



# The evolution of stories: from mimesis to language, from fact to fiction

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Why a species as successful as *Homo sapiens* should spend so much time in fiction, in telling one another stories that neither side believes, at first seems an evolutionary riddle. Because of the advantages of tracking and recombining true information, capacities for event comprehension, memory, imagination, and communication evolved in a range of animal species—yet even chimpanzees cannot communicate beyond the here and now. By *Homo erectus*, our forebears had reached an increasing dependence on one another, not least in sharing information in mimetic, prelinguistic ways. As Daniel Dor shows, the pressure to pool ever more information, even beyond currently shared experience, led to the invention of language. Language in turn swiftly unlocked efficient forms of narrative, allowing early humans to learn much more about their kind than they could experience at first hand, so that they could cooperate and compete better through understanding one another more fully. This changed the payoff of sociability for individuals and groups. But true narrative was still limited to what had already happened. Once the strong existing predisposition to play combined with existing capacities for event comprehension, memory, imagination, language, and narrative, we could begin to invent fiction, and to explore the full range of human possibilities in concentrated, engaging, memorable forms. First language, then narrative, then fiction, created niches that altered selection pressures, and made us ever more deeply dependent on knowing more about our kind and our risks and opportunities than we could discover through direct experience. © 2017 The Author. *WIREs Cognitive Science* published by Wiley Periodicals, Inc.

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We wallow in stories, from campfires on the savannah to binge-watching in cities, from the nursery to the rest home. How can it make evolutionary sense that members of a species successful enough to reshape the earth spend so much time in telling one another stories that neither tellers nor listeners believe? After all, evolution favors organisms that can extract accurate and relevant information from their environment. Why have humans evolved

such an appetite for the untrue along with our unparalleled appetite for searching out truth? Why, at least, have we not evolved a resistance to fiction?

Once written down, stories like Homer's can endure for millennia, but purely oral stories last only in memory and do not fossilize. Old evidence is scant, the evolution of behavior is always hard to analyze, as Frans de Waal notes (Ref 1, p. 45), and we have to glean insights from wherever we can: from evolutionary anthropology, archeology, biology, linguistics, psychology, and theory; from modern anthropology, especially among hunter-gatherers; from comparative and developmental psychology; from cognitive psychology, linguistics and neuroscience; and from philosophy and literary studies.

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Despite the meagerness of evidence, the cacophony of disciplines with often divergent assumptions, interests and methods, and the continued production of new hypotheses, a surprisingly convergent account of the evolution of narrative and of fiction has begun to take shape. It depends on the coevolution of language, narrative, and play, each feeding the other, within the emerging hypersociality of *Homo erectus* as the species began to construct its own sociocognitive niche. Although many pieces still remain missing from the puzzle, many others have been identified and set in place by the recent work of Daniel Dor on the origin of language.<sup>2,3</sup>

The toolmaking, firemaking, and cooperative hunting in late *Homo erectus* required rich communication, even if not yet spoken language. Meanwhile play, long established throughout and beyond mammals, more prominent in highly social primates,<sup>4</sup> must have become still more prominent in a species like *erectus* with cooperative breeding and prolonged childhoods. As Dor shows, the pressures for ever-better communication sparked the invention of language.<sup>2,3</sup> That enabled efficient narrative, which coupled with play to produce fiction. Dor stresses language's unique role in allowing us to instruct others' imaginations, and therefore to share across the experiential gap between individuals. This allowed us to understand one another in much richer ways, in our variety and commonality, and to intensify our hypersociality and the creative divergences it also made possible.

Drawing on the growing case for behaviorally and culturally driven evolutionary change,<sup>5–9</sup> Dor explains the emergence of language in terms not of individual cognitive development or an initial genetic driver, but of social invention. Once invented, even in rudimentary form, language began to shape human cognition, as natural selection tracked new criteria for success: linguistic production and comprehension, and their effect on sociality, not least through the role of narrative in deepening folk psychology.<sup>10</sup> These evolutionary changes in turn helped our forebears to refine language in ways that further intensified the selection for the capacity for language.<sup>2</sup> In the same way, fictional stories arose as cultural inventions, through a natural confluence of mimetic preverbal narrative, play, and the emerging capacity for verbal narrative. As a way of discovering more of what it might be to be human, and of exploring the unknown, fiction shaped human development, cognition and sociality and quickly became compulsive. Like languages, fictions are constantly being refined to become still more effective in changing circumstances, and thereby put new pressures on minds and societies.

I will discuss, in sequence, (1) the prehuman capacities to understand, recall, and communicate events; (2) the human preconditions for protolanguage and protonarrative, the so-called 'mimetic phase' of human communication;<sup>11,12</sup> (3) the invention of language; (4) the emergence of full linguistically enabled narrative and the difference it made to human cognition and sociality; (5) the emergence of fiction from factual narrative and play, and its impact in development and in modern hunter-gatherer societies; and (6) the extra impact of fiction through myth and religion.

## ANIMAL PRECURSORS OF NARRATIVE: EVOLVING IN A WORLD OF EVENTS

What precursors are there in nonhuman animals for understanding, recalling, and communicating events?

Even organisms as remote from us as bacteria and plants extract information from their environment and communicate it to others. Animals, being mobile, need cognitive maps of the territories they move within.<sup>13</sup> And they especially need to understand the rapid changes that other animals—predators and prey, mates and offspring, rivals and allies—make to their contexts of action.

Synthesizing and theorizing studies of animal cognition and behavior, psychologist Merlin Donald in 1991 influentially categorized the mental worlds of apes, and probably other higher animals, as 'episodic ... lived entirely in the present, as a series of concrete episodes' (Ref 11, p. 149). He suggested that 'event perception'—perhaps 'event comprehension' would be better—'is the most evolved form of cognition' in animals, and that animals' intelligence can be defined in terms of the complexity of the events they can understand (Ref 11, p. 153), the more complex, presumably, the more flexible the behavior and the more intricate the social organization of the species.

Since then, as research has been better attuned to each species' mode of life, our knowledge of the extent and varieties of animal cognition continues to expand, especially in the case of social species, birds (corvids and psittacids), and mammals (cetaceans, canids, and primates). Research on primates in the wild and in captivity confirms that they 'have excellent event-representations' (Ref 12, p. 219) and that 'in the subject of 'social knowledge, everyone is a straight-A student' (loc. 1898).<sup>14</sup> Apes understand events in terms of individual character and standard or exceptional behavior within the group.<sup>15–19</sup> They interpret others' actions in light of their intentions<sup>20</sup>

and knowledge, as inferred from what others are in a position to see,<sup>21,22</sup> but possibly *not* with a clear sense of their beliefs (loc. 962–965).<sup>23</sup>

If animals comprehend events richly as they happen, can they recall them? Thomas Suddendorf and Michael Corballis proposed in 1997 that mental time-travel was unique to humans.<sup>24</sup> Like many such claims for human exceptionalism, the proposal invited falsification, in this case through research into animal memory and foreplanning. Food-storing birds such as magpies, black-capped chickadees, and especially scrub jays, have fine-grained what–where–when memories, as do rats.<sup>25,26</sup> Chimpanzees have been shown to recall unique events after 5 years.<sup>1,27</sup> Evidence for foreplanning has been found in orangutans, bonobos, and chimpanzees (most famously, the chimpanzee Santino at Furuvik Zoo in Sweden, who stockpiled stones to hurl at visitors)<sup>28</sup> as well as in scrub jays.<sup>29</sup> In light of the evidence, Corballis now suggests that ‘Mental time travel may well be one of the earliest of mental faculties to evolve. It is fundamental to all moving animals to know where they are, where they have been, and where they are going next’ (loc. 730–731).<sup>23</sup> (see Ref 29 for a review).

Can nonhuman animals communicate events? Many animals, de Waal notes, are very highly ‘attuned to the postures, gestures, and facial expressions of others’ (Ref 1, p. 131) in the moment, can act on shared intentions, and in some cases—such as chimpanzees, macaques, capuchins, and ravens—take into account what others can see and know.<sup>30–33</sup> Animals can often distinguish which other unseen conspecific is signaling a reaction to a current situation, and adjust the intensity of their response according to their relationship to the signaler.<sup>34,35</sup> Honeybees’ waggle dances indicate foraging opportunities for hive-mates, and adult vervet monkey alarm cries distinguish between different kinds of threats, eagles, snakes, and leopards,<sup>36</sup> but these are stereotyped responses to present situations. Chimpanzees can draw attention flexibly to other chimpanzees’ immediate actions, where it serves their purposes,<sup>17</sup> but no nonhuman animal currently seems either capable of communicating with its conspecifics about complex events beyond the here and now or motivated to try. Even de Waal, convincing champion of gradualism in cognitive evolution that he is, notes: ‘A chimpanzee may detect another’s emotions in reaction to a particular ongoing situation, but cannot communicate even the simplest information about events displaced in space and time’ (Ref 1, p. 106). But one clear example has been recorded of a chimpanzee communicating successfully about the present consequence of an event retained in its memory—the hiding of treats in

its sight but out of reach, the previous day—to humans unaware of what had happened.<sup>1,37</sup> The urge to share information, if there was a chance of its being understood, may well have been there in our common ancestor with the chimpanzee. From such beginnings, language and narrative would grow.

## THE HUMAN CASE: EVOLVING BEFORE LANGUAGE AND NARRATIVE

Although we do not know the precise timing, sequences, or overlaps of the major factors in the evolution of our ancestors within *Homo* toward language and *Homo sapiens*, a broad consensus has formed that *Homo erectus* moved decidedly into the ‘cognitive niche.’<sup>38,39</sup> That formulation originally tended to emphasize cognition within the individual brain, but recent work has stressed how much early human cognitive advances depended on social and cultural conditions and interactions,<sup>9,40</sup> and I have in mind a sociocultural cognitive niche. As Dor notes, human survival ‘came to depend less on individual behavior and more on collective cooperation’ (Ref 2, p. 198), not least in terms of understanding the world and one another.

Four major behavioral novelties emerged in *Homo erectus*: cooperative breeding, refined stone tools, fire-making, and cooperative hunting of large animals. All arose from and accelerated the central, mutually reinforcing trends in hominin evolution: expansion of the brain, increases in sociality and cooperation, and improved communications.

Cooperation, as de Waal shows, is widespread in chimpanzees and no ‘huge anomaly’ in nature (Ref 1, p. 186). But cooperative breeding intensified it dramatically in *Homo*. Known elsewhere among primates only in small-brained marmosets and tamarins, alloparenting may have evolved in *Homo erectus* around 1.6 million years ago, Sarah Hrdy shows, as ‘human mothers began to bear offspring too costly to rear by themselves’ (Ref 41, p. 283). Infants and young children were increasingly provisioned and cared for not only by mothers but also by female kin and others. More reliable food supplies could feed energetically hungry brains, while allowing mothers to reproduce at a faster rate than that of any other great ape, and social support permitted a prolonged childhood that enabled more intense social learning. Cooperative breeding also selected for greater social responsiveness, trust, and empathy between infants and their carers, and an incentive on the part of the infants to assess, understand, and learn to please their elders.

Even the first crude stone tools, the Oldowan handaxes from about 2.5 million years ago, enabled cutting of meat from animal carcasses, and added to the value of the food intake. After the rapid cranial expansion of about 2–1.5 million years ago, and the emergence of *erectus*, Acheulean bifacial handaxes became the norm. These required elaborate training to manufacture successfully: modern archeologists find it takes months of practice to become proficient at creating Acheulean tools.<sup>11</sup> *Erectus* swiftly became adaptable enough to expand beyond Africa, spread across Eurasia, and survive in a wide variety of climatic conditions.<sup>11</sup>

Firemaking, which may also have been mastered by 1.5 million years ago, and had become routine a million years later, allowed the easier extraction of nourishment from food sources. It further increased the available caloric intake so vital for larger brains, reduced the need for large mandibular muscles, leaving more room for cranial expansion, and shrank drastically the time need for chewing raw food.<sup>42</sup> It would also have added both to the pressure for sociality—for fire-making and fire-tending together, for sharing of food around the fire—and the opportunities for relaxed companionship in the extra hours after sunset.<sup>43</sup>

With all needing to spend less time digesting food, and females specializing in gathering and in tending fires while males hunted, an increased appetite for the high energy value of meat led to the emergence of complex cooperative hunting, to which the finely crafted and aerodynamically efficient hunting spears from 400,000 years ago bear striking testimony.<sup>44</sup>

In late *erectus* and in *heidelbergensis*, extensive instruction must have been required for the mastery of tool-making, tool-using, fire-making, fire-tending, and hunting that increasingly relied on ecological knowledge, tools, strategic guile, and close and flexible cooperation. Our forebears became evolved apprentices, learning from their elders.<sup>45</sup> Now firmly in the cognitive niche, they would have been selected for their capacity to absorb socially accumulated knowledge. Both acquiring skills and executing them in action would have required improved communication and readiness to cooperate with others in teaching and learning.

A suite of related adaptations improved hominin communication during the *erectus* years. Our forebears would have developed the capacity to point, to draw distant or close features of the environment to others' attention, something apes do not do except in human environments, and then only for food.<sup>46,47</sup> They presumably also developed further

the great ape capacity and an appetite for joint attention, for noticing something worth others' attention, signaling to draw their notice to it, checking through reciprocal gaze that they are attending to the same feature.<sup>1,48</sup> *Homo erectus* would have developed a greater capacity and motivation for the imitation of others, already well developed in the apes (and in other lineages);<sup>1</sup> this would have facilitated the acquisition of the complex skills needed in stone tools, foraging, fire-making, and cooking. Although there is no direct record of these developments, they can be inferred from the comparative complexity of the *erectus* life style, and from the very early emergence of these social skills and dispositions in modern infants.

## EVOLVING IN THE MIMETIC NICHE

The best current fossil and genetic evidence for the evolution of spoken language—evidence relating to tongue, ear, and mind—suggests that speech had begun to develop by about half a million years ago, in *Homo heidelbergensis*, the common ancestor of *Homo sapiens* and *Homo neanderthalensis*.<sup>49</sup>

Synthesizing the then available archeological, anthropological, biological, linguistic, and neuroscientific evidence, Donald in 1991 proposed a succession of stages of the emergence of the modern mind.<sup>11</sup> Although he was speculating boldly, and although he presupposed that language did not develop until anatomically modern *Homo sapiens*, about 100,000 years ago, Donald has been enormously influential. He suggested that on top of the episodic minds of other animals, and before language, *Homo erectus* evolved a mimetic mind. By this, he meant a suite of capacities, controlled by the intention to represent and communicate, and using a range of modes of expression short of language: pointing, gesture, posture, movement, facial expression, and vocal sound.

The evidence for this is indirect. We can infer much from the need for communication, social learning and social teaching, planning and coordination in the tool-making, fire-making, and hunting practiced by later *erectus* (or *heidelbergensis*). We can also read back from the way modern humans communicate when they do not have language in common (the pointing, joint attention, gestures, facial expressions, and mimetic movements used by those with no shared languages, or illiterate deaf-mutes, or those with lesions in linguistic areas of the brain)<sup>11</sup> or even when they do have a common language (the gestures and expressions we still use when talking to listeners who cannot see us: in the dark, in the next room, on

the phone).<sup>50</sup> And the recent fossil and genetic evidence suggests that the proposed pre-linguistic mimetic mind should now be dated to *erectus* or *heidelbergensis*, about 1.5–0.5 million years ago. Nevertheless, much in Donald's hypothesis still seems suggestive to many.

He argues that mimesis can shape the mind even when communication is not involved: in the capacity to represent to oneself and consciously rehearse and practice the complex multistage actions needed, for instance, for creating Acheulean handaxes. But it is in communication that mimesis would have had its most decisive impact. Donald distinguishes mimesis from mimicry, the attempted exact reproduction of sound or feature, and from imitation, copying without either the intention to represent or the invention of a means to do so: both intention and invention he sees as central to mimesis (More recently de Waal notes that not only are apes 'born imitators' but imitation occurs also 'in monkeys, dogs, corvids, parrots, and dolphins'; Ref 1, p. 152, 156). Donald emphasizes immediate pre-human mimesis as not a single expressive mode but a high-level communicative control system, shaped by the very intention to communicate, by whatever means can be drawn on without a system of efficient linguistic signals already in place: through hands, arms, eyes, faces, movements, and sounds.

The archeological evidence suggests that late *erectus* and *heidelbergensis* would have felt increased pressures to communicate in instruction for tool-making and use, and in planning and coordinating cooperative big-game hunting<sup>2</sup> (Jerome Lewis shows how the expert hunting of modern BaYaka pygmies in the Congo depends on nonlinguistic communication—hand gestures, vocal imitation of bird calls as coordinating devices, vocal imitation of prey animals as lures—even if in other contexts they use all the resources of speech).<sup>51</sup> Since increased cooperation itself was a major hominin advantage, there would also have been pressure to communicate in social play (so central to modern hunter-gatherers),<sup>52</sup> including vocomotor games, and children's play in imitation of adult roles<sup>11</sup>; in social monitoring and the enforcement of social norms, perhaps in the kind of gently mocking mimicry that hunter-gatherers still use in playful correction of those who transgress against rules of sharing and egalitarianism<sup>51,52</sup>; and in rituals to bind the band emotionally.

As mimesis improved, there would have been selection pressure for the capacity to produce and to interpret mimetic signals. As social cooperation deepened, and with (and because of) better sharing of

attention and greater trust in the communicative process, the value of imparting what had just happened or what should happen next, would have intensified. Donald hypothesizes that much mimetic communication would have been about events, a kind of dramatic proto-narrative: 'The key innovation in *erectus* was the emergence of the most basic level of human representation, the ability to mime, or re-enact, events' (p. 16); mimesis 'evolved for the purpose of re-enacting events and representing their structure' (p. 178). The event perceptions characteristic of the episodic, pre-human mind, therefore became 'event reproductions and reenactments' (Ref 11, p. 191).

Donald at times seems highly sanguine about the power of mimesis: 'Basically, anything that the event-recording episodic system can perceive and store, the mimetic controller can model' (p. 190). At times he is more cautious, contrasting mimesis with language: 'a much more limited form of representation ... slow-moving, ambiguous, and very restricted in its subject matter' (Ref 11, p. 197). The likelihood is that mimesis could communicate best only about events in the very recent past, unless they were both highly salient and common knowledge, and about possible events—plans, threats, opportunities—in the very near future. Like charades, mimesis would often have been frustratingly hit-and-miss, more flailing than swift signaling.<sup>23</sup> But the key point for the evolution of stories is that Donald establishes so strongly the plausibility of a drive to, and means to, communicate events, to engage in narrative, even before our ancestors added language and could discover an efficient means to report events.

In order to communicate with less ambiguity, many mimetic moves may have become conventionalized into something closer to language, as Corballis explains: 'Each act could be reduced to a standard form, and need no longer retain the pictorial element of pantomime. Communities could come to agree on the meanings of individual acts, and pass them on to the children. This process can be seen in gestural form in the development of sign languages invented by deaf communities' (loc. 1086–1087).<sup>22</sup> Other apes already have a range of gestures, which they can utilize more flexibly than their vocal cries,<sup>46</sup> although they often use the two in tandem.<sup>53</sup> Hominins needed finer motor control in their hands than their predecessors, and this finesse could easily have been coopted for communicative needs.<sup>54</sup> As Corballis notes, manual motor control lies adjacent to modern speech areas of the brain, perhaps another sign that gestural language, or a combination of gesture and vocal sound, could have preceded speech.<sup>55</sup>



## EVOLVING IN THE LINGUISTIC NICHE

Since the 1960s evolution has most often been seen in terms of individual- and gene-level selection.<sup>56–58</sup> But over the last 15 years many have realized that phenotypic plasticity often drives evolution: that creatures confronted with new problems may try out new solutions, some of which may succeed, be repeated, copied, improved, and stabilized, be learned early in life by new generations, and thereby create new niches where new selection pressures come into play.<sup>2,6–9</sup>

This recognition has impacted strongly on recent work on the origin of language. Many now argue persuasively that language has been led not by genetic change, but by behavior, as Dor defines it, by ‘a collective process of invention and development’ (Ref 2, p. 1). The social, piecemeal, protracted invention of language placed new selection pressures on our hominin forebears, shaping cognition, emotion, and individual and social behavior more *for* language. In Dor’s formula, ‘First we invented language. Then language changed us’ (p. 4), individually and socially, altering not just our cognition and our vocal and auditory systems but also our emotions, behavior, and our relationships to our own experience and to others.

Dor has advanced the most compelling, detailed, and consequential new account of language’s nature and origins. Other forms of communication, in humans and other animals, are presentational (Ref 2, p. 23): the participants share in aspects of a common experience: a place, a time, an event that one can draw others’ attention to; a facial or bodily expression, a scowl, a smile, a swagger. But under the recurrent pressure to share what was at first just beyond common perception, and then what lies still further afield, to understand across small gaps in experience, and then across larger ones, language developed.<sup>2,3</sup>

Dor shows that what distinguishes language from earlier forms of communication is that it crosses the inevitable experiential gap between individuals that remains ‘even when we experience together’ (Ref 2, p. 16): ‘It allows speakers to intentionally and systematically instruct their interlocutors in the process of imagining the intended experience—*instead* of directly experiencing it’ (p. 2). In language ‘the communicator does not try to make some of his or her experience perceptibly present to the receiver’ (p. 24): rather the communicator provides the verbal cues to instruct the imagination of the receiver to share something even if it cannot be pointed to, even if it is no part of current experience: something past or private or even invented.

Language, Dor argues, is no general purpose system of communication—it can be virtually useless in, say, teaching us how to tie a knot or play the violin or see what a drawing, painting, or photograph could show in a flash—but is ‘specifically designed for the communication, through the instruction of imagination, of experiences that cannot be experientially communicated’ (p. 31). With language, ‘Individuals began to learn to imagine events that happened to others, and learn how to take them into account in their own decisions’ (p. 33). And we even began to look at the world not just to behave in it but also ‘*in order to tell about it*’ (Ref 2, p. 204).

## EVOLVING IN THE NARRATIVE NICHE

Narrative does not need language. If Donald’s claims about the mimetic world of *Homo erectus* are valid, our forebears felt a strong urge to communicate off-stage events and had some capacity to do so before language. Modern mime, silent film, and wordless graphic novels show that even now narratives can function without language—although we now bring to them story-constructing and story-inferring skills acquired in our exposure to narratives *with* words—and verbal narrative gains a vividness beyond words through the presentational modes of drama, screen, and comics.

But until language, the hominin narrative urge had no efficient outlet. Donald suggests that narrative is ‘the natural product of language,’ and that language is ‘basically for telling stories’ (Ref 11, p. 275). He goes too far: so long as language has been available, it has surely mattered for greeting, requests, guidance, description, opinion, argument, agreement, and more. Yet, if language developed to instruct imaginations about what might be in one person’s head but could not be in others’ without words as cues, then it comes close to the core of narrative. We each have different experiences: our unique past and memories, our unique capacities, dispositions, interests, and perspectives. Narrative allows us beyond the limits of our lives, gives us access to the experience of others, to the past, the private, the imagined.

As language began to allow the reporting of events, different individuals would have had different skill levels. Those who could cope better in constructing or even comprehending narrative would have been selected for, since reporting events produces such decided advantages.

Narrative offers us a far greater range of experience to think with than what we can glean just by

acting, reflecting, and observing as individuals. Through social report, we can learn much more of the range of human behaviors and characters, desires and intentions, predicaments and solutions,<sup>59</sup> and norms and transgressions.<sup>60</sup> In narrative, we are attracted not to the routine we already know but especially to what is surprising<sup>61,62</sup>—to what extends our sense of what to expect in human behavior—and to what is emotionally engaging, to what we feel matters. Narrative helps us know better what it can be to be human, what risks we may face, what options we may have, so that we can cooperate and compete better through understanding one another more fully. Narrative can model and motivate personal values like courage, resilience, resourcefulness, circumspection, and social values like generosity, sensitivity, respect for others whatever their status. It can spread, deepen, question, and inflect norms.<sup>63–65</sup> This makes the social landscape more navigable, more expansive, more open with possibilities for all, changing the payoff of sociality for both individuals and groups. We therefore have a hunger for learning about striking personalities, situations, actions, and developments.

Through narrative, we can greatly deepen folk psychology. Philosopher Daniel Hutto trenchantly critiques Theory of Mind in both its Theory (whether nativist or developmental) and Simulation Theory forms, and proposes instead the Narrative Practice Hypothesis: that folk psychology just *is* the ability to construct a narrative explanation of a person's actions, her reasons for what she does, in view of her personality, situation, history, beliefs, desires, and plans.<sup>10</sup> (Primatologists Emil Menzel and Frans de Waal also object to the 'theory' in Theory of Mind; Ref 1, pp. 131–2). We learn folk psychology, Hutto argues, through all our practice with narrative, perhaps especially from first- and second-person cases ('why did you do that?'), through putting behavior into story form that accounts for actions through the variable particulars as well as the commonalities of situations, persons, and motives.<sup>10,66</sup>

Narrative allows us to keep better track of those we interact with, impossible already for our forebears, given the dispersed daily activities of hunter-gatherer life, until they had narrative.<sup>67</sup> Gossip can broadcast an individual's reputation, which can be hard to earn and easy to lose, and its capacity to do so may help foster cooperation perhaps as powerfully as punishment can, and at much lower cost.<sup>68</sup> Gossip also offers a means to reinforce and broadcast social-cooperative norms,<sup>69</sup> and the hazards of transgressing them. We have a particular interest in violations of norms that either affect us

directly (if perpetrated by those we deal with) or at least belong to a kind that could harm us.<sup>60,70,71</sup>

We have many reasons for wanting to learn from factual narratives, whether we learn about particular individuals<sup>72</sup> or general principles.<sup>60</sup> But, Jean-Louis Dessalles asks, why do we tell narratives, why do we compete to do so rather than hold back?<sup>61</sup> We spend about 40% of our conversational time in spontaneous narratives.<sup>73</sup> Why do we not listen to what we learn from others, then refrain from passing on what we have learned, hoarding the information for ourselves and saving ourselves the effort of relaying it? We do not regard telling stories about ourselves or others as an altruistic public service,<sup>61,74</sup> we *want* to report about experience when we think we have something to offer: something salient enough, or relevant enough to the conversation, the time, the place, the company. We want to display our social vigilance, our ability to appraise human behavior and discern norms, our worth as trading partners in the information and interest exchange. We want to supply the information that has come our way while it still has value. We earn attention and status for our alertness to high-value social information and for our social discrimination.<sup>75</sup> And as the social beings we are, Bernard Rimé notes, 'we exist to a very large extent through the attention we receive' (Ref 76, p. 177). We even risk incurring disapproval for not sharing social information that would have been useful to others.<sup>60</sup>

A recent study of storytelling among hunter-gatherers in the Philippines by Daniel Smith et al. tallies and tests many of the positive social and individual effects of narrative among people whose way of life may in some ways resemble those of the earliest storytellers. 'Agta stories convey messages relevant to coordinating group behavior in a foraging ecology, such as cooperation, sex equality and social egalitarianism.'<sup>77</sup> Their stories emphasize the benefits of cooperation over competition, they punish norm-breakers, and they show how reverse dominance hierarchies prevent concentration of power—morals not markedly different from those examined in a comprehensive study of characters in Victorian novels, for all the difference in their sophistication of technique,<sup>71</sup> and indeed, as de Waal shows, the rejection of inequity has been recognized in social species as varied as capuchins, dogs and corvids.<sup>1</sup> Smith et al.'s Agta study assessed ratings of storytelling and other skills. Skilled storytellers were almost twice as likely as unskilled storytellers to be chosen as campmates, and were distinctly more likely to be chosen than even the most skilled foragers. Camps with greater proportions of skilled storytellers were

associated with higher levels of cooperation; the more skilled storytellers had higher reproductive success (0.53 more living offspring) than others, and they were also more likely than others to receive additional resources in an experimental game, suggesting, as the authors note, ‘a plausible pathway by which a group-beneficial behavior such as storytelling might have evolved through individual-level selection.’<sup>77</sup>

Assessing the effects of the collective and piecemeal invention of language, Dor notes some of the cognitive changes in our forebears—even if they had already been intense social communicators before language—once they began to inhabit the language niche their own efforts had started to construct.<sup>2</sup> Similarly, our forebears had already been intense social monitors before narrative, but underwent changes in cognition as they moved into their newly constructed narrative niche.

As Hutto proposes, narrative would have enabled what he labels folk psychology, a deep understanding of people’s reasons for acting,<sup>10</sup> and thereby massively refined social cognition, not to mention social interaction. Our skills at causal inference in social situations, our very understanding of causal relevance and causal complexity, and our bias toward interpreting or even overinterpreting cause in terms of agency, would have been deepened. We would have developed an increased capacity for toggling between what cognitive discourse analysts call local and global processing, readily nesting current situational details and developments within larger contexts.<sup>12</sup>

We would have improved in sustained offline thinking, and in the scope and richness of our imaginations, stocked with many more examples and stretched with extensive daily practice. Much recent work shows that the same brain network (medial prefrontal cortex, retrosplenial cortex, posterior cingulate, medial temporal lobe, and lateral temporal and parietal cortices) is activated in memory, imagination and foreplanning,<sup>78</sup> perspective-taking,<sup>79</sup> and social scenarios,<sup>80–82</sup> and suggests that we flexibly combine elements of episodic memory in order to plan for the future, particularly in social contexts. This network acquired the name ‘default mode network’<sup>83</sup> because it was active in subjects in fMRI experiments when they were *not* engaged in attention-demanding goal-directed cognitive challenges. The network might be better named the actor–scene or scenario network, since it supports not only autobiographical recall but also thinking about the minds and personalities<sup>71</sup> of others, as well as future scenes<sup>84</sup> involving self and others.<sup>78–80,85–87</sup>

Much of the cognitive neuroscientific research on this network has focused on autobiographical memory and imagination,<sup>88</sup> on constructive episodic memory as the basis for future episodic simulation (‘the ability to flexibly recombine elements of past experience into simulations of novel future events’),<sup>78,85,86,89</sup> and on the social imagination engaged in fiction.<sup>90–92</sup> But philosopher Derek Matravers rightly notes that we need imagination to understand factual narrative as much as fiction;<sup>93</sup> and Dor, as we have seen, points out that we need imagination even to understand language—but he would probably agree that we have a specially swift and responsive imagination when we attend to verbal narrative. Language may have enabled a new kind of recall, word-based episodic recall,<sup>94</sup> but it is unlikely that much detail of the many thousands of narratives we encounter would remain vivid in episodic memory.<sup>95–97</sup> Nevertheless, the social implications derived from these narratives, including personality judgments,<sup>72</sup> would enrich semantic memory,<sup>78</sup> and semantic memory turns out to be sufficient to support future-oriented personal judgments and plans.<sup>29</sup> The exercise of the imagination in understanding even factual narratives, and the stocking of episodic and semantic memory with the many reports of others’ experiences, must have greatly increased our capacity and our reliance on this actor–scene network, both for pragmatic reasons and for the private pleasures of mindwandering.<sup>23</sup>

Our engagement in narrative would also have helped us to shift perspectives more rapidly from agent to agent within a story and to maintain multileveled responses, to the actors within the story, to the storyteller, and to other members of the audience. We would have developed the scope and efficiency of our time travel, and our ability to swiftly sort events told out of order into the necessary chronological-causal sequence. And perhaps most of all we would have developed a craving for understanding our world not only in terms of our own direct experience, but through the experience of others—and not only real others. Time to move to fiction.

## EVOLVING IN THE FICTION NICHE

Although I opened this review with a question about why fiction could have evolved, I am turning to fiction only late in the story. Why?

Most of the drivers for fiction were also drivers for our hominin ancestors’ mimetic communication before language, and for language, and for narrative with language: our high sociality, our intense social monitoring, our increasing dependence on



information-sharing. The close link between memory and imagination, between experience and planning, meant that imagination was ready to recruit not just experience personally lived through, not just experience reported and activated in listeners' imaginations, but also experience that was 'only' concretely and vividly recombined—concocted—from elements of remembered experience. Language, as Dor shows, instructs the imaginations of interlocutors, to conjure up out of memory something not part of their direct experience.<sup>2</sup> Nonfiction narrative, as Matravers makes clear, also targets the imagination,<sup>93</sup> and specifically the brain's default mode network or, as I have dubbed it, its actor–scene network. By their very nature language and narrative teeter already on the verge of fiction.

All the more so when we take into account other factors already present in mind and in narrative prior to fiction. First, in mind. As we have seen, the actor–scene network appears designed to allow the recombination of memories to support future planning. For those who might wish to invent stories, a recombinatory imagination had already been at hand, before language and narrative, and had been used every day—and was exercised far more often now they were immersed in the world of language and narrative, even if only as listeners.

And every night, too, the actor–scene network was already active. Dreaming appears to occur in many species. It too combines memories into new configurations. We experience dreams as immediately present to the inner eye and as engaging both attention and emotion. To that extent dreams resemble and probably anticipated fictional narrative,<sup>98</sup> and would have had more raw material to play with the more frequently and more elaborately factual narrative had begun to circulate. But dreams recombine elements of memory in apparently stochastic and therefore arbitrary and usually poorly retrieved ways, even if they can be triggered by current preoccupations or moods. They mostly provide meager direct hints either for waking life or for fiction. I suggest that the main function of dreams may be to keep the retrieval and recombinatorial mechanisms of the default or actor–scene network in good running order for daytime retrieval and planning—with the consequence that the network was also already available for idle daydreaming and could easily be coopted for purposeful fictional invention.

Second, aspects of narrative that fall just short of fiction also prepared its way. People recounting recent news or old lore do so to hold the attention of others.<sup>75</sup> They may readily feel tempted to vivify the account not only with expressive mimetic means but

even with exaggerated or wholly invented details. After all, for the earliest storytellers modern standards of historiographic fidelity to fact and documentary accountability were thousands of generations ahead in a quite unimaginable future. We know too that our minds readily confabulate<sup>99</sup>—fill in gaps in our understanding of events with the first plausible gap-fillers that come to mind, rather than leave holes in the fabric of a story. *Perhaps* we do so only nowadays, because we have been steeped all our lives in fiction, but it seems perfectly possible that our forebears have had confabulating minds since very soon after the invention of narrative. And certainly lies, to exonerate oneself or one's sub-group or group, to inculcate others, or for that matter to smooth social situations, will have prompted divergences from fact since early in the history of narrative,<sup>100</sup> just as they surface swiftly in children as they learn how to report on events.

Only one more factor needs to be added to language, narrative, and the prepared mind, in order to engender fiction: play, present on earth for tens of millions of years before language or narrative. Observed not only in the young of most mammals, but also in birds, fish, cephalopods, and insects,<sup>4</sup> play offers a way of learning species-typical skills by detaching them from serious mode, testing them in safe circumstances in exuberant fashion so that trial and error can refine them at low risk.<sup>101</sup> Play has been so beneficial in the young of so many species that it has evolved to become self-motivating, irresistible—sheer fun.<sup>75</sup> The amount of play in a species usually depends on both the length of immaturity and the flexibility and complexity of species behavior.<sup>102</sup> Social species play more than solitary species, hunting species more than prey species.<sup>23</sup> *Erectus* and *heidelbergensis* were highly social, uniquely flexible in their responses to their environment, dependent on hunting, with the longest childhoods yet evolved, and with cooperative breeding enabling children to learn through play longer than the young of any other species.<sup>41</sup> Synaptic development in the human prefrontal cortex reaches its peak at five years of age, rather than at one year as in macaques and chimpanzees,<sup>103</sup> allowing children to learn more through play and from others. Presumably our big-brained hominin predecessors were already evolving in this direction. Human children have a uniquely intense predisposition to imitate those around them, and again our precursors in late *Homo* were well along this track. And uniquely among living primates, humans play even as adults.<sup>104</sup>

Pretend play with objects and social situations is universal in children,<sup>11</sup> although the stages at

which it develops and the forms it takes can be culturally variable.<sup>105,106</sup> Role-playing games occur in all cultures, and do not need language: nonsigning deaf children, observes Donald, ‘play essentially the same games as hearing children’ (Ref 11, p. 174). Play has been judged central to hunter-gatherers, the closest modern equivalents to the life style of *heidelbergensis*, for mastering life-skills, for regulating social life, and for ensuring group cohesion.<sup>52</sup> Among the Mbendjele in the Congo Basin, for instance, older boys play structured role-play games, including hunting games, requiring considerable coordination and cooperation, but adults too play fictional ritual games (Lewis calls them ‘spirit play’) that encourage egalitarianism and their strong sense of community.<sup>104</sup> By its role reversals and the self-handicapping of the stronger, play counteracts tendencies toward dominance in animals as in humans, and, notes Paul Gray, ‘hunter-gatherers appear to have promoted play quite deliberately for that purpose’ (Ref 52, p. 476).

Fiction is narrative as play. Gregory Bateson noted in 1955 that in play, experience is decoupled<sup>107</sup>: a dog’s play bite is marked as nonserious, placed in nonscare quotes, as it were, by the dog’s preliminary play-bow to its partner, just as fiction’s action, however intense, is decoupled by an explicit ‘Once upon a time’ or an implicit mutual recognition of fictionality (Nielsen, Phelan, and Walsh show how swiftly modern humans understand fictionality even in the midst of serious discourse).<sup>108</sup>

Ontogenically, fiction emerges out of children’s pretend play, although that in turn may be scaffolded by the stories of adults or older children (fairies or superheroes, for instance, in modern Western culture). Phylogenically, stories may well have emerged mostly around the campfires our ancestors have regularly used for around 400,000 years.<sup>109</sup> Polly Wiessner’s study of conversation among the Ju/’hoansi Bushmen, hunter-gatherers of Namibia and Botswana, shows that while talk during the day focuses on regulating economic and social life, over 80% of talk around the campfire involves stories, often interspersed with music and dance.<sup>110</sup> The stories, often of real people of the current or the past three generations, full of laughter and surprise and embellished with gestures, imitations, sound effects, and song, also include pure fictions, folktales, myths, and reports of encounters with the spirit world. Robin Dunbar observes that firelight offered an extra four active hours or so when ‘social interaction, and pretty much only social interaction, could take place.’<sup>43</sup> Wiessner notes similar patterns of night tale-telling in the ethnographic record of other

foraging peoples, and draws the parallel to modern Western culture,<sup>110</sup> where after the working day people have told fairy stories to their children, read novels, attended the cinema, listened to radio plays, watched television dramas or played video games.

Storytellers have always earned recognition, attention and status. Wiessner comments of the Ju/’hoansi: ‘Stories provided a win-win situation: those who thoroughly engaged others were likely to gain recognition as their stories traveled’ (Ref 110, p. 14029). As Smith et al. show, the Agta people value their storytellers, prefer them as campmates, and offer them resources.<sup>77</sup> Although the BaYaka pygmies of the Congo do not trade in material goods, they will pay one another for spirit plays.<sup>51</sup> Homer, Shakespeare, and J.K. Rowling are the earliest campfire storytellers’ direct descendants in ever-wider modern worlds.

Play allows us to learn from trying out experience as wildly as we like within safe boundaries. Nonfiction narrative, whether new gossip or old lore, instructs our imaginations, and transforms our lives and our social world by extending our range of experience, but it depends on the accidents of what has happened and what the speaker has experienced directly or heard reported by others. Fiction does not. It allows us experience limited only by the recombinative imagination of storytellers, who can try out life within the boundaries of the story as exuberantly or as intensely as they like.

While true social report can catch our attention, especially by its direct connection to individuals we know, or those in circumstances akin to ours,<sup>60</sup> fiction can construct its surprising events, characters, changes of fortune, and implications precisely in order to hold us engrossed from first to last. We learn indirectly about predicaments<sup>98</sup> and prospects, norms and exceptions, values and violations through real-life stories too, but fiction can invent characters and events and the acutest angles on them to allow for maximum involvement and memorability, while also providing maximum opportunity for disinterested reflection and clarification.<sup>111</sup>

And although real-life stories offer insight into folk psychology, into people’s reasons for acting, they can present only outer views of actors: even if they speak within the course of factual narratives, they may hide or distort their thoughts. Fiction permits us access even to characters’ inner lives, or at least to storytellers’ imaginings of inner lives, to their attempts to render these more plausibly than other storytellers have done.

As even leading psychologists admit (Corballis [loc. 1274–1276] cites his mentor Donald Hebb),<sup>23</sup>

fiction can offer psychological depth and experiential breadth in ways scientific psychology cannot match. Fictional stories do more than exercise theory of mind (Lisa Zunshine's explanation of 'why we read fiction'),<sup>112,113</sup> but it seems highly likely that they *can* improve our understanding of human lives and possibilities. For the general case, see Hutto;<sup>10</sup> for an anthropological perspective, see Scalise Sugiyama<sup>59</sup>; for the developmental case, which shows that children exposed to more stories and more mentalizing terms in and around them develop aspects of folk psychology earlier, see Peskin and Astington and others.<sup>66,114–116</sup> It is difficult to prove that stories can improve adult understanding of human lives and possibilities, since most potential adult subjects have already been exposed to innumerable stories, and may already be at ceiling levels, but the evidence suggests at least a strong correlation between exposure to fiction and better social cognition, and to some, suggests that even in our story-saturated world reading still more fiction further improves social cognition.<sup>92,116–121</sup> Fiction also appears able to induce changes of social attitude more readily than nonfictional narrative.<sup>122</sup>

Fiction's effects at the social level are as striking as at the individual level. Because they are designed to earn attention, arouse emotion, and resonate in memory, stories can be particularly effective at imparting norms and showing the consequences of violating them, and thereby foster cooperation.<sup>51,77</sup> By appealing to a wide audience, and often in ancestral times or small-scale societies to the whole community, they can, as I have elsewhere explained, 'solve what economists call the problem of common knowledge (I will do something only if you will, and vice versa; but how do I know you will, and how do I know that you know that I will?) by making us feel that we share these values and react in much the same way' (p. 108).<sup>51,69,75</sup> By depicting suffering from the perspective of the sufferer they can be a means of expanding the circle of compassion.<sup>63–65</sup>

Like language, fiction is a collective, piecemeal human invention. Like language, and like narrative, it has shaped the niche into which human minds are born and the societies in which they mature, to the point where humans almost from birth have story-craving minds. As storytellers find new possibilities in their craft—more deliberately fostering and prompting the imagination,<sup>75</sup> more deftly probing psyches, more swiftly shifting perspectives, more often trusting to inference rather than statement—they change the selective pressures on audiences. Stories will continue to develop, and minds to evolve within the constantly self-renewing niche of fiction.

## EVOLVING IN THE RELIGIOUS AND SCIENTIFIC NICHES

Donald proposes that after the episodic and mimetic phases of mind, the next phase, the early human, constitutes the mythic.<sup>11</sup> He rushes too fast from the invention of language and narrative to myth.

If language emerged in the common predecessor to *Homo sapiens* and *Homo neanderthalensis*, currently identified as *Homo heidelbergensis*, then a long time seems to have elapsed between narrative deploying language and the emergence of religious myth. Only ochre, perhaps processed and used from about 400,000 years ago,<sup>123</sup> may suggest the possibility of early ritual and perhaps myth—but it may well have been used only for personal adornment or group identification.

There are a number of reasons to think that the emergence of narrative and of fiction, however indistinctly separated at first from nonfiction, had to change human minds before the first religions could emerge. Narrative foregrounds the idea of cause, and fiction, shaped by its tellers, can tightly marshal all causes and consequences relevant to the events in focus. Narrative, especially fiction, also serves to allay anxiety about uncertainty. Like play, in which animals throw themselves off balance in order to learn how to extend their range of control, stories traditionally plunge audiences into turmoil and suspense in order to bring them to a resolution that tames uncertainty and reasserts control.

The heightened awareness of cause within stories, and the satisfactions of uncertainty reduction at the ends of stories, would also have made uncertainty about the causes and courses of events outside story more salient. All the more so as more advanced folk psychology had brought our forebears to a clear understanding of false belief: that we or others can make mistakes when we do not understand the true underlying situation.<sup>75</sup> We do not like uncertainty, and because the kinds of causes we focus on most in our stories are animal or human agents, and because it makes sense to suspect a potentially dangerous agent in an unidentified sound or movement than to assume no agent when there is one, we have a disposition to over-read agency.<sup>124,125</sup> An inclination to confabulation,<sup>99</sup> which would only have been strengthened by exposure to story, would easily have led to positing unseen agents as a way to plug possible explanatory gaps. After all, unseen thoughts and feelings can direct our visible actions, and unnoticed actions (like an enemy or predator taking up a position undetected) can have serious observable consequences.

Moreover, we have an innate disposition to matter–spirit dualism,<sup>126,127</sup> and have long been concerned about, and still disagree over, the boundaries between matter and mind or spirit, between lifelessness and life. No wonder that animism, investing the inanimate and the animal with human-like ‘spirit,’ seems to have arisen in all early human societies, or that all societies have invested in explanations in terms of spirit-like agents.<sup>128</sup> Although we needed to understand physical causes of physical effects (the wind blew this hut down, lightning caused that hut to burn), a deeper level of explanation (why *this* hut *now*?) appeared to be offered by unseen agents, by, say, the animosity of witches or demons.<sup>129</sup> The first-pass physical explanations allowed people to cope with the physical world; a secondary level allayed anxiety about deeper unknowns.

Because we are still fascinated by the boundaries between life and death, living and nonliving, human and animal, even modern secular stories swarm with werewolves, vampires, zombies, and superheroes. In traditional stories, too, minimally counter-intuitive agents—unseen spirits, witches, gods and demigods—catch and hold attention.<sup>129,130</sup> Religious myth emerges from the stories that seem to offer the most compelling and memorable explanations. In suggesting ways to control uncertainty by earning the favor or appeasing the hostility of unseen forces, they help ensure cooperation and group cohesion,<sup>131</sup> even in hunter-gatherer societies that recognize, in Gray’s words, that ‘religious stories, while in some ways special and even sacred, are in the end just stories’ (p. 500).<sup>52,77</sup> The cultural selection of religious stories with moralizing high gods, with their even stronger effects on cooperation, eventually allows the emergence or consolidation of large-scale societies.<sup>128,132,133</sup>

Because we have developed and evolved in the language niche, we have language-craving minds. Because we have evolved in the narrative and the fiction niches, we have story-craving minds. Because we have evolved in the religious niche, we have religion-craving minds: even children brought up in the modern secular West pass through a phase of fascination with fairies, witches, and Santa Claus as a counter-intuitive monitor of children’s deeds and rewarder of their virtues.

The fertility of the imagination fostered by language and narrative gave rise to a hundred thousand religions. But since at least Xenophanes that very proliferation of supposedly ultimate causal explanations has also made some recognize that not all the competing accounts could be correct, and perhaps not any. After the first push toward naturalism from

Xenophanes to Democritus, science took two more millennia to become firmly established. Even now its causal explanations without agents seem more difficult for most to accept, without persistent explicit instruction, than stories that explain through the purposes and causal actions of spirits or gods. We live now in a scientific niche that has transformed our lives and our world, but our minds can be made to accommodate science only through explicit teaching that most still find difficult. We are not yet a species of science-craving minds.

## CONCLUSION

In *On the Origin of Stories*, I argued that fictional storytelling is itself a human adaptation, not just a byproduct of features the human genome was adaptively designed for.<sup>75</sup> Now I see that the very opposition of adaptation and byproduct reflects an overly gene- and individual-centered view of evolution.

Narrative arose from an adaptive predisposition for sociality, social monitoring, and information-sharing in our hominin forebears that found much richer expression after the invention of language. Language too arose from an adaptive predisposition for intense intraspecific communication, but was an invention that then impacted in complex ways on human development, individual and social behavior, cognition and emotion (including our craving for language), and presumably our genes, by means of the genetic assimilation explained first by Waddington<sup>5</sup> and the assimilate-stretch dynamic described by Jablonka and Lamb.<sup>7,8</sup> It allowed us to instruct one another’s imaginations, even toward experiences where interlocutors had not been copresent.

Once fueled by language, narrative impacted our development, our individual and social behavior, cognition, and emotion (our craving for narrative, for living our lives enriched by detailed indirect knowledge of many other lives), and presumably our genes. It made us more dependent on learning from experiences not our own.

Fiction in turn arose from our particularly strong hominin and human predisposition for play, itself adaptive for our social existence, as a learning, a bonding, and a corrective mechanism. Play quickly coupled with the possibility of verbal narrative (although it would surely already have found imperfect expression in earlier mimetic protonarrative) and also affected our development, especially our compulsion for pretend play, our individual and social behavior, cognition and emotion (our craving for stories of unreal as well as real lives), and



presumably our genes. To adapt Dor's dictum, first we invented stories, then they changed us.

Our predisposition to invent stories, especially stories that highlight agents as causes of events, fed in time into myth and religion, which in turn became an adaptive predisposition that did much to intensify within-group cooperation. Our natural bias toward agents as primary causes, and toward over-reading

agency, helped give rise to a disposition toward subsurface explanations that both delayed science and ultimately enabled it. Science has not yet become an adaptive predisposition, although this latest niche we have constructed has begun to have the strongest effects of all. But the effects of science depend on our sociality, our dispositions for language, for narrative, for fiction, for imagination, and for knowing the whole story.

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