and "kinesthetic sensations" —"our human capacity to discern and interpret body movements" as opposed to the "motor sensations" we may have of our own actions, whether voluntary or involuntary: "kinesthetic sensations cannot be directly shared, whereas kinesic information may be communicated. I cannot feel the kinesthetic sensations in another person's arm. Yet I may infer his kinesthetic sensations on the basis of the kinesic signals I perceive in his movements. In an act of kinesthetic empathy, I may internally simulate what these inferred sensations possibly feel like via my own kinesthetic memory and knowledge" (1-3). The ability to understand the actions represented in a story (what is told) as well as to follow the movements of the narration (the telling) requires both kinds of cognitive competence—the hermeneutic capacity to configure signals into meaningful patterns (kinesic intelligence) and the intuitive sense of how the structures emplotting the actions and the forms deployed in the narration fit with my own unreflective, habitual modes of figuring the world (embodied in my kinesthetic sensations).

The kinesic intelligence and kinesthetic empathy that we use to understand stories entail a kind of "doubling" between self and other that, according to Maurice Merleau-Ponty, makes the alter ego fundamentally paradoxical. As Merleau-Ponty explains, "the social is already there when we come to know or judge it" because the intersubjectivity of experience is primordially given with our perception of a common world—and yet,

[2] In what follows I focus on the third of these topics—that is, the social powers of narrative and their neurobiological bases. For a general exploration of the neurobiology of narrative, see my book *How Literature Plays with the Brain* and my forthcoming essay "Neuroscience, Narrative, and Narratology."

he continues, "there is . . . a solipsism rooted in living experience and quite insurmountable" because I am destined never to experience the presence of another person to herself (362, 358). The "kinesthetic empathy" Bolens describes is paradoxically both intersubjective and solipsistic, for example, inasmuch as I "internally simulate" what the other must be feeling "as if" her sensations were mine which, of course, they are not (otherwise I wouldn't need to "infer" them on the basis of my own). Following a story is similarly a paradoxical process, with both intersubjective and solipsistic dimensions, whereby my own resources for configuring the world are put to work to make sense of another, fictive, narrated world that may seem both familiar and strange and that may either reinforce or disrupt my sense of the world's patterns because its figurations both are and are not analogous to mine. Reading is an *as-relation* whereby I think the thoughts of someone else, but think them *as if* they were my own—a *doubling* of the "real me" I bring to the text and the "alien me" I produce by lending it my powers of consciousness (see Iser 152-59). This doubling overcomes the opposition between self and other (giving me intersubjective access to the inwardness of another's experience that is impossible in everyday life) even as it reinscribes it (this other world is fascinating, after all, because it is not my own).

Neuroscience has proposed three ways of explaining the paradox of the alter ego, and the emerging consensus is that all three probably work in combination in the brain's complicated, messy interactions with the social world (see Gallagher and Zahavi 191-218). The first approach, known as "theory of mind" (ToM) or "theory theory" (TT), focuses on our capacity to attribute mental states to others—to engage in "mind reading" through which we theorize about the beliefs, desires, and intentions of others that we recognize may differ from our own. The second approach, "simulation theory" (ST), argues that we do not need "theories" to understand the simple, everyday behavior of others but that we instead automatically run "simulation routines" that put ourselves in their shoes by using our own thoughts and feelings as a model for what they must be experiencing. Critics of ST claim it begs the question of how the simulator senses what is going on in the other person, but an answer may be provided by "mirror neurons" that were first discovered in the motor cortex of the macaque monkey. These neurons fired not only when the animal performed a specific action but also when it observed the same action by another monkey or an experimenter—not only when the monkey grasped a piece of food, for example, but also when the scientist did the same thing. Although the

"mirror neuron" research has been controversial and is still somewhat unsettled, experiments have conclusively shown that mirroring processes are evident not only in the motor cortex but also across the brain, in regions associated (for example) with emotion, pain, and disgust.[3] In different ways, all three of these theories—"theory of mind," "simulation theory," and "mirror neurons"—are attempts to explain the acts of doubling "me" and "not-me" that human beings routinely, automatically engage in as they negotiate their way through a paradoxically intersubjective and solipsistic world.

These processes are all involved in the activity of following a story, and narratives differ from one another as they draw more or less and in various, distinctive ways on each of these modes of doubling self and other. Mind-reading skills emphasized by "theory theory" of the sort necessary to pass "false belief" tests may be invoked by stories that depict characters who act in a surprising or suspicious manner and whose motives and desires we may speculate about, or that are told by narrators whose reliability we may have reason to distrust, so that we feel compelled to oppose their versions of the story with counter-narratives we invent. Other narratives that encourage immersion in the action of the story may set in motion the automatic, subliminal "simulation routines" of ST as we involve ourselves in the illusions we construct and get carried away by our vicarious participation in the characters' dramas, and the embodied, emotional reactions that these involvements may provoke (whether the sympathy of pity, the contagious excitement of represented conflict, or the fear of suspenseful threats) may set off embodied mirroring resonances of the kind identified in the "mirror neuron" experiments.

Given the large body of experimental evidence about the real impact of imagined action on bodily performance, it would be surprising if these virtual experiences of doubling self and other did not have consequences for the social abilities of readers. As neuroscientist Marc Jeannerod points out, for example, many different experiments have shown that "imagining a movement relies on the same mechanisms as actually performing it," and that is because "imagined actions are indeed actions in their own right: they involve a kinematic content, they activate motor areas almost to the same extent as executed actions, they involve the autonomic system as if a real action was under way" (28, 39). Imagining an action stimu-

[3] For an analysis of the "mirror neuron" controversy, see my *Brain* 131-74. See Iacoboni and Rizzolatti on the evidence in favor of the theory and Hickok on the reasons for skepticism.

lates both the brain and the body in a manner very similar to real action, even down to the level of muscular response. Although imagining an action is not by itself sufficient to master it, many studies have shown that "mental training" by athletes and musicians can improve actual motor performance, enhancing speed, accuracy, consistency, and even "strength of muscular contraction" (41). These findings are consistent with brain-imaging studies that have disclosed that "learning a motor task by using motor imagery induces a pattern of dynamic changes in cortical activation similar to that occurring during physical practice" (41). These results have had important consequences not only for athletic training and observational learning but also for the rehabilitation of stroke patients suffering from motor impairments. Because of the physiological links between real and imagined movement, mental rehearsal of an action can have demonstrable effects on the ability of athletes, musicians, or patients with lesions to actually perform the action.

By the same token, reading or listening to a narrative that imitates an action would be likely to have practical effects on the brains and bodies of the recipients and on their capacities for acting in the world. If the motor cortex and even muscle tissue can be excited by mental rehearsal of an action, that should also be true of linguistic simulations of actions, and there is experimental evidence that this is so. Cognitive scientist Lawrence Barsalou reports, for example, that, "when reading about a sport, such as hockey, experts produce motor simulations absent in novices" (628). This is consistent with an fMRI study by Nicole Speer that showed correlations between six different kinds of changes represented in stories and the brain regions activated by "analogous activities in the real world" (changes in the location, cause, goal, character, timing, or the object involved in an action). "Different brain regions track different aspects of a story," Speer concludes, "such as a character's physical location or current goals," and "some of these regions mirror those involved when people perform, imagine, or observe similar real-world activities" (990). There is also evidence that actions and sensations figured in metaphorical language evoke embodied, cortical responses correlated to literal, real-world perceptual experiences (see Lakoff and Johnson). A brain-imaging study conducted by Krish Sathian's group demonstrated that areas of the brain "previously shown to be texture-selective during haptic perception" were also "activated when processing textural metaphors" from the same sensory domains. Even very familiar, unsurprising metaphors like "a rough day" or "a slimy person" that "have negative

connotations because they refer to attributes that may be particularly unpleasant to touch" evoked responses in the somatosensory cortex associated with these bodily experiences (Lacey 416-18). These and many other similar studies point to some of the neurobiological processes set in motion by the feigned figuration of action and sensation in narrative, brain-body interactions in response to imitation that could have the power to reinforce or reshape the recipient's embodied, configured experience of the world.

## IV. Identification and the Ambiguities of Empathy

The analogy behind cognitive critic Lisa Zunshine's oft-noted claim that reading stories provides a "workout" for our theory-of-mind skills (see 35-37) is misleading, however. What these consequences might be is less straightforward than the improvements in skill caused by imagined physical training because the processes of identification entailed in narrative understanding are acts of *doubling* that are inherently unpredictable and open to a wide range of variation. This is why, for example, the moral and social effects of empathy are notoriously ambiguous, as the scientific literature on the topic amply attests. It is widely acknowledged, for example, that the fellow-feeling of empathy does not necessarily produce ethically beneficial, pro-social sympathy and compassion. Indeed, as neuroscientists Grit Hein and Tania Singer point out, "empathy can have a dark side" because it can be deployed for Machiavellian purposes "to find the weakest spot of a person to make her or him suffer" (154). Or, as empathy researchers Jean Decety and Claus Lamm point out, feeling another's emotional state may cause "personal distress" and result in aversion from the sufferer rather than sympathetic concern and involvement. Because identification is an act of doubling, its consequences are not foreordained, whether in literature or in life. Empathy may promote pro-social or anti-social behavior depending on how the *as-relation* of identification structures the relation between me and not-me.

The doubleness of empathic understanding is evident in the classic definition of identification as *Einfühlung*, in which one "feels oneself into" the experience of another. Theodor Lipps's oft-cited example is the anxiety a spectator may feel while watching a circus acrobat on a high wire, where the thrill of the performance is based on the spectator's vicarious sense of the tightrope walker's danger. What Antonio Damasio calls the

"as-if body loop" (155-64), whereby the brain simulates body states that are not caused by external stimuli, may indeed be set in motion by such a participatory experience. But such an "as if" recreation of another's observed behavior may not produce the same kinesethetic sensations she or he is experiencing. In this case, the cool, calm, and collected professional performer probably does not experience the same fear, anxiety, and excitement as the spectator—otherwise he might become paralyzed and fall—even as the spectator's ability to enjoy the act depends on his or her not being in any real danger. Similarly, when we read about a character's fictionally represented experiences or identify with a narrator's point of view, our self does not simply disappear in a merger of ego and alter ego. Rather, setting in motion the paradoxical doubleness that both joins and separates self and other, readers exercise their own powers of configurative comprehension so that another world, based on perhaps different pattern-making structures, can emerge. The result, as Wolfgang Iser points out, is a paradoxical duplication of subjectivities, an interplay of the "alien me" whose thought-patterns I recreate and inhabit, and the "real, virtual me" whose configurative powers of understanding cause this other world to take shape and, in the process, can find themselves transfigured and transformed (see 155-59). These unpredictable, dynamic, open-ended interactions can only take place because the act of following stories entails doublings of various kinds and is not a static correspondence between or a homogeneous merger of self and other.

The bodily feelings generated by following a story and vicariously, empathically participating in the actions it represents—whether Aristotle's classic examples of pity and fear or any other of the widely various emotional responses stories can evoke—are consequently double and split. They are "as if" emotions that both are and are not the bodily, kinesthetic sensations we would have in an original experience unmediated by the interface of narrative. This doubling helps to explain, for example, why Dostoevsky's novel *Crime and Punishment* is so thrilling and disturbing. "Raskolnikov's waiting is *my* waiting which I lend to him," Jean-Paul Sartre observes; "his hatred of the police magistrate who questions him is my hatred which has been solicited and wheedled out of me by signs" (39; original emphasis). Our identification with the criminal is a peculiar doubling whereby I experience his anger and anxiety *as if* these emotions were my own because in a sense they are, even as they are also *not* mine because they are Raskolnikov's (and I am not an axe-murderer). They are *my* emotions that I project onto him and feel *with* him, even though I

never cease to be me, the reader, who is *not* the character I both identify with and observe (and the ability to do both is a consequence of the doubling of identification through which boundaries are simultaneously maintained and crossed). It is thrilling to identify with Raskolnikov because we experience the anxieties of an axe-murderer—and disturbing, because this crosses boundaries between my everyday world and another, bizarre, and frightening world—but only "as if" that were happening, so that we can maintain the detachment of an observer even as we experience the emotions of a participant.

The "as if" quality of embodied experiences of identification has been widely documented in experimental studies of an observer's vicarious participation in another's pain or disgust. Oft-cited experiments by William Hutchison, Tania Singer, and Yawei Cheng, among others, have shown that neurons in the insula and the anterior cingulate cortex (ACC) fire not only in response to a pinprick or an electric shock but also at the sight of someone else receiving the same painful stimulus—or even to a report that someone else would be poked or shocked. But the responses of observers are also sensitive to individual differences—more intense, for example, if a loved one is receiving the stimulus, or less intense if the witness is someone (like a nurse or an acupuncturist) conditioned to view pain and regard it as potentially beneficial—and these variations suggest in turn that the "as-if body loop" set in motion by the brain's simulation routines are a doubling of self and other, not a simple, one-to-one match. Similarly, well-known experiments by Bruno Wicker and his group have shown that the anterior insula responds not only during the experience of disgust prompted by an unpleasant smell but also during the observation of someone else's disgusted facial expression. But observing another person's disgust is not likely to result in actual vomiting because the experience both is and is not the same bodily sensation as the feeling it duplicates. Feeling with a character depicted in a story or adopting the attitudes suggested by a narrator would similarly entail a doubling process of simulation and inference "as if" we were experiencing embodied, kinesthetically original sensations. Our re-enactment of these sensations in response to stories makes narrative identifications possible, but these simulations both are and are not like the experiences whose underlying biological mechanisms they draw on and (partially) duplicate.

This doubleness makes the consequences of our emotional responses to narrative more variable and unpredictable than Aristotle's theory of catharsis suggests. The doubling of the "like" and the "not-like" in "as if"

simulations helps to explain the oft-observed paradox, for example, that emotions such as fear and terror that would otherwise cause discomfort or pain can instead give rise to pleasure in aesthetic reenactments. Our identification with the tragic hero both is and is not the same as his or her experience, and this makes all the difference. But this doubling also need not result in a purgation of the emotions it simulates because mirroring another's sensations can instead stimulate and spread them contagiously. As psychologist Paul Bloom observes, for example, experimental evidence shows that "watching a violent movie doesn't put one in a relaxed or pacifistic state of mind—it arouses the viewer" (192). Neuroscientist Marco Iacoboni similarly worries that "mirror neurons in our brain produce automatic imitative influences of which we are often unaware," which in turn may explain why "exposure to media violence has a strong effect on imitative violence" (209, 206). Representations of violence do not immediately and necessarily provoke aggressive behavior in the viewer, however, because responses depend on several factors that influence what psychologists call "observational learning"—for example, whether the behavior is rewarded and reinforced, whether the model is viewed positively and seen as similar to the observer, or whether the behavior is within the viewer's spectrum of abilities (see Gerrig and Zimbardo 199-200).

Aggression is not an automatic response to represented violence because the doubling of "me" and "not-me" in empathic identification is an *as-relation* that can be variously configured and can have different outcomes depending on how the negation in the interplay of "like" and "not-like" is staged and received. The patterns of emplotment that configure the conflictual relations between persons in a dramatized action are widely variable—some representing aggressive behavior as heroic, for example, and others foregrounding the suffering of its victims—and these different plots in turn will be transfigured and transformed in various ways according to the interpretive dispositions of the respondent, who may be thrilled or repulsed and will construct his or her own reading of the story accordingly (responding with sympathy or reacting with horror, or both in some unique combination). The interactions between these patterns of representation and response may result in the transformation of renderings of aggression and conflict into aesthetic pleasure, moral repulsion, or imitative violence depending on how the "as" is configured in the narrative and on how it is refigured in the listener's or reader's response. None of this is predetermined or foreordained.

## V. The Social Consequences of "Doubling"

The doubling of self and other in the exchange of stories can consequently have a variety of beneficial or potentially noxious social consequences. The duplication of subjectivities in the exchange of stories is a fundamentally collaborative transaction that can promote the "shared intentionality" that Michael Tomasello and other neurobiologically oriented cultural anthropologists identify as a unique human ability that other primates seem to lack. What Tomasello calls "'we' intentionality" is the capacity for "participating in collaborative activities involving shared goals and socially coordinated action plans (joint intentions)" (676). The fundamental "skills of cultural cognition" made possible by shared intentionality begin with parent-infant "proto-conversations" that involve "turn-taking" and "exchange of emotions"—activities also entailed, of course, in telling and following stories—and such collaborative interactions culminate in what is known as the "ratchet effect" of cumulative cultural evolution (681, 675).

This ability to engage in coordinated activity is analogous to what neuroscientists of music observe in the predisposition of infants "to attend to the melodic contour and rhythmic patterning of sound sequences" and their attunement "to consonant patterns, melodic as well as harmonic, and to metric rhythms" (Trehub 13-14). The back-and-forth interaction of telling and following the configured patterns of action in a narrative is similar to how, according to cognitive scientist Ian Cross, music "enables the sharing of patterned time with others and facilitates harmonicity of affective state and interaction"—a "communal experience of affect elicited by moving together rhythmically in music and dance" that, he argues, "could have enhanced cooperative survival strategies for early humans, for example, in hunting or in inter-group conflict" (48, 50). The coordination of action across subjectivities in the exchange of stories—emplotted patterns of actions reconfigured in the listener's patterns of reception—would no doubt similarly enhance the "'we'-intentionality" that makes culturally productive collaboration possible.

The comparison to music is instructive, however, because rhythmically coordinated action beneath conscious awareness can be both enabling and disabling. The sensation of boundaries dissolving in experiences of rhythmic interaction and harmonic unification—what Nietzsche famously attributed to the Dionysian powers of music to overwhelm Apollonian line and form—may miraculously, even sublimely transport us outside of

ourselves, but it can also result in well-documented contagion effects (the shared "thrills" of an audience response at a concert, for example, or the collective enthusiasm of a crowd at a sports event or a political rally) that disable cognitive capacities for criticism and evaluation (see Garrels, Lawtoo). Although perhaps less sweepingly powerful, the experience of being carried away by a narrative may similarly transport the listener and seem to erase boundaries between worlds. If not as intoxicating as the Dionysian abandon that Nietzsche describes, such an erasure of self-other differences may facilitate the inculcation of patterns of feeling and perceiving and have a more powerful impact on habitual pattern-formation than cooler, less absorbing, less transportive exchanges of signs and information.

For better or worse (and it can be both), the power of stories to reshape or reinforce the listener's unreflective patterns of configuring the world may increase to the extent that the difference between self and other in the "as" of empathic identification is reduced or erased. The ideological workings of narrative—its ability to inculcate, perpetuate, and naturalize embodied habits of cognition and emotion—are optimized as the "not" in the doubling of "real me" and "alien-me" disappears. If stories ask us to suspend disbelief to immerse ourselves in the illusion they offer, this invitation may be a temptation to the dissolution of boundaries that the demystifying suspicions of ideology-critique rightly resist in order to shake the hold on us of habits of thinking and feeling whose power we may not recognize because they are so deeply ingrained, familiarized, and naturalized. The capacity of stories to facilitate beneficial social collaboration and to habitualize ideological mystification are two sides of the some coin.

## VI. Stories and Distributed Cognition

These complications call for important caveats to the oft-heard claim that a culture's narratives constitute a valuable source of collective knowledge and social cohesion. Ricoeur argues, for example, that stories offer "narrative intelligence," providing "practical wisdom" different from "the theoretical use of reason" in philosophy or science ("Life" 428), a cultural reservoir of implicit ways of understanding that Jerome Bruner identifies as a "major link between our own sense of self and our sense of others in the social world around us" (69). These arguments have

recently been reformulated in the terminology of "distributed cognition" based on Andy Clark's influential notion of the "extended mind." Surveying the various tools and *affordances* (Gibson's well-known term) provided by the environment that extend our cognitive capacities, Clark observes that a "linguistic surround envelops us from birth"—a "sea of words . . . and external symbols [that] are thus paramount among the cognitive vortices which help constitute human thought" (226). These include, of course, the stories we find circulating around us. Cognitive narrative theorist David Herman consequently claims that "narrative's capacity to distribute intelligence—its ability to disseminate knowledge about or ways of engaging with the world—makes it . . . a key instrument of mind," with a culture's repository of stories constituting "a society of mind" through the "suprapersonal systems for sense-making" they offer (162, 192).

Cognition is not limited to what happens inside the skull, then, but this does not mean (as some advocates of distributed cognition seem to think) that what occurs there is unimportant. Clark himself acknowledges, for example, that "the brain (or brain and body) comprises a package of basic, portable, cognitive resources that is of interest in its own right" (224). What the notion of "distributed cognition" can do, rather, is to help clarify the dynamics of the transaction between stories and the embodied cognitive processes of their recipients, interactions that are in some respects similar to but in others importantly different from our involvements with other kinds of external resources that extend our minds into the world.

Cognition occurs, according to Clark, whenever "the human organism is linked with an external entity in a two-way interaction, creating a coupled system" between the brain and its extensions in which "all the components . . . play an active causal role" and "jointly govern behavior" (222). Like Clark's examples of a blind man's stick or a notebook with formulas or directions a user may consult, a culture's stories may provide navigational equipment or a set of tools that increase our individual mind's capacities to negotiate its way through the world. Like the resources for problem-solving afforded by features of the environment, the preformed patterns we find already circulating in our culture's stories offer readily available resources for thinking about commonly encountered situations that we do not have to invent from scratch. As participants in "two-way interactions" in a "coupled system," however, these extensions of the mind may not leave the user unchanged. The acquisition of

language, for example, has powerfully and profoundly transformed the brain. By the same token, just as we need to learn how to use a tool or adapt our practices to the environment's affordances, so stories can only extend our minds if we let ourselves be shaped by them. We not only need to learn how to follow stories, acquiring competence in recognizing and responding to the patterns they deploy; these ways of configuring narratives will only have cognitive power in other realms of our lives if they reshape our brain- and body-based habits of figuring the world.

This is not a linear or one-way process. Even learning to follow the instructions for using a particular tool or device can transform not only the user but also the instrument, whether through applications of its features to problems for which it may not have been initially intended or through discoveries that lead to improvements or alterations in its design. As cognitive literary critic Terence Cave observes, "affordances are by definition open-ended, since someone or something may always come up with a new use for the most unlikely object" (49). As Cave points out, the responses made possible by what he calls "literary affordances" are both constrained and "underspecified," inviting and enabling particular uses but also leaving open unpredictable improvisations that can transform both the instrument and its users (see 51-62). Once again these interactions can take a variety of shapes depending on both the affordance and the respondent and on what happens in their encounter.

To follow a story is to engage in a two-way, back-and-forth interaction between the configured patterns of action emplotted in the narrative and the figures through which the recipient experiences the push and pull of the world. The to-and-fro of this transaction is like the playing of a game that can be so absorbing that it may take over and submerge our sense of self in the communal operation of the exchange (offering the pleasure of immersion in a story or reinforcing the ideological power of customary cognitive patterns). Or the reciprocity between story and recipient can open up a space between them for innovative interactions neither partner alone controls but that may transform both—resulting in new interpretations of the narrative, new ways of configuring its elements, new possibilities of pattern-formation that break the recipient's past habits and reshape his or her world. Stories get reshaped through their transmission as they are refigured in their reception in ways that may then get passed on in their subsequent re-telling and re-hearing. This circuit in turn can be transformative for the audience—or, again, can inculcate and reinforce existing patterns.

This circuit is not unique to narratives. Skillful use of even a simple tool like a hammer can be such an absorbing experience that the boundary between worker, instrument, and task becomes blurred in the job at hand, and an instrument is susceptible to a wide range of unpredictable, transformative applications (a hammer can be used for building a house or committing murder, with unforeseeably ramifying consequences in both cases). There are differences here that matter, however. Stories are equipment for navigating the world and solving problems, but they are not entirely defined by their instrumental dimension. The "as if" of aesthetic experience is potentially more playful and open-ended than the use of tools for particular ends, even if those ends can lead to other unforeseeable consequences.

## VII. Conclusion

The transactions through which stories are received and transformed in the lives of recipients are to-and-fro interactions whose dynamics may become more open-ended, playful, and unpredictable to the extent that the narratives serve non-instrumental purposes and can dwell in the realm of the "as if"—what Ricoeur calls the "split reference" of fictions that operate with a double logic of "it was so and it was not" (*Metaphor* 265-305). If the to-and-fro of play between telling and following stories mobilizes the brain's habitual sense-making patterns and sets these against its need to test, revise, and change its customary ways of configuring the world, then the "as if" of the aesthetic dimension opens up more room for experimentation, flexibility, and play than may be available in the instrumental use of patterns for problem-solving (although here too the brain needs to be open to adjustments and realignments in its schemata when anomalies don't fit the figures it typically deploys). Paradoxically, perhaps, the pragmatic usefulness of stories for keeping our cognitive processes from congealing into rigid habitual patterns—for holding open their capacity to be reshaped and re-formed—may be enhanced by the non-instrumental play of the aesthetic. Exchanging stories for their own sake is cognitively useful, then, especially to the extent that the play of configuration and refiguration is able to loosen the habitual, ideological hold of any particular set of narrative patterns on our individual and social minds.

Neuroscience cannot predict what the social consequences of narrative

will be. The variabilities introduced by the "as if" of narrative representation and the "as" of doubling in reading are too many and too uncontrollable to permit simple, sweeping generalizations about the social powers of narrative. Anyone who claims that stories make us better people by enhancing empathy and theory of mind or that narratives inherently promote social progress should be met with considerable skepticism because such assertions oversimplify the complex, paradoxical interactions entailed in the exchange of stories. The neuroscience of embodied action and self-other relations shows, however, that narratives can and do have social power because of the brain- and body-based processes that they set in motion. The ends that these processes may serve are highly variable and are not predetermined but, rather, depend on how they are deployed in the acts of figuration and refiguration through which we tell and follow stories. It is up to us as writers and readers to use these possibilities well, for whatever purposes we happen to value. Cognitive science and literary theory can clarify what those possibilities are, but the choice of what to do with them is our own.

Brown University

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**Abstract**

Stories are important instruments for configuring our cognitive and social worlds, but they do not necessarily make us more caring or less aggressive and self-involved. The ability to tell and follow a story requires cognitive capacities that are basic to the neurobiology of mental functioning, and so it would stand to reason that our experiences with stories would draw on and re-shape patterns of interaction that extend beyond the immediate experience of reading or listening to a narrative. Our intuitive, bodily-based ability to understand the actions of other people is fundamental to social relations, including the circuit between the representation of a configured action emplotted in a narrative and the reader's or listener's activity of following the story as we assimilate its patterns into the figures that shape our worlds. The activity of following a narrative can have a variety of beneficial or potentially noxious social consequences, either promoting the shared intentionality that neurobiologically oriented cultural anthropologists identify as a unique human capacity supporting culturally productive collaboration, or habitualizing and thereby naturalizing particular patterns of perception into rigid ideological constructs. The doubling of "me" and "not-me" in narrative acts of identification may promote the "we-intentionality" that makes socially beneficial cooperation possible, or it can set off mimetic conflict and various contagion effects. Neuroscience cannot predict what the social consequences of narrative will be, but it can identify the brain- and body-based processes through which (for better or worse) stories exercise social power.

Key Words: Narrative, neuroscience, reading, identification, empathy

Notes on Contributor:
**Paul B. Armstrong** is professor of English at Brown University and the author of several books, including *How Literature Plays with the Brain: The Neuroscience of Reading and Art, Play and the Politics of Reading: The Social Uses of Modernist Form,* and *Conflicting Readings: Variety and Validity in Interpretation*. He is also the editor of Norton Critical Editions of Joseph Conrad's novella *Heart of Darkness* and E. M. Forster's novel *Howards End*.
Email: paul_armstrong@brown.edu