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HOMO INVENTANS: THE EVOLUTION OF NARRATIVITY

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Until recently, evolutionary theory had been thought to be the exclusive domain of the biological sciences. Today this view is being challenged by constructivist psychologists, neuroanatomists, paleoanthropologists, and others in numerous fields who are studying the origin and evolution of language both in children (ontogenetically) and in our human ancestors (phylogenetically). From the perspective of cognitive anthropology, this paper argues that human narrativity has been in our ancestral past (phylogenetically) and continues to be in the present (ontogenetically), a fundamentally rational mode of discourse that is essential to personal and social survival and adaptation.

Two theoretical orientations have taken precedence in recent years: discontinuity theorists who support 'uniquely human' cognitive and communicative *abilities* that divide human and non-human primates and hominids (Chomsky, 1972, 1980, 1986; Fodor, 1980, 1983, 1987; Lieberman, 1991), and continuity theorists who support the view of innate, albeit not species-specific, cognitive and communicative *capacities* of humans and non-human ancestors (Gibson, 1983, 1988, 1993a,b,c,d, 1994; Lock, 1983, 1993; Marshack, 1992; Ragir, 1992; Armstrong *et al.*, 1994, 1995).

This paper addresses these questions: what is 'narrativity' defined in the broadest terms as gestural, iconic, kinesthetic, and spoken modalities of communication? Where did it originate in cognitive, phylogenetic, and ontogenetic terms and what functions did it serve for evolving humans? In attempting to respond to these questions, this paper adopts a gradualist or continuity approach which argues that 'the biological capacity for language evolved slowly and incrementally within the hominid line' (Armstrong *et al.*, 1994, p. 349; Gibson, 1990, 1994).

The compelling evidence for this approach lies in assembling the pieces of a complex puzzle composed of empirical evidence, scientific research, and logical inferences. What will hopefully emerge is a narrative reconstruction of the evolution of narrative preadaptations and prenarrative abilities that begins with apes, leads genetically and morphologically to hominids, and ends with the ancestors of hominids, modern humans. This narrative of narrative evolution will unfold in three major sections:

(1) *The evolution of cognition and narrativity:* this section discusses the brain structures and processes that underlie prenarrative and narrative capacities: embodied schemata generated from perceptual experiences; the cross-modal association of neuronal, knowledge-structuring processes responsible for the 'conversion of function' from one schemata (motor) to another form (language); and the gradual elaboration of narrative scripts from everyday routines and gestural word/signs over time into conventionally-sanctioned, archetypal narrative plots.

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(2) *The phylogeny of narrative:* the genetic continuity from apes to hominids and from hominids to humans has been shown through genetic taxonomy or cladistics, thus allowing for a phylogenetic model of narrative evolution. In addition, comparative analysis of ape and human brains has shown no *qualitative* differences between ape and human brain structures and processes that are implicated in prenarrative capacities. Rather, differences have been found to be mainly *quantitative* (e.g. the density of neuronal connections).
(3) *The ontogeny of narrative:* the evolution of prenarrative cognitive and linguistic abilities in pre-hominid, studied apes maps with those of children between two and three years of age. This genetically-based, seemingly isomorphic mapping of prenarrative abilities from apes to children strongly suggests an active role that recapitulation (among other factors) plays in children's cognitive and language development.

The evolution of cognition and narrativity

This section draws from the cognitive sciences (cognitive linguistics and cognitive semantics) in providing a brief overview of the brain structures and processes that underlie prenarrative and narrative capacities. They include the following: embodied schemata generated from perceptual experiences (Lakoff, 1987; Lakoff and Turner, 1989; Johnson, 1987; Deane, 1991; Turner, 1991); the cross-modal association of neuronal, knowledge-structuring processes responsible for the 'conversion of function' from one schemata (motor) to another form (language) (Calvin, 1987, 1993; Edelman, 1987, 1989); and, from 'semantic phonology' (Stokoe, 1991; Armstrong *et al.*, 1994, 1995), the gradual elaboration of narrative scripts from everyday routines and gestural word/signs over time into conventionally-sanctioned, archetypal narrative plots.

In cognitive linguistics evolution has been viewed from two opposing perspectives: a *modular model* (Fodor, 1975, 1980, 1983, 1987; Chomsky, 1972, 1976, 1980, 1986, 1990; Bickerton, 1990) that argues in favor of an innate and uniquely human structure for grammar and syntax distinct from other cognitive functions, and a *functional model* that emphasizes parallel processing and the hierarchical organization of information. Gibson describes human neuronal information processing as 'parallel processing with duplication of neural units and distribution of behavioral control among varied neural regions, many of which function simultaneously and are interconnected by a complex circuitry' (Gibson, 1994, p. 104; see, Deane, 1991, 1992; Edelman, 1987, 1989; Langacker, 1991).

The *first step* in the emergence of pre-human narrativity involves the schematization of perceptual experience (visual, auditory, and kinesthetic) in the spatial centers of the brain, notably in the inferior parietal lobe (IPL). This is not a linear process, but one that is recursive and interactive at every step along the way. According to semantic and cognitive linguists (Lakoff, 1987; Johnson, 1987; Deane, 1991, 1992), all perceptual experiences are processed in the brain as image schemata. And especially important to narrativity, which involves temporally-unfolding events, 'even action sequences are processed as if they were a spatial concept' (Deane, 1992, p. 47).

As Johnson argues (1987), image schemata are essentially mental structures 'which function as cognitive models of the body and its interaction with the environment' (Johnson, 1987, cited in Armstrong 1995, p. 35). In addition, 'a schema is a recurrent pattern, shape and regularity in, or of, these ongoing ordering activities' of the mind (Turner, 1991, pp. 24–25), such as *near–far*, *linking*, or *merging*. Turner refers to image schemata as embodied 'structures for organizing our experiences and comprehension', and as 'preconceptual structuring processes' whose structures can 'fit general concepts (e.g. the *over–under* schemata) and can generate particular images (e.g. a woven object image)' (Turner, 1991, p. 25; my parenthetical examples).

Donald Norman describes schemas as '*flexible configurations*' (by which we construct or constitute order), . . . continually in modification, continually adapting to reflect the current state of affairs. (They) are flexible *interpretive states* that reflect the mixture of past and present circumstances' (Norman 1995, p. 142; my italics and parenthetical inserts). Norman maintains that 'because the system configures itself differently according to the sum of all the numerous influences upon it, each new invocation of a schema may differ from the previous invocations. Thus, the system behaves as if there were prototypical schemas, but where the prototype is constructed anew for each occasion by combining past experiences with biases and activation levels resulting from the current experience and the context in which it occurs' (Norman, 1986, cited in D'Andrade, 1995).

Schematization appears to serve a number of adaptive functions, including: organizing our experience and understanding at the level of bodily perception and movement (Armstrong *et al.*, 1995, p. 31); enabling the organism to permute efficiently already existing mental structures; and, following from permutations, allowing for the modification of fast actions that require pre-planning, such as accurate throwing or shaping an 'utterance' (gesturally or vocally).

Of particular interest for innovative narrativity, permutations occur in schemata through a process of metaphorical mapping of schemata from one neuronal area to another. According to William Calvin, 'the brain is better at "new uses for old things" than any other organ of the body' (Calvin, 1993, p. 230). Permutations or 'new uses' provide improvements on an existing function, 'old things.' Permutations, in other words, represent a Darwinian 'conversion of function' by which nature takes leaps without the arduous task of total reorganization. For example, a leap may occur first through the imitation of an existing schema, and in time through the permutation or innovation caused by introducing new information to the original schema. This method of adaptation on the neural level, which Calvin calls 'rounds of shaping up', involves new neural sequence trains being graded against memories of how similar sequences have performed in the past. Through this process of self-monitoring and self-programming, the brain creates new sequences or schemata, which become permutations of older sequences. The new information that triggers a permutation may originate externally from sensory input or internally from other cell assemblies.

According to Armstrong (1995), 'image schemata are the very stuff out of which cognition and language are built' (Armstrong, 1995, p. 59, on Deane, 1991). Parallel information processing is necessary for rapid succession of skilled movements, such as the complex manual sequencing involved in tool use and production, as well as in syntactic and narrative production. Deane argues that the association region of the brain (ape and human) where this type of processing occurs is the inferior parietal lobe (IPL) 'where information from visual, auditory, kinesthetic and other sensory modes converge and may therefore be integrated' (Deanne, 1992, p. 278; on apes' cross-modal association area, see Savage-Rumbaugh *et al.*, 1988, cited in Armstrong *et al.*, 1994, p. 357). Deane's Parietal Hypothesis (1991), derived from Lakoff's Spatialization of Form Hypothesis (Lakoff, 1987, p. 283) seeks to explain the conversion of function from motor to linguistic schemata through a process of metaphorical mapping of schemata from one neuronal area to another. Edelman adds further support to this view in his theory of interacting neural maps which interact with each other in a process called *reentry*, 'the temporally ongoing parallel signalling between separate maps' (Edelman, 1989, p. 49; also see Churchland, 1986, pp. 473–474).

Evolution favors 'the fast track' (Calvin, 1993), and what the fast track meant for hominids and humans was the ability to 'get set' mentally or neurally pre-programmed before a critical moment (throwing or communication). This cognitive ability depends upon the neocortical space and elasticity—present in apes, hominids, and humans—both to generate neural schemas and, subsequently, to be able to adapt or revise them in the presence of new circumstances. In the case of manual and language neural areas of the brain, which share the same neural circuitry in the inferior parietal, fast track schemas from one area impact on the fast track schemas of the other. In other words, the formation of schemata to facilitate improved throwing impact upon the formation of episodic (presyntax and prenarrative) schemata implicated in syntactic and narrative structuring (Edelman, 1991).

The *second step* in prenarrative evolution involves an organism's ability to create an understanding of recurrent situations (or event patterns) by fitting them into structured frameworks or *scripts*. Narrative scripts evolve from the 'embryonic' events encapsulated in gestural word/signs, as well as from the routines of everyday life. The evolutionary process leading from prenarrative behaviors to gestural or vocal narrativity is grounded in generative semantics and cognitive grammar which maintain that syntax can be derived incrementally from presyntactic behavior. According to Armstrong, Stokie, and Wilcox, complex structures, like syntax are built incrementally both ontogenetically and phylogenetically. Stokoe's theory of a 'semantic phonology' describes this semantic and syntactic unfolding process as it applies to American Sign Language (ASL) (Stokoe, 1991; Armstrong *et al.*, 1994, 1995).

Armstrong cites Edelman's theory of neural group selection (TNGS) in explaining that 'the ontogeny of neural structure involves the selection of preexisting elementary neuron groups and their assembly into increasingly complex structures' (Armstrong *et al.*, 1994, p. 356). Visible (hand) gestures 'could provide the building blocks associated with neuronal group structures for constructing syntax incrementally, both behaviorally and neurologically' (Armstrong *et al.*, 1994, p. 356). Hand gestures or signs, such as those used in ASL, can be viewed as 'embryo sentences' which from the perspective of gestural analysis and generative semantics, represent the marriage of a gestural noun and a gestural verb (agent–action construction). For example, the sign for 'to understand', a fist, or hand in the act of grasping, placed against the side of the forehead, could also mean 'I understand that (you, him, her, them)'. In the neuronally-rich environment of human brains (humans' quantitative advantage), embryonic sign/words can become fully elaborated in the form of sentences and, over time, into related groups of sentences or scripts.

According to the rules of generative semantics, embryo signs/words also contain within them the seed of a narrative event or script. According to Savage-Rumbaugh, interactions between bonobos frequently take the form of a game, 'chase'. The gestural or spoken word *chase* can function as a simple, decontextualized *verb*; as an embryonic *sentence*, 'You chase me'; or as an embryonic *script* using the sign/word 'chase' as a prompt for a game or activity that involves 'a predetermined, stereotyped sequence of actions' (Schank and Abelson, 1977; cited in Turner, 1991, p. 20), for example, a specific game with its prescribed actions, agents, roles, and goals (see untaught zoo gorillas, Kubie and Zura below; Tanner and Byrne, 1996).

Scripts are similar to concepts in that they reflect generalized knowledge about perceptual experiences, but differ in that they focus on 'generalized knowledge about a sequence of events' (Rumelhart, 1975; cited in Turner, 1991, pp. 19–20) and they function as fixed templates for 'scripted activity as a basic knowledge structure' (Turner, 1991, p. 19). Schank and Abelson argue that 'we understand situations by fitting them into structural frameworks that include character, setting, sequences of events, causal connections, goals, and so forth that are the means by which we organize our knowledge of the world' (Turner, 1991, p. 19). According to Schank and Abelson,

> A script is a structure that describes appropriate sequences of events in a particular context. A script is made up of slots and requirements about what can fill those slots. The structure is an interconnected whole, and what is in one slot affects what can be in another. Scripts handle stylized everyday situations. They are not subject to much change, nor do they provide the apparatus for handling totally novel situations. Thus, a script is a predetermined, stereotyped sequence of actions that defines a well-know situation (Schank and Abelson, 1977; cited in Turner, 1991, p. 20).

While Turner likens embodied schemata to *plans* for ongoing interacting with objects and persons, giving us 'expectations and anticipations that influence our interactions' (Turner, 1991, p. 21), in contrast, scripts are more like templates for conceptualizing *past* experience. As cognitive linguist, Langacker writes 'language is embedded in the general psychological matrix and represents the evolution and fixation of structures having a less specialized origin' (Langacker, 1987, p. 13; cited in Armstrong *et al.*, 1995, p. 56). Prenarrative scripts, then, originate in the less specialized structures of malleable event schemata. To illustrate, a *journey* prenarrative script would be a stereotyped sequence of actions composed of *slots* related to character (traveler, companions, people along the way), setting (mountain, forest, desert, sea, etc.); sequence of events (departure, good and/or bad experiences, and destination (new or return home); causal connections, goals, etc. These slots themselves are the products of perceptual categorization and conceptualization derived from embodied schemata such as *near–far*, *away–toward*, *movement*, and *path*.

Langacker's theory of cognitive grammar 'provides a framework for understanding how language and cognition might be derived from prior systems based on perception and movement of the human organism' (Langacker, 1987; cited in Armstrong *et al.*, 1995, p. 56). His cognitive grammar provides insights for a continuity approach to the gestural origin of narrative because of the recognition it 'gives to the deep connections between visual perception, event cognition, and language' (Armstrong *et al.*, 1995, p. 57). In particular, he explains the cognitive reasons for the universality of nouns and verbs, which he says are grounded in human perceptions of physical objects and their interactions. First, he discusses 'role archetypes', which he believes are semantic roles that are prelinguistic conceptions grounded in the embodied events of everyday experience before they are linguistic constructs. Furthermore, he maintains that

> These archetypes reflect our experience as mobile and sentient creatures and as manipulators of physical objects. The archetype **agent** is a person who volitionally initiates physical activity resulting, through physical contact, in the transfer of energy to an external object. Its polar opposite is an archetypal **patient**, an inanimate object that absorbs the energy transmitted via externally initiated physical contact and thereby undergoes an internal change of state (Langacker, 1991, pp. 284–285; cited in Armstrong *et al.*, 1995, pp. 56–57).

Secondly, like linguistic structures with which perceptual, gestural and cognitive structures are in continuous interactions (Kimura, 1981), Langacker's 'canonical event model' provides insights into the semantic roles that shape gestural or vocal narrative scripts. In particular, his *stage model* for perceiving and reconstructing experienced events has important implications for understanding the origins of prenarrativity in the production of narrative scripts. According to his basic 'stage model',

> (T)he role of perceiver is in many ways analogous to that of someone watching a play. An observer's gaze is generally directed outward, toward other objects. Any moment his field of vision subtends only a limited portion of his surroundings, within which his attention is focused on a particular region, just as a theater-goer focuses his attention on the stage . . . There is further organization along the temporal axis, where clusters of contiguous interactions (particularly those involving the same participants) are perceived as forming discrete **events** (Langacker, 1991, p. 284; cited in Armstrong *et al.*, 1995, p. 57).

As Armstrong (1995) argues, Langacker's 'canonical event model' is virtually identical with a 'canonical gestural model' that was in continuous interaction with linguistic structures (Poizner *et al.*, 1987; and Kimura, 1981, on sign language and speech in same area of the brain).

As will be discussed further below, since the early hominids some rudimentary form of gestural expression is believed to have been in use (Armstrong *et al.*, 1994, 1995; Corballis, 1991; Hewes, 1978; Rickland, 1990; Tobias, 1987), and from then until the time when *Homo sapiens sapiens* were capable of and opted for vocal language (*ca* 40,000 B.P.), embryonic sign/sentences had gradually evolved into syntactically complex sentences that could be used for descriptive, analytical, narrative, and argumentative purposes. The adaptation to vocal language involved the relatively simple transfer of cognitive and linguistic abilities already developed through gestural language to a new modality, speech. This preadaptation of syntax and narrative in gestural language might explain how oral myths could 'suddenly' appear *ca* 33,000 B.P. Gestural language could have easily been instrumental in developing a rich reserve of narrative scripts and, perhaps even in beginning the process of conventionalizing popular narrative plots, such as those recited in ritual contexts (e.g. the creation of the world, ancestral origins, the hero's journey, etc., etc.).

The *third step* in the process of narrative evolution being hypothesized here, involves the conventionalization of prenarrative, probably initially gestural, narrative scripts. Returning to the journey example, the embodied schemata (*near–far*, *away–toward*, etc.) would be mapped to form a fixed, stereotypical journey script, which, in turn, would become a specific, conventional narrative plot with established archetypal characters, events, etc. The hero's journey is one well-known archetypal plot pattern (Campbell, 1949). Initially grounded in the blending of generic scripts (journey, deeds of gods, goddesses, and heroes, supernatural events and creatures), one notable version (in ancient Greek culture), probably out of many, became conventionalized over a long period of time, resulting in the oral, formulaic 'text' of Homer's *Odyssey*. The favored version was further stabilized when written down by Homeric scribes in the 6th century B.C. However, despite the evolution toward increasing stabilization in the narrative process, I need to emphasize that all along the way—from schematizing sensory experience, to creating scripts and narrative plots—innovation ('rounds of shaping up') has been an integral part of the process of cognitive–cultural adaptation. Revisionist myth-making can be viewed in this context as a form of innovative narrativity (differentiating, combining and recombining) that is grounded in the way the human brain processes external, sensory and internal, neuronal experiences (schemata) and creates mental frameworks (scripts) that help in understanding the past and in shaping the future.

The phylogeny of narrative

Narrativity served early and modern humans' biological and social needs to define and communicate social identities (part of managing genetic resources in kinship units), as well as to preserve, transmit, and revise socially-constructed knowledge (Lakoff and Johnson, 1980; Lakoff and Turner, 1989; Goody, 1982). These narrative capacities, I will argue here, are innate, albeit not species-specific, being traceable phylogenetically through the mental schematizing and sequencing abilities of non-human primates and hominids. Primate studies, including neurobiology and behavioral science, strongly suggest that modern apes have much to teach us about their immediate ancestors (and our human predecessors), the hominids, due to several areas of overlap: genetic taxonomy, brain structures and processing abilities of apes, hominid endocasts, and similar tool technologies, all of which suggest cognitive (and therefore prenarrative) similarities between chimpanzees and hominids.

This section focuses on non-human primates', hominids', and early humans' iconic, gestural, and kinesthetic prenarrative abilities. First, it discusses primate research which provides evidence of prenarrative abilities involving wild and enculturated apes. Secondly, it discusses the physical and inferential evidence indicating hominid cognitive-linguistic abilities, in part drawn from what is known about prehominid apes. Finally, it discusses early human prenarrative and narrative abilities, leading up to and including oral narrativity.

Researchers in a number of fields studying human evolution agree that manual dexterity (tool-making and use) and language (gestural, vocal) developed in similar ways and in synchrony due to shared neural circuitry (Lakoff, 1987; Dean, 1991, 1992; Calvin, 1993, on throwing; Gibson, 1993a,b,c,d, 1994; Edelman, 1987, 1989; Lock, 1983, 1993). Since oral narrative emerged late in this evolutionary process, we will focus upon wild and captive apes and hominid manual/gestural, iconic, and kinesthetic forms of prenarrativity: tool-making; 'reading' and producing tracking markers; and strings of vocalizations, signs, and lexigrams; action-ordered games and everyday routines.

Until recently, humans were thought to be *the* uniquely imitative and inventive species on Earth, and especially with regard to narrativity. However, the study of pongids (great apes, chimpanzees, gorillas, orangutans) over the past couple of decades challenges this hypothesis of discontinuity by providing empirical evidence of their *capacity* for spontaneously generating, imitating, and innovating prenarrative, mainly gestural behaviors. Experiments with enculturated pygmy chimpanzees and gorillas in captivity provide us with evidence of ability to organize a complex task, showing program-level imitative skills often without (or with little) direct human instruction. The focus of the section will be on wild and captive, enculturated apes' prenarrative behaviors which are compared with the 'program-level imitation' (Byrne, 1995, p. 71; Whiten and Ham, 1992) common in 16 month-old children.

What is the neurological and cognitive evidence of continuity between apes and humans to date? The evidence of genetic continuity from apes to hominids and from hominids to humans comes from the science of genetic taxonomy or cladistics. In addition, comparative neurological analysis of ape and human brains has shown no *qualitative* differences between ape and human brain structures and processes that have been implicated in prenarrative capacities. First, we know that ape brains are more similar to human brains than they are to monkey brains (Deacon, 1988, 1989; Greenfield, 1991; Holloway, 1966; Luria, 1966, *contra* Lieberman, 1984, cited in Gibson, 1994; Gibson, 1988, 1990, 1991, 1993a,b,c,d, 1994). Secondly, there are no qualitative differences in neural circuitry (Deacon, 1988, 1989) and apes (higher primates) have neural units involved in language: multiple somatosensory areas (IPL), Broca's area, and basal ganglia. We know that wild and captive, enculturated apes demonstrate program-level mental sequencing abilities, such as: tool use and production, devising games and imitating routines, and symbolic capacities, e.g. meaningful vocalizations, gestures in strings, tracking, comprehending spoken English, producing signs or using lexigrams, etc. (discussed below).

As Gibson (1994) and others have argued, any differences between ape and human brains constitute quantitative, not qualitative, differences, such as: absolute and relative brain size; human's larger, more expanded association regions (IPL) for more complex sequential and simultaneous mental and motor constructions, which are, notably, responsible for on-going permutations or innovations of the mental schemata implicated in throwing, tools, language; differences in the size of specific neural structures; and the ratios of neuronal connections to neurons (Holloway, 1966, cited in Gibson, 1994, p. 105). What emerges in behavioral terms are 'qualitative' differences in ape and human behaviors, in particular the remarkable differences in fine motor abilities (e.g. throwing and tool-making), as well as in syntactic elaboration.

We believe the evidence shows that human narrativity evolved incrementally from nonhuman primate and hominid preadaptations for narrative thinking. These preadaptive abilities in apes and, by inference, in hominids are demonstrated in sequencing, presyntactic, and prenarrative abilities to be discussed below, such as: strings of meaningful and intentional vocalizations and gestures; action-ordered games; tracking abilities and intentional trail marking; observational learning of everyday routines; intentional deception; symbolic or pretend play; a comprehension of novel English spoken sentences and production of short sentence strings with word-order rules (proto-syntactic). All these prenarrative activities (some admittedly more common than others) involve both the ability to process or 'read' and to imitate through one or a combination of observational learning strategies: emulation (goal-oriented), impersonation (detailed tasks), and program-level imitation (Whiten and Ham, 1992; Byrne, 1995).

Acquiring new skills through imitation is not, as previously believed, unique to *Homo sapiens sapiens*. Primate research provides ample evidence of various forms of imitative abilities (emulation, impersonation, or in rarer instances of 'human-like' program-level imitation in apes in the wild and in captivity). While humans may appear to be the primary imitative species or *homo imitans* possibly from birth (Meltzoff, 1988), program-level imitation has been reported in apes both in the wild and in captivity (Boesch, 1993; Gibson, 1993a,b,c,d; Visalberghi, 1993; McGrew, 1993, in Gibson and Ingold, 1993; Tanner and Byrne, 1996; Byrne, 1995). To 'ape' after all, means to imitate. While sharing the capacity for mental schematization and, to a degree, program-level imitation with great apes, large brained humans distinguish themselves in being mentally equipped and flexible enough *to innovate and elaborate* upon established mental structures (schemata, syntax, scripts, and archetypal plots).

Tool use and production

That chimpanzees do imitate has been borne out by population differences in chimpanzee tool-using traditions in the wild (Terrance *et al.*, 1979, in Gibson and Ingold, 1993, p. 132). The existence of chimpanzee imitative capacities is corroborated by Boesch, noting that 'mother chimpanzees in the Tai Forest behave as if they expect their young to imitate them' (Boesch, 1993, in Gibson and Ingold, 1993, pp. 132–134) and on very rare occasions (twice in several years), emulation (goal-oriented) was combined with the mother's active teaching of the young in nut-cracking techniques that take up to 11 years of practice to master. They can generalize uses of an object, using many different kind of objects as tools and for many different purposes (Byrne, 1995, p. 93). Wild and captive chimpanzees invent novel tool uses; use objects to solve problems (see Byrne, 1995, pp. 188–90 on chimpanzee and hominids on tool use), e.g. using poles as ladders to escape captivity; and make tools, but never by combining two objects or a tool/object used solely to make another tool (Byrne, 1995, p. 97, cites one possible exception).

The best evidence of program-level imitation, according to Byrne, comes from the wild mountain gorillas' techniques for processing food and eating celery, which involve complex, multi-stage skills (Byrne, 1995, pp. 73–77). The fine details of processing Galium appear to be learned observationally by impersonation of some of the detailed actions like leaf folding. Learning the technique seems to resemble the process of learning a script which is grounded in prior schematization of perceptual experience. Byrne's other examples of unenculturated, wild-caught apes show how humanly-modeled behaviors can result in the observational learning in the impersonation of detailed subtasks or the emulation of the results (goals) of task stages. For example, an orangutan could follow the steps involved in chopping weeds along a forest path and sweeping them up into neat piles or in starting a fire in a camp stove (Byrne, 1995, pp. 69–70).

For apes in captivity, there is evidence of their ability to organize complex tool-using tasks, involving program-level copying of task organization and enough manual dexterity to copy detailed motor acts with some or little human instruction. For example, the well-known, enculturated bonono, Kanzi, had limited instruction from anthropologist, Nicholas Toth, who demonstrated for him how to make a flint cutting tool from a stone to cut a rope (Toth and Schick, 1991; see Wright, 1972, in Byrne, 1995, pp. 188–190, on a similar experiment with an orangutan). Using what appeared to be the emulation of the results of task stages (not precisely impersonation, which refers to copying detailed motor acts, as of human caretakers). Kanzi knapped flint by throwing down the stone on a hard surface, akin to hypothesized hominid methods of flint knapping in Oldovian 1.5 My ago, using trial and error until he produced an effective flint tool. He then used the flint tool to cut a rope that kept a box containing a banana closed. Despite Kanzi's remarkable accomplishment, among neither pongids in the wild nor in captivity, has there yet been found evidence of the invention of tools with more than one component, or evidence of joining two objects to form a new tool or other structure (McGrew, 1993, cited in Gibson and Ingold, 1993). These abilities are associated with quantitative differences in neuronal interconnectivity underlying schematic innovation and elaboration.

Behavioral prenarrativity

Behavioral preadaptations for narrativity have been observed both in the wild and in a zoo setting with uninstructed apes. I would like to focus on the following behaviors that appear to be most clearly preadaptive for narrativity: marking and following trails; playing action-ordered games; and learning multi-tasked, everyday routines. The first behavior, marking and following trails, was recently reported to have been observed in the wild (Savage-Rumbaugh, keynote address at the conference on 'The Minds of Nonhuman Animals', University of Colorado, Boulder, April 19, 1996). Savage-Rumbaugh relates how wild bonobo adult males in Zaire mark frequently traveled trails by smashing leaves into the soft soil with their feet. Since groups of from sixty to one hundred bonobos travel great distances by foot along the forest floor, it is important for the purposes of group cohesiveness to indicate the direction of travel for those following. Therefore, they mark key junctures along the trails occurring in a 25 square mile area, using the smashed leaf technique, as well as marker branches to indicate the direction of the trail, the direction of travel, and the location of day nests. The ability to create these trail markers shows preplanning and second-order intentionality (Byrne, 1995, pp. 119–123). In addition, the bonobos' ability to follow the marked trail involves a cognitive activity akin to 'reading' iconic symbols in a 'protosyntactic' sequence. Wild bonobos' trail-marking and tracking abilities suggest *innate* program-level imitation skills learned observationally by *individual* adult males, not simply by a general process of socially-imitative learning (Whiten and Ham, 1992, pp. 248–249).

A second behavior has to do with action-ordered games, accompanied by gestures initiated by a 13 year-old captive, untaught adult male, Kubie, and 7 year-old female, Zura, lowland gorillas (*G. gorilla gorilla*) in the San Francisco Zoo. The authors, Tanner and Byrne (1996), discuss the different types of gestures used spontaneously by Kubie in his interactions with Zura to affect play or physical contact. I wish to focus on the apes' spontaneous initiation and imitation of action-ordered, game 'scripts' (also referred to as 'event knowledge' or 'event model' in Bruner, 1983; Nelson, 1986; Savage-Rumbaugh, 1991, p. 215; Langacker, 1991, p. 284). The authors reported observing six different 'games' in the interaction between Kubie and Zura: tree tag, nest-and-stump chases, bag tug, rock wall keep-away, nest and mountain trading, mating positioning. While the authors did not discuss the components of these games, it is reasonable to assume that each game is composed of its own subroutines. For example, 'tree tag' 'involves "keep-away" activities with trees and stumps as barriers for hiding and chasing and Kubie's nest of burlap bags as a "home base"' (Tanner and Bryne, 1996, p. 167).

Using Langacker's 'canonical event model', one can infer prenarrative capacities in certain behaviors of enculturated bonobos. Specifically, they imitate the program-level sequences of everyday routines and learn to understand and to use lexigrams and vocal symbols (Savage-Rumbaugh, 1991, pp. 215–216). Kanzi, learned vocal and lexical symbols and the comprehension of novel spoken English sentences, within the context of a process-oriented, interindividual experience that began by learning everyday routines (Savage-Rumbaugh, 1991, p. 215). As Savage-Rumbaugh explains, 'The chimpanzee's daily interactions with caretakers, although not experimentally programmed, can be viewed as a series of interindividual "routines," which become ever more complex and interchangeable with maturation and experience. The word *routine* is used to mean a more or less regularly sequenced set of interindividual interactions that occur in a relatively similar manner across time, or at different times' (Savage-Rumbaugh, 1991, p. 215).

Kanzi and certain conspecifics have learned to imitate numerous everyday routines through observation learning. Because each routine, such as diaper-changing, preparing the milk bottle, blowing bubbles, etc. 'develops spontaneously, and no experimental guidance is given' (Savage-Rumbaugh, 1991, p. 216), it inevitably differs on each new occasion. At the same time, each routine has predictable components that follow a set script. For example, 'blowing bubbles' would involve the following components: finding the bubble jar; opening the bubble jar; getting the bubble wand out of the bubble jar; blowing bubbles; watching or attempting to pop the bubbles. 'Additionally, some components often are added by the apes themselves, such as drinking the bubbles and/or pouring the bubble liquid out on the floor' (Savage-Rumbaugh, 1991, p. 216). Caretakers use verbal markers (lexigram or spoken words) to denote the different parts or subtasks of the routine. 'As routines are learned, behavioral changes occur in the ape that suggest that the ape now knows the main components of the routine' and 'Once the routine is understood, it will be initiated by the ape' 'In so doing, the ape moves from being a passive observer of a routine to an active participant, to a primitive initiator, to a communicator symbolically announcing his or her intentions (lexigrammatically or gesturally) to another party' (Savage-Rumbaugh, 1991, p. 217).

Linguistic prenarrativity

Gibson writes that 'comparative studies suggest that in evolution, as in ontogeny, object manipulation and language skills mature through the differentiation of existing behaviors into smaller component parts and *the combination and recombination* of these differentiated skills into new and varied behavioral patterns' (Gibson, 1983, p. 37). Permutations, as Calvin informs us, carry out the 'conversion of function' by which nature takes leaps without the energy-intensive task of total reorganization. Leaps, we are told, occur first through the imitation of an existing function or process, and then through the permutation, innovation, or 'progressive restructuring' (Ragir, 1992, p. 44; Edelman, 1987, 1989) that results from the introduction of new information into existing schemas.

A preadaptation for syntactic organization ('protogrammar' or presyntax), has been shown to exist in chimpanzees, bonobos, as well as in gorillas (Gardner and Gardner, 1969; Savage-Rumbaugh and Rumbaugh, 1993; Savage-Rumbaugh, 1994; Patterson, 1978; Patterson and Cohn, 1990, 1994). At the very least, the demonstrated ability of these apes to put gestures, ASL signs, vocal calls, or lexigrams into sentence-like strings suggests, as Hewes observes, 'a preadaptation to syntactically-ordered language' (Hewes, 1978, pp. 19–20; elaborated in Armstrong *et al.*, 1994, 1995). Visible evidence of an innate capacity to generate grammatically-ordered language appears in perhaps its earliest form in what has been called the locked-box problem solved by chimpanzees. With little human training, chimpanzees were given experimental problems involving something very much like syntax. One of the problems went as follows: 'successive locked boxes, etc., had to be opened with special keys or other tools, in a fixed sequence, in order to obtain rewards. Successful solution of such tasks seems to require syntagmatic abilities of a fairly high order' (Rensch, 1967, p. 55, in Hewes, 1978, p. 20). Since solving the locked box problem relies upon the ability to recognize causally-related and embedded sequences (a preadaptation for syntax), ape behavior shows some cognitive abilities related to perceptual categorization and hierarchical-ordering.

This theory gains further support from observations of untaught gorillas in a zoo setting. In one reported case, a five-member group of gorillas used over forty 'discrete and meaningful gestural types and conversational strings' of up to eight gestures in request–response dialogues (Patterson and Gordon, 1993, p. 75). In another example, Kubie, the lowland gorilla, used iconic gesturing, involving a *armswing under* often combined with *tap other* in a single cohesive phrase, to affect 'male/female interaction and bonding' (Tanner and Byrne, 1996, pp. 167–169). The most commonly used, complete phrase 'was effectively a three-part imperative statement with locational modifier: "Tap other/armswing under/(touch genital area)" (usually accompanied by a playface), which might perhaps be roughly "translatable" as "you/come to me/for sexual contact play"' (Tanner and Byrne, 1996, p. 168). In addition to these iconic gestures, Kubie used deictic (pointing) gestures, "indicating Kubie, the signaller, or Zura, the recipient, as actor or object of action or sometimes indicating locations in the environment for shared focus of attention in play' (Tanner and Byrne, 1996, p. 169). The authors believe that the presence of another, older silverback male in the group compelled Kubie to resort to silent gestures to elicit Zura's cooperation without attracting the other male's attention. From this perspective, Kubie had intentionally 'invented' iconic (silent) gesturing for the purpose of deception (see Byrne, 1995, pp. 119–122 on intentional deception).

Not surprisingly, enculturated apes show even more adeptness than untaught captive apes at comprehending and imitating their human caretakers' use of word-order rules. At the level of a 2–3 year old child, Kanzi's use of lexigrammatical symbols and gorilla Koko's use of ASL have been described as 'protogrammatic' or presyntactic. The development of the ape's latent social-cognitive skills, relative to their untaught conspecifics, have been explained in terms of the 'scaffolding' and intentional instruction that serves to 'socialize the attention' (Tomasello, 1988; Vygotsky 1978; cited in Tomasello *et al.*, 1993, p. 1702). This 'scaffolding' appears to bring about the 'conversion of function' from object manipulation (e.g. the locked-box problem; Kanzi's tool problem solving;) to gesture (e.g. zoo group's request-response dialogues; Kubie's gestural 'statements') to symbol (e.g. Kanzi's use of lexigrams; Koko's use of ASL (See Lock, 1983; Bruner, 1983; Nelson, 1985, cited in Savage-Rumbaugh, 1991, p. 218)).

Kanzi learned vocal and lexical symbols and to comprehend novel spoken English sentences within the context of a process-oriented, interindividual experience that began by learning everyday routines. 'Just as parts of the routine are learned and practiced spontaneously after observing the caretaker, so do the caretaker's gestural and verbal markers come to be responded to appropriately across time' (Savage-Rumbaugh, 1991, p. 217). It must be emphasized that these 'verbal markers', such as 'find (or "open", "blow", "play with") the bubbles', relate to decontextualized lexigrams, as well as to embryonic sentence/events that imply certain routines and behavioral scripts. For instance, the lexigram *bubbles* is semantically dense (i.e. embryonic or undifferentiated) in that it contains the reference not only to an object/noun (*bubbles* or *jar of bubbles*), but also to a multi-staged routine or script (agent–action–object–goal, etc.). Similarly, when Kanzi uses the lexigram *chase*, he elicits not only a single verb, but also a game-script or a multi-staged routine, which he may follow strictly or submit to some form of prenarrative behavioral inventiveness.

If apes may not be able to create actual sentences or narratives, it has been shown that they can comprehend and construct rudimentary, 'protogrammatical' sentences. Bonobos (Kanzi, Mulika, and Panbanisha) and chimpanzees (Panzee and Washoe) demonstrated the ability to communicate in two-word sequences by combining lexigrams and gestures, and gorillas (Koko and Michael) used from two to seven string signed utterances. They practiced this both spontaneously and by imitating their human caretakers ('scaffolding'). Beginning by learning routines and verbal markers, Kanzi has a large working lexical vocabulary and follows instructions given in spoken multi-word and unconventional sentences, such as, 'Would you hide some leaves in your shirt?' or 'Put the pine needles in the refrigerator'.

In addition to language comprehension, Savage-Rumbaugh reports that Kanzi has created his own word-order rules for word sequencing (Savage-Rumbaugh and Rumbaugh, 1993; Sevcik and Savage-Rumbaugh, 1994). She argues that while his caretakers consistently modeled agent–action word order constructions, Kanzi implemented his own action–agent word order (lexigram followed by gesture), such as *chase* (lexigram) plus 'you' (gesture) and he has generalized this lexigram–gesture structure to apply to other lexical relationships.

In addition, Kanzi uses a modified agent–action–object sequencing rule by consistently omitting, but implying any reference to himself as agent or object in agent–action–object (s/v/o) constructions. For example, he combines two lexigrams or a lexigram and a gesture in: '(Kanzi) grab Matata' or 'Matata bite (Kanzi)' (Savage-Rumbaugh and Rumbaugh, 1993; Sevcik and Savage-Rumbaugh, 1994). While gorillas, Koko and Michael, consistently sign in s/v/o constructions and include references to themselves by name or pronoun, Kanzi uses this modified agent–action–object sequencing rule modeled by his caretakers. Kanzi's less complete mode of expression is not due to a lack of self-awareness (Savage-Rumbaugh 1996, in conversation); rather, it may be due to his way of coping with (simplifying) the inherent complexities of 'juggling' both lexigrammatic and gestural modalities. As Savage-Rumbaugh has intimated (1996, in conversation), the differences in language abilities between chimpanzees and gorillas has less to do with intelligence than with the nature of the modalities of communication that each has learned.

Sign language instructed gorillas (Koko, Michael and Ndume) who have not had to cope with the same 'complexity' of expression as Kanzi does, typically create their own holophrastic or proto-sentences with a string of two to seven word (sign) constructions. Koko frequently used action–object (82%) and agent–object (76%) constructions (Patterson, 1978, p. 94–95) and included herself by name or pronoun in the signed utterance (Patterson and Gordon, 1993, on self-awareness in lowland gorillas). Koko's sign sequencing appears to follow both structural rules that naturally evolve in gestural communication systems (Menendez and Patterson, 1994–1995, p. 3), as well as to imitate word-order sequencing rules (agent–action–object) modeled by her caretakers. The differences between ape and human symbol usage is stated succinctly by Gibson (1994):

> Apes have not yet spontaneously composed phrases and other linguistic units that are embedded in higher order hierarchical syntactic structures, and their comprehension of English syntax has not exceeded that of a human child of 2–3 years of age. Consequently, no distinct qualitative gaps separate human and nonhuman symbolic and syntactic capacities. Rather, humans have larger communicative repertoires and apply greater hierarchical constructional capacity to their syntactic symbolic communications than do apes (Gibson, 1994, p. 101).

Evidence of cross-modal association (IPL) has been found to exist in chimpanzees (Savage-Rumbaugh *et al.*, 1988; cited in Armstrong *et al.*, 1994, p. 357). This cognitive ability has been implicated in perceptual categorization which provides the foundation for metaphoric thinking. Metaphoric thinking, in turn, is believed to underlie language acquisition, in general, symbolization (sign/signified relationships), and the ability to create spontaneously compound and blended signs, such as Koko's innovative signing (Patterson and Cohn, 1990; Patterson and Gordon, 1993; Menendez and Patterson, 1994–1995). Of the 290 ASL signs that Koko has learned, she has invented 54 signs or created 15 new signs by compounding and blending familiar signs (Menendez and Patterson, 1994–1995, p. 3). 'In each of these innovations, Koko appears to have altered the configuration and/or motion of her hand while retaining the location of her original signs' and, 'Koko appears to be altering familiar words in ways which conform to both an ASL lexical system as well as her own unique categorization and structural system' (Menendez and Patterson, 1994–1995, p. 3).

Koko's innovative signing generally calls upon perceptual similarities, or a kind of preconceptual, metaphoric mode of thought (e.g. shape, texture and patterns, movement, and size attributes). In addition, she has produced over-extensions (generalizations) and compound names from known objects to describe objects that are new to her, as a two year old child would (Patterson and Cohen, 1990, p. 143). Most interestingly, Koko is the only ape to date reported to have spontaneously constructed a metaphor by using ASL. On the first occasion, she was drinking water through a piece of (grey) rubber hose from a pan on the floor. After repeatedly asking a companion for a drink of juice, and being ignored, she referred to herself as a 'sad elephant' (Patterson and Gordon, 1993, p. 65). (Whether the elephant metaphor was modeled by her caretakers some time earlier is not clear.) On another occasion, when shown a picture of a bird feeding her young, Koko pointed to the adult bird and signed, 'Koko good bird' (Patterson and Gordon, 1993, pp. 65–66). While this example is cited as an example of Koko's child-like incongruity-based humor (she signs later when asked if she can fly, 'fake bird, clown' and 'gorilla Koko'), both examples (elephant and bird) also show her recognition of perceptual (long trunk) and relational (mother–child) similarities, as well as her predisposition for role-playing, a form of symbolic play (discussed below).

The third type of prenarrative behavior observed in apes has to do with the prenarrativity found in symbolic or pretend play. Developmental psychologists believe that symbolic play (like intentional deception) serves as a preadaptation to spoken, and later to written, narrative for children between the ages of two and five years old. First, we must distinguish between *game-play*, which involves activities like hiding or chasing that are so popular with apes in the wild and in captivity and children; *exploratory play*, which mainly involves object manipulation; and *symbolic or pretend play*, which involves the imaginative transformation of one object or individual into another (Pellegrini, 1985, p. 107). Some of the apes in these studies who were described as 'pretending' (Hayes and Hayes, 1951, cited in Hewes, 1978; Savage-Rumbaugh and Rumbaugh, 1993) appear to have been merely following verbal prompts asking them to play-pretend.[1] More importantly, there is spontaneous pretend play, common to children, but also observed on occasion among enculturated apes.

To complicate matters, there appear to be two kinds of pretend play. One type describes imitating roles and activities from everyday routines or scripts, for example when Kanzi puts on a scarf or sweeps the floor. In another example of what appears to be spontaneous or genuine pretend play, Koko 'created an imaginary social situation with two gorilla dolls. She signed "bad, bad" while looking at one gorilla and "kiss", while looking at the other. Next she signed, "chase, tickle", hit the two dolls together, and then wrestled with them' (Patterson and Cohn, 1994, p. 285). Here, the gorilla has mentally transformed the dolls into living, interactive playmates and used signed 'private speech' (Vygotsky, 1978) in order to rehearse (or possibly to invent from other subscripts) her own play-script.

Spontaneous role-playing, as well as intentional deception, involve the ability to take the other's perspective for a predetermined purpose. Both Kanzi and Koko have been reported to have engaged in intentional deception for various reasons (Savage-Rumbaugh, 1996, conversation; Patterson and Cohn, 1994, p. 283). In an example of what appears to be spontaneous role-playing, Koko adopted the perspective of her 'baby', a stuffed orangutan doll, when Penny Patterson asked, 'Where does the baby drink?' Koko 'molded the doll's hands to form the signs "drink mouth", with the doll's hand indicating the doll's mouth' (Patterson and Cohn, 1994, p. 284). If Koko had answered the question from her own perspective, she would have indicated 'nipple', which is where the 'baby' drinks from her. Koko has demonstrated the ability to take the other's perspective in the elephant and bird metaphors, and in her role-playing from the gorilla dolls and from the 'baby's' perspectives. Koko's accomplishments show that the *capacity* for symbolic play and metaphoric expression, which occurs spontaneously in children between the ages of two and five years old, appears to be latent in apes, requiring some human 'scaffolding'. Kanzi's ability to imitate symbolic play and Koko's occasional excursions into symbolic play and metaphoric expression currently mark the outer most boundary of non-human primates' imitative and inventive abilities.

Hominid's narrative capacity

Anthropologist Sonia Ragir writes, 'It is reasonable to assume that the capacity (whatever it is) to use language has to be almost universal in the hominid population before language can emerge' (Ragir, 1992, p. 42). In this section, I will argue that the hominid *capacity* for narrative expression, in particular, would have been actualized gesturally and iconically, along with some vocalization (Armstrong *et al.*, 1994, 1995). Thus nonvocal modalities for narrative expression would have provided the foundation for the emergence of oral narrative shortly *after* modern humans attained full vocal capabilities or around 35,000 B.P.

As early as the australopithecine era, new organizational features in the brain were apparent (Rickland, 1990, p. 180). With a cranial capacity similar to that of a modern chimp, early hominid brains show a 'prominence of the inferior frontal convolution, forward placement of the brain stem (consistent with bipedalism), expansion of the inferior parietal lobe (IPL)' (Armstrong *et al.*, 1994, p. 357), and reorientation of the cerebellum. The IPL is of special interest due to its having been strongly implicated with schematization, cross-modal association, and gestural language. Armstrong continues:

> Despite continuing controversy, there seems to be more general agreement concerning the presence of neurological structures underlying language in the earliest representatives of the genus *Homo*: "The occurrence of both a strong inferior parietal lobule and a prominent motor speech area of Broca in the endocasts of *Homo habilis* represents the first time in the history of the early hominids that the two most important neural bases for language appear in the paleoneurobiological record" (Tobias, 1987, p. 753; Corballis, 1991, p. 185; cited in Armstrong *et al.*, 1994, p. 357). It is also notable that the IPL in the left hemisphere is critical to signing, as well as speech (Poizner *et al.*, 1987; Kimura, 1981).

The IPL is, also, the seat of schematization where embodied schemata 'function as cognitive models of the body and its interconnections with the environment' (Deane, 1991, pp. 363–364). Deane and other cognitive linguists (Geschwind, 1965; Laughlin and D'Aquili, 1974; Armstrong, 1983) have called attention to the importance of this cortical area for the cognitive processes underlying language, and especially for the spatialization processes underlying grammar (Deane, 1991). It is a cross-modal association area 'in which sensory input from several modalities including vision, hearing, and somatosensory systems, is integrated without mediation by the limbic system' (Geschwind, 1965, cited in Armstrong *et al.*, 1994, p. 357).

Armstrong hypothesizes that hominids were aware of the resemblance between things done with the hands (gestures) and events/objects further away possibly by 'reentrant mapping' which correlates the patterns of near and distant events and objects in the brain, making them isomorphic in brain structure. Neuronal structures akin to 'reentrant maps', found in macaque monkeys (Perrett *et al.*, 1989), are implied in language comprehension and production of the pygmy chimpanzees and gorillas discussed above (sign/signified as a metaphoric relationship). With bipedalism, hominid hands were used for numerous things, such as shaping tools for striking, piercing, and cutting, igniting and controlling fire, making clothes and shelter, domesticating animals and cultivating plants. 'But with their hands and developed brain and greatly increased eye–brain–hand neural circuitry, hominids may well have invented language—not just expanding the naming function that some animals possess but finding true language, with syntax as well as vocabulary, in gestural activity' (Armstrong *et al.*, 1995, p. 197).

Some agreement exists among paleoanthropologists that as early as the close of the australopithecine era (*ca* 2 My ago), a rudimentary grammatically-ordered sign language system may have been in use (Armstrong *et al.*, 1994, 1995; May, 1974; Jaynes, in Harnad *et al.*, 1976; Shafton 1976; Dingwall, 1977, cited in Hewes, 1978). At least by *Homo habilis*, hominid language was probably multi-modal, combining gestural, iconic, and some vocal modalities of expression. As discussed earlier, gestural embryonic word/sentences contained within them a presyntax and prenarrative event scripts.

According to Armstrong *et al.* (1995), the primate genera *Australopithecus* and *Homo* 'belong to an order whose members are better at taking things apart than at putting them together, but to do that they need something to take apart. To see the rudiments of syntax, it is only necessary to look perceptively at the parts of a gesture (i.e. differentiating), like grasping a finger or miming throwing. Getting from consciously produced signs to syntax is a matter of analysis, not synthesis' (Armstrong *et al.*, 1995, p. 182). He continues, 'visible gestures most probably were used by hominid populations, along with early spoken words, for naming things' (Armstrong *et al.*, 1995, p. 181). 'Suppose that words are the starting point: before they can be fitted into something resembling syntax as commonly understood, words must be sorted into categories—two categories at least to begin with: nouns and verbs, i.e. names for things that act and names for actions and states' (Armstrong *et al.*, 1995, pp. 183–184). Syntax, as mentioned earlier, is grounded in perceptual experiences, 'a reflection of patterns of cause and effect (and similarity and differences) we see in the world around us' (McCrone, 1991, cited in Armstrong *et al.*, 1995, p. 184; my parenthetical remark).

Once a hominid could recognize the natural pattern of actor-plus-act, the next crucial step, according to Armstrong, is equating the relations in sentences with relations in the outer world; i.e. 'pairing of visible events with similarly structured visible gestures provides the relations, and the relations between relations, without which language and syntax are impossible' (Armstrong *et al.*, 1995, p. 185). This pregnant recognition, apparently present in non-language taught apes, as well as in enculturated apes, therefore, must have been a given for hominids.

In tandem with the development of a gestural language, hominids were already probably 'reading' nature's iconic narratives. That hominids would have benefited both socially and as a species from being able to 'read' natural and gestural signs probably goes without saying. Being able to predict the movement of animal herds or seasonal changes would have been basic to their survival. It can be inferred that the ability to 'read' the signs of nature, i.e. to see patterns and relationships, in the natural, physical world (e.g. seasonal changes, animal tracks, physiological changes, etc.) would have carried over into 'reading' gestural signs, i.e. the 'pairing of visible events with similarly structured visible gestures'. These visible gestures, handshapes used in signing, have been described as tokens, a kind of iconic representation 'derived by direct resemblance to the things they represent or through figurative processes such as metaphor or metonymy' (Armstrong *et al.*, 1994, p. 355).

Human narrativity

'Through the hand of man, the mental faculty was transformed gesturally into language, and through language into cultural expression' (Armstrong *et al.*, 1995, p. 197).

Around 40,000 B.P., a veritable 'explosion' in the development of tool construction and language occurred in humans (Gibson, 1983; Lock, 1983; Gibson and Ingold, 1993; Wind *et al.*, 1992). Soon thereafter, there was a cultural explosion of art, ritual and myth. I would like to replace the model of a discontinuous, unprecedented cultural expression with a view of underlying continuity from multi-modal prenarrative (non-human primate, hominid; *Homo habilis*), multi-modal proto-narrative, and fully actualized gestural/vocal narrative in modern humans. What motivated this effusive expression of human cultural expression in the form of the various modalities of narrativity? In addition to the neuronal factors already mentioned, another contributory factor may have been related to problems posed by steady population growth, and the consequent needs to define social identities (kinship units), as well as to preserve, transmit, and revise socially-constructed knowledge crucial to their individual and collective survivals.

We have already discussed how gestural language probably began in embryonic word/sentences (Stokoe) and word/events (Langacker) that were multi-modal, relying upon gestural, kinesthetic and iconic modes of communication. In this section, I would like to demonstrate how human narrative expression grew out of the differentiation or unpacking of an inherently dense gestural modality of narrativity. This unpacking process, occurring over a long period of time (approximately 1.5 My ago to 40,000 B.P.), led to the cultural 'explosion' *ca* 40,000 B.P. This explosion was expressed through modalities previously conflated in gestural language, the iconic and the kinesthetic, added to the new modality of speech: (iconic) cave art, mobile art or fetishes, ritual masks, body painting; (kinesthetic) ritual dance, mime, enacted scripts (proto-drama); and (vocal) oral narratives, especially myths or origins, ancestry, and (perhaps later) heroic deeds.

We have already mentioned Gibson's idea that 'in evolution, as in ontogeny, object manipulation and language skills mature through the differentiation of existing behaviors into smaller component parts and the combination and recombination of these differentiated skills into new and varied behavioral patterns' (Gibson, 1983, p. 37) This process of differentiating, combining, and recombining applies to neuronal schematization, as well as to the process of unpacking gestural language into its components. Each of these modes represents a form of proto-narrativity (in receptive and productive terms), derived from the prenarrative aspects of gestural language discussed earlier. In the sections that follow, I will look, in turn, at the following forms of proto-narrativity: iconic and kinesthetic; vocal; and ritual and myth.

Iconic and kinesthetic forms of narrativity

Both iconic and kinesthetic proto-narrativity began with what I refer to as a 'reading'/ receptive (or attentional) stage of narrativity. Such receptive protonarrative experiences of the natural world might include acts of 'reading' the visual-iconic signs, such as: the changing weather patterns; human physiological changes, such as birth, growth and aging; or the seasonal movement of wild game. As Hewes points out, tracking game was one particularly salient type of visual sign in nature that was probably 'read' by hominids and early humans. He reasons that 'the ability to identify particular game animals by their hoofmarks, to determine their numbers, whether they were moving slowly and securely or rapidly and warily, seems to me analogous both to reading and to the decoding of gestural signs'.

Iconic and kinesthetic proto-narrativity capitalized upon time-ordered, innate structuring and representational capacities (schematization, categorizing perceptions, and recognizing patterns of causality) of the human mind. Such time-ordered events (tracking; diurnal, seasonal, and physiological changes) map with narrative development, which similarly involves: listening, observing, reading, schematizing, reciting, and retelling. These retellings of temporally-unfolding, human everyday experiences would have led to repeated informal narrative retellings, which, if culturally significant, would have become stabilized in the form of formal narratives or myths. Over a period spanning hominids (*ca* 1.5 My ago) and early humans (*ca* 100,000 to 40,000 B.P.), the growing ability to 'read', interpret, and recount (iconically, gesturally, and, to a limited extent, vocally) experiences of the natural world would have functioned as a preadaptation for oral narrative and, in particular, myth.

Acts of 'reading' the signs of the natural world would be followed over time by a productive stage of proto-narrativity, acts of 'retelling' these events in a social context. These retellings might occur either *iconically* (cave art, carved figures, body decoration, masks), *kinesthetically* (dance, mime, event-reenactment), or through *gestural* or *vocal modalities of expression*. Hewes has observed how more than one form of retelling might occur in a given context: 'Related to the hunt, at least among modern hunter-gatherers, are hunting dances or rituals, in which animals may be skilfully imitated, by mime and gesture, but also by onomatopoeic sounds' (McBride, 1973, p. 15, cited in Hewes, 1978, p. 37).

Another kind of iconic proto-narrativity would have occurred with the cave painting of the Upper Paleolithic, Aurignacian (30,000–13,000 B.C.) period. While much research has focused on determining the nature of images depicted, methods of production, and exact dates of execution, little has been done to assess these images as components of iconic narratives (correspondence with F. d'Erico, Université de Bordeaux in progress). It has been suggested that these cave drawings of predator and prey animals and hunting scenes depicted on the wall of sacred sites (especially in Spain), as well as the human hands—perhaps those responsible for their deaths, played a part in various rituals and the worship of animal-ancestral spirits or powers. Prehistoric and more recent petroglyphic and pictographic art, discovered in Europe, the Middle East, Africa, and the American Southwest (Pueblo), has been interpreted as iconic narratives of mythic or ritual events. For example, Carole Patterson-Rudolph argues that Pueblo Indian petroglyphic symbols relate aspects of myths that exist to the present among Pueblo Indian people (Patterson-Rudolph, 1990).

Patterson-Rudolph's reading has important implications for Upper Paleolithic cave painting, which might be better understood as a form of proto-narrative. In the example of the hunting ritual (cave painting in Alpera, Amarga, Cueva Remigia, or Tormón, Spain), the salient moments from the past are visually 'reactivated' on the cave walls, transforming the past into the mythic present. In this ritual setting, hunting dances, for example, could have taken place with dancers wearing animal masks, body paint and chanting (vocally and/or gesturally) stories related to the hunt. It may be that carved figures, too, like the lion-man mammoth ivory, an anthropomorph or a human figure wearing a lion mask from the Aurignacian (*ca* 30,000 B.P.) served in a ritual context where dancers, too, wore lion masks and, as Marshack suggests, where the clan reenacted a lion myth in a ceremonial dance (Marshack, 1992, p. 438), perhaps, 'retelling' the myth of the Lion Clan's ancestral origins. In France (Troi Frères Cave and Espélugues), sketches of shamans with animal masks (bull, stag) adorn the cave walls, giving us more visual evidence (i.e. masked dancers, fetish-like figures, and cave paintings) of these proto-narrative events.

To add further credence to this hypothetical scenario, I propose that the Fraternity rituals of modern hunter-gatherer hunter societies (Zuni Indian) may shed light on the multi-modal narrativity of Upper Paleolithic people. As Matilde Stevenson has painstakingly reported (Stevenson, 1901–1902, p. 23), the Zuni Indians' Hunters Fraternity initiation took place in a ceremonial chamber (a cave-like kiva) whose walls displayed murals of anthropomorphic figures, including shamans, as well as prey and predator animals engaged in flight and pursuit (*iconic narrativity*) (Stevenson, 1901–1902, p. 438). Part of this ritual centered upon an animal dance (*kinesthetic narrativity*) involving animal impersonation and mimicry wherein dancers wore masks fashioned from the skins of animal heads (Stevenson, 1901–1902, p. 440; Ortiz, 1979, p. 334). In addition, songs of the fraternal order were chanted (*vocal narrativity*) to 'invoke the gods to give them power over the game when on the hunt' and 'songs of thanksgiving after capturing of game' (Stevenson, 1901–1902, p. 438). Animal fetishes used in the hunt were, also, involved in the ritual events (Cushing, 1972, pp. 32–39), as were Hopi kachina dolls (Kachina cult), which, like the lion-headed human figure of the Aurignacian, are replicas of humans wearing animal masks and costumes in impersonation of supernatural, anthropomorphic beings during ritual ceremonies.

To anticipate a later section, the emergence of ritual in early human prehistory seems to reflect the gradually unfolding cognitive processes of the *differentiation* of previously conflated gestural, iconic and kinesthetic modes of prenarrativity, followed by the *combination* of these separate modalities (art, dance and gestural and/or vocal expression) into the new proto-narrative, multi-modal script of ritual.

Vocal forms of narrativity

Oral narrative follows a generative and combinatory pattern of development, like manual skills (Gibson, 1983, 1993a,b,c,d; Lock, 1983, 1993). It was selected because it provided the 'fast track' (Calvin, 1993, p. 235, p. 248) in defining kinship units and preserving and communicating shared knowledge. With *Homo loquens*, the first human speakers had already been combining iconic symbolism (carved and clay figures, cave art) with vocal (song, chant, auditory mimicry) and gestural (dance, animal impersonation, sign language) modalities of communication. Early human oral narrativity quite simply capitalized on the time-ordered, innate structuring and representational capacities of the human mind already actualized in gestural and iconic narratives.

The transfer from gestural and iconic to oral narrative (storytelling, myth) in the evolution of human language may be understood as undergoing a 'conversion of function' (Calvin, 1993) by which permutations of an existing function occurs, a process by which nature takes leaps without the energy-intensive task of total reorganization. Leaps, we are told, occur first through the imitation of an existing function or process, and then through the permutation, innovation, or 'progressive restructuring' (Ragir, 1992, p. 44) that results from the introduction of new information into existing schemas.

Continuity scholars generally agree that vocal communication must have had some selective advantage(s) over gestural communication. What those selective advantages might have been is still generating discussion, but it seems clear that vocal communication capitalized upon already operating neuronal structures and processes and overcame the inherent limitations of gestural communication with respect to time (after dark), to space (out of view), and to efficiency of social interaction. In contrast with the limitations of gestural communication (Armstrong *et al.*, 1994, p. 358; citing Hockett, 1978, Armstrong, 1983; Corballis, 1991, p. 158), vocal communication leaves the hands free to aid the young or to demonstrate a manual skill, being especially efficient in instructing the young in kinship units; and it allows communication in the dark (time), past physical barriers (space), and 'among speakers whose attention is diverted' (social impact) (Armstrong *et al.*, 1994, p. 358).

It is widely known that 'all cultures have stories, fables, and legends. Narrative thinking is used by all humans everywhere', and, 'Without such (narrative) structure we would not be able to make sense of the world and to synthesize it into memorable stories' (Danesi, 1993, pp. 140–142; Bruner, 1990; Britton and Pellegrini, 1990). When the human capacity for creating prenarrative scripts was combined with the capacity for speech, oral narrative was born. These scripts probably drew upon everyday patterns of experience, such as, birth/death, departure/return, coming/going, rising/falling, ignorance/knowing, conflict/resolution, empty/full, etc. As if residing in an innate and unchanging 'collective unconscious', as Carl Jung proposed, these generic and unconscious episodic schemas, the shared patterns of human experience across time and place, became stabilized as narrative scripts and later conventionalized as mythic or folkloric plot patterns derived from everyday experiences.

This narrative *capacity*, as the evidence shows, had already existed in the non-propositional modalities for creating meaning (gestural and iconic narrativity) that existed millenia before spoken language, probably going back as far as the hominids (Marshack, 1992; Armstrong *et al.*, 1994, 1995). Myth-making, which combines all of these abilities—event knowledge, narrative scripts, symbolization, and speech—proved to be the most efficient means available to preserve, transmit, and revise communal knowledge.

Ritual and oral narratives

As the pool of humanly-constructed knowledge in narrative forms grew increasingly large, so did the need to preserve, to recite, and eventually to revise this communal treasury. Vygotsky tells us that memory systems in oral cultures are based either on the environmental stimuli of 'natural memory' or on human-made objects that stimulate memory in the form of cultural products or 'mediated memory' (Vygotsky, 1978, pp. 38–39). Remembering in primary oral cultures, then, relies heavily upon environmental and cultural artifacts (totems, fetishes, knotted or notched sticks, sacred objects, verbal *ecphrasis*, etc.) and planned, formal and fixed, performances (ceremonies, rituals, storytelling, speech-making) intended to preserve knowledge and to stimulate one's memory.

In oral, or even transitionally oral-literate, cultures, knowledge is perceptually-based and context-dependent, that is, embedded in the human and natural worlds. Anthropologist Jack Goody writes about the three sources of knowledge in oral cultures: pragmatic, primary knowledge from immediate experiences; traditional knowledge transmitted by elders or through ceremonies and ritual (myths, stories); and supernatural, oracular or special knowledge transmitted by ghosts (or ancestors) (Goody, 1982, pp. 210–216). Rituals of initiation, included under the second type, are one of the primary means of transmitting traditional knowledge by combining gestural (dance, dramatic enactment), iconic (figurines, masks and costumes), and oral (mythic narrative) communication.

Initiation rituals in tribal societies are grounded in human observations of physical and emotional maturation processes (puberty), coupled with the society's need to transmit traditional knowledge to the younger generation. In this light, initiations enable a people to anticipate these biological and social changes, and, therefore, to be able to maintain societal traditions while accommodating change. These rituals are composed, in large part, of narrative acts of 'remembering' that are formalized within a ritual context, which is a solemn form of symbolic play. According to Jean Houston, initiates are first 'stolen' away from their homes at night and are guided by a *mystagogos* or initiator to a sacred site where an important mythic event important to the tribe's history is reactivated, that is, relived, in the present (Houston, 1992, pp. 288–292). Later, they are sequestered and experience a 'remembering' whereby they learn secret tribal knowledge. In this way, youths are said 'to become storied' that is, to learn the myths of creation of the world and of their people, the struggles of their forefathers or genealogies of the leaders often originating in the mythic past with a divine ancestor. The initiate undergoes a symbolic death, regeneration, and rebirth and emerges a spiritually and intellectually re-born adult, possessing a more mature understanding of the world and one's role in it.[2]

Oral narratives in tribal cultures often function as a ritualized remembering or 'becoming storied' that takes the form of local myths. Just as the initiate physically enacts a return to the 'sacred ground' of tradition, the mythic poet must imaginatively return by drawing upon the cultural stock of narrative scripts and schemas. In mythic narrative, the Muse signifies a *mystagogos* and the sacred ground the orally transmitted mythic tradition. While maintaining this stable structure, the poet recontextualizes the prior story by reconfiguring it into a new mythopoetic text(ile). Through the process of 'becoming storied' by the poetic Muse, the mythic past is reactivated in the poet *cum* initiate. The revisioned mythic text is, thus, born out of the sacred ground of received paradigms and made meaningful in the present.

In Homer's *Odyssey*, the importance of returning to the sacred ground of tradition by becoming storied is made clear to the hero, Odysseus. In this oral epic poem, the prophet Tiresias tells Odysseus that in order to reach his home and kingdom in Ithaca, he must first descend to the land of the dead to visit his deceased ancestors. Once there, he is immediately surrounded by the spirits of family, friends, and the heroes and heroines of his land, pressing him to hear their stories and to *retell* them to the living. James Applewhite has compared Odysseus to the poet in that 'He or she gathers stories out of cultural and personal history: old stories that will be seen in the new form of their retelling. Like Odysseus, the poet learns from the past how to get back home to the present, how to live in it more vitally, how to proceed into the future. When we've come to the past as free persons, able to accept and internalize its mighty echo, it can send us along our way, abler and more confident, surer of our mission, and of who we are' (Applewhite, 1994, p. 44). The idea of preserving ancestral knowledge, while retelling their stories in a way that is meaningful both personally and to the present audience, describes the fundamental nature of all narrative production, and in particular, one of its earliest literary forms, revisionist myth-making.

The ontogeny of narrative inventiveness

The evolution of prenarrative cognitive and linguistic abilities in pre-hominid, studied apes maps with those of children between two to three years of age. This genetically-based, seemingly isomorphic mapping of prenarrative abilities from apes to children strongly suggests an active role that recapitulation plays in children's cognitive and language development (Armstrong *et al.*, 1994; Gibson, 1983, 1993a,b,c,d, 1994; Gould, 1977; Lock, 1983, 1993; Patterson, 1978; Patterson and Cohn, 1990; Tomasello, 1988; Savage-Rumbaugh *et al.*, 1988; Savage-Rumbaugh and Rumbaugh, 1993; Sevcik and

Savage-Rumbaugh, 1994). On a cautionary note, regardless of how compelling the similarities are between apes' and two year-olds' cognitive-linguistic abilities, we must remind ourselves that children's development is not controlled by a single mechanism. Rather it is made more complex due to the effects of a long neoteny and a *quantitatively* neuron-rich, mental plasticity. Herein must lie the reason for, in all practical terms, *qualitative* differences in cognitive and linguistic *abilities* between apes and humans.

The new, neuro-biological circumstances faced by human infants and children leave them more impressionable for a much longer period than apes are with respect to adult psycho-linguistic scaffolding, instruction, and a steady influx of cultural influences. In addition, the process of feedback looping generated between latent cognitive capacities and cultural factors, such as adult scaffolding, strongly influences children's (as well as enculturated apes') psycho-linguistic development, including the pace of individual developmental clocks. While narrativity is universal among all human cultures, the degree to which latent innovative narrative (and other) capacities are actualized appears to be controlled by cultural attitudes.

Research confirms that in a child's first six years, the development of object manipulation and language occur in synchrony, a process that loosely parallels the motor and language synchrony shown to exist in our genetic ancestors (phylogenetically). Mental and behavioral constructional capacities interact 'in a generative fashion', and 'this interacting suite of human behaviors includes imitation, teaching, object manipulation and manufacturing skills of all kinds, social behavior, and symbolic communication. All are tied together into a complex *web* by higher cognitive and neural information processing capacities which permit expanded human mental constructional capacities' (Gibson, 1993a, p. 136; my italics).

Object manipulation and language appear to have developed in synchrony, as we learn from numerous researchers in primatology, anthropology, archaeology, psychology and neuropsychology, behavioral sciences, biology. Kathleen Gibson, professor of anatomical sciences, writes, 'Both language and object manipulation skills depend upon similar mental constructional processes. Both begin with simple forms and mature to the point where the child can construct semantic and object formations of extraordinary variety' (Gibson, 1983, p. 48). Both share neural circuitry in the IPL of the left hemisphere. For both manual and language skills, children begin with undifferentiated (generic, stereotypical) skills and move to increasingly more differentiated and reconstructed ones.

The child's cognitive and narrative development may be seen to progress through stages that begin with gestural and iconic expression, and their gradual transfer to or combination with oral and, later, written narration. Scholars generally agree that the synchronous development of object manipulation and language proceeds as follows (Gibson, 1983, 1993a,b,c,d; Lock, 1983, 1993). In the first few months, the infant makes generalized cooing sounds of undifferentiated phonemes and stereotypical gestures, that is, they cannot be self-corrected once initiated. By the second year the child is differentiating and combining numerous movements involved in the complex act of walking, and combining simple gestures (pointing) with a variety of single words (toy, milk), and imitating simple behaviors (smiling). Between two and three years, about the same time that she is using building blocks, simple puzzles, or composing generic drawings (house, dog), the child is speaking in simple grammatical constructs (clusters, syntactic units).

Between three to five years old, language and motor skills are becoming increasingly differentiated. We witness more individualized drawings, more complex building and puzzles, agent–action–object syntax with embedded structures, and meaning constructed on the sentence level. At this point, I would like to focus on children's developing narrative competency and its relationship to narrative revisionism or innovation. Children's developing narrative competency progresses by following a building block pattern of construction as follows: by first learning, reciting, and internalizing narrative schemas, then events, then episodes, and, finally, narrative scripts. When a treasury of narrative scripts have been internalized in the first years of primary school, children begin to use parts of these scripts to construct their own oral or (in literate cultures) written narratives. The process of narrative invention assists the child in understanding his/her world, as well as in developing a sense of self or personal identity.

This developmental process can be observed to migrate from gestural and iconic narrativity, a kind of narrative pre-adaptation, to oral and written narrative or storytelling. While the first phase of the development of narrative competency (cognitive origins, imitation, and comprehension of narrative forms) in pre-school and primary school children has been the object of much research (Galda, 1984; Gardner, 1980; Heath, 1982; Nelson and Gruendel, 1979; Pellegrini, 1985), the second phase, which includes narrative reconstruction by altering existing narrative scripts, a form of psycholinguistic innovation, has received little, if any, attention.

At preschool age, children are combining iconic and gestural narrativity with speech in a number of creative ways. I would like to focus on two of these 'nonliterate' modes of narrative: drawing and symbolic play. With respect to iconic narrativity, a single drawing might visually 'tell' a story or provide the child with the stimulus to do so orally, or the child might draw a sequence of pictures, such as a picture board, that visually depicts a narrative event 'read' in temporal sequence. With regard to symbolic play, it is typical to observe children from three to five years old pretending an object is something else, such as a rock being a diamond or rope being a snake, or pretending to be someone else, real or fictitious, such as a teacher or a cartoon character.

Children's symbolic play draws upon the narrative scripts and schemas (Nelson and Gruendel, 1979; Lakoff and Turner, 1989; Pellegrini, 1985; Schank and Abelson, 1977; Turner, 1991) reconstructed from their everyday experiences (like meal-time or bed-time) and the stories they have heard or witnessed (as on television or movies). As in written narrative later, children engaged in symbolic play demonstrate narrative competency by being able to reconstruct story schema, 'the mental representations of story structure' (Mandler and Johnson, 1977, cited in Pellegrini, 1985, p. 109). 'These stories are represented mentally (i.e. schematically) in terms of settings and characters' feelings and actions. An important part of narrative competence is knowing story characters' prototypical behavior and knowing that characters' plans and acts are temporally and causally motivated. Children use such character knowledge while enacting roles in symbolic play' (Pellegrini, 1985, p. 109; my parenthetical remark).

The process of developing narrative competency through symbolic play relates to Vygotsky's belief that 'early social communication precipitates private speech', which, in turn, 'gives rise to all uniquely human, higher cognitive processes' (Vygotsky, 1978, cited in Berk, 1994, p. 80). 'The most significant moment in the course of intellectual development', Vygotsky wrote, '. . . occurs when speech and practical activity, . . . converge' (Vygotsky, 1978, cited in Berk, 1994, p. 80). Through repeated 'practice' in symbolic play, narrative scripts and schemas become internalized as silent, inner narratives, and it is at this stage that children are capable of reinventing these scripted narratives by combining and varying the scripts internalized and abstracted from everyday life (Nelson and Gruendel, 1979; Schank and Abelson, 1977), perhaps as synchronously, from stories. In this way, as a prelude to reinventive or revisionist narrative (oral or written), children at this age use symbolic play to incorporate new experiences into their existent story schema. This process of narrative development from symbolic play and drawing or iconic narrativity in children may provide a window on the narrative development of our human ancestors leading from ritual (a form of symbolic play) and cave drawings *ca* 33,000 to 13,000 B.P. to myth.

Storytelling or narrativity, I have argued, progresses in stages (ontogenetically and phylogenetically). It begins with faithful recitation or playful reenactment based upon most children, under normal circumstances, having been 'storied' (that is, talked and read to, watched ritual ceremonies, movies, or television) from birth. Preschool children can easily recite a story they have heard orally or read to them; imitate the act of reading (a form of pretending) by holding a favorite book while reciting or retelling the story in their own words; and tell stories prompted by picture books and based upon their own drawings. In addition, children at this age are rapidly learning the narrative schemas and scripts that compose their everyday lives: eating, dressing, cooking and house cleaning routines; a variety of adult roles and occupations; as well as, the roles of fictional characters from books, television, and the movies. These narrative scripts are, in turn, rehearsed in the symbolic play and artistic expression that often, but not necessarily, takes place in social context. In the enacted narrative scripts of symbolic play, preschool children use 'private speech' to master narrative schemas on the way to internalizing them.

After reciting or enacting narrative scripts, children three to five years, have begun to internalize a number of narrative scripts. At this point, we find that they begin to engage in retelling narratives (paraphrasing, creating variants), often with a new or personal emphasis (Bakhtin). At this age, children can create new variants of learned narratives in a number of innovative ways, such as: by putting stories into their own words, by creating variant versions, or by combining the elements from different stories into their own stories. In the child's narrative development, reciting reflects the imitative behaviors involved in mental schematization and learning any skill, while retelling and reconstructing a narrative reflects the next stage in the developmental process, the innovation of existing skills or structures by adding variants or new combinations to a fixed narrative script or macrostructure. This stage has been referred to as the 'mythic' or 'holistic' stage in the child's cognitive and narrative development.[3]

Most germane to innovative narrativity, however, is the development of children's metacognitive awareness of a stable narrative script or text as distinguished from the interpretation of it. Listening to others read a text provides the scaffolding necessary to prepare the child for reading a text alone. Learning to recite stories helps the child gain control over and eventually to reconstruct story schema (character, setting, action, motive) and to internalize them. When the private, but social voice of symbolic play and recitation transfers to the inner voice of mental mastery (Vygotsky, 1962; Berk, 1994), the child has reached the next stage in narrative development, the metacognitive stage necessary for revisioning and interpreting. Revisionist narrativity, I would argue, is one of the leading cognitive–linguistic strategies that children between three and five years of age use in the process of concept and identity formation.

Throughout the elementary school years, the child has the cognitive *capacity*, if not always the ideal cultural environment, to progress from narrative recitation to narrative retelling (innovation), a process that leads to the decontextualized, abstract conceptual modes of the advanced literacies (academic, scientific, corporate). In the West, where innovative thinking is highly regarded, these discourses, introduced in high school and practiced throughout college and after, are infused with the elaborated forms of revisionist thinking and narrative. For example, in high school, students learn the distinction between expository writing (reciting information) and argumentative writing (retelling with a new conceptual focus). Later, as an adult, if one joins an academic discipline, revisionist thinking or retelling still permeates abstract conceptual thinking. This is evidenced by the proliferation of revisionist histories and literary studies, especially in the past decade. The robust, politicized revisionist climate in late twentieth century Western culture embraces academic, scientific and literary discourses.

NOTES

[1]In one example of prompted pretending, Kanzi responded to the sentence, 'Can you make the doggie bite the snake?' by picking up the toy dog and placing it near the rubber snake, putting the snake's head in the dog's mouth, and using his thumb to close the dog's mouth on the snake's head (Savage-Rumbaugh and Rumbaugh, 1993, pp. 98–99). This example shows the difference between prompted pretending, and the spontaneous pretending apparent in the symbolic play of a two to three year old child. If Kanzi had initiated the pretend biting scenario (assuming that he had previous similar experiences *and* that he was not simply imitating a caretaker who had been pretending to make the toy dog bite the rubber snake), or if he had spontaneously picked up a rope or another snake-like object to simulate a snake, then, in my view, Kanzi would have been engaging in spontaneous symbolic play.

In another case, where an ape was purported to be spontaneously pretending, Viki, a chimpanzee in captivity, was said 'to pull an imaginary toy on an imaginary string' (Hayes and Hayes, 1952; my italics). This example is problematic because the human observer appears to be the one interpreting (perhaps over-ascribing) the nature of Viki's behavior ('pulling'), as well as the nature of both the object and pulling mechanism ('an *imaginary* toy on an *imaginary* string').

[2]Mircea Eliade, *Myths, Dreams and Mysteries: The Encounter Between Contemporary Faiths and Archaic Realities*, tr. Philip Mairet (New York: Harper and Row, Publishers, 1967); originally published as *Mythes, Rêves et Mystèrs* (Libraire Gallimard, 1957). Eliade talks about how myths of origin 'are not just recited no matter when or no matter how, but only to accompany and justify a ritual designed to *re-make* something or to *make*, to create a new spiritual factor (the shaman) or situation' (p. 61). See Eliade (1967, pp. 209–228) on symbolic death and rebirth in initiation rites.

[3]The three to five year-old child's worldview can best be described as synthetic, meaning that differentiation of self and other, or saying and meaning, is incomplete. Their cognitive or epistemological state has been described variously as: undifferentiated, preliterate, holistic or mythic: Fischer (1971, 1987); Ong, 1982; Winnicott, 1965, 1971; Vygotsky, 1962, 1978. Ego or identity-formation appears to involve the process of separation or differentiation from the mother or primary caretaker. Hence, the child has a sense of departure from a state of mythic Oneness with the other into that of a separate Self. Therefore, identity formation, developing a sense of separate self, is a key developmental issue at this age that is assisted by narrative inventiveness.

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