

Recurrence of Bear Restoration Symbolism: Minusink Basin Evenki and Basin-Plateau Ute

Lynda D. McNeil

Program for Writing and Rhetoric, University of Colorado,
ENVD Building 1B30, Boulder, CO 80309, USA
e-mail: Lynda.McNeil@colorado.edu

Abstract

By combining ethnographic and evolutionary psychological approaches, this paper compares adaptive strategies of two groups of hunter-gatherers colonizing marginal environments, one in Southern Siberia (Minusink Basin) and the other in North America (Great Basin and Colorado Plateau). The biological and cultural survival of Southern Siberian (Evenki) and Basin-Plateau (Numic) hunter-gatherers depended upon developing a complex of social and symbolic strategies, including ritual, oral narratives and rock art. These symbolic representations, which emerged in response to reproductive and somatic demands, appear to have been preserved and transmitted inter-generationally, and to have recurred cross-culturally above chance.

Keywords

Bear restoration symbolism, Evenki (Southern Siberia), recurrence of symbolic representations, spring revival rites, Ute Indian (North America)

By combining cultural ecological and evolutionary psychological approaches, this paper reconstructs similar adaptive strategies of two groups of ancient hunter-gatherers colonizing marginal environments in Southern Siberia (Minusink Basin) and North America (Basin-Plateau). Both hunter-gatherer groups, the Tungusic Evenki (Trans-Baikal and Yenisey River) and the Numic Ute (Great Basin and Colorado Plateau), colonized marginal regions by adopting similar adaptive strategies responsible for their biological and cultural survival: macroband annual aggregations for spring revival rites. For both groups, spring revival rites and related symbolic complexes expressed in myths and rock art iconography, emerged in response to reproductive and somatic demands.

Earlier studies concerning hunter-gatherer mobility and mating strategies in low density populations (Mandryk, 1993; MacDonald, 1999) emphasize “the tendency of hunter-gatherer populations, particularly in seasonal environments, to alternate between dispersion into minimum bands during that

part of the year when resources are scarce ('fission') and aggregation into larger maximal bands in seasons of abundant resources ('fusion')" (Conkey, 1980, 1992; Bahn, 1982; Mandryk, 1993, 43 (inserts added); Moure, 1995; Sieveking, 1997). Focusing on a less often considered adaptive strategy, this paper discusses how hunter-gatherers living in widely dispersed microbands with low population densities periodically aggregated into macrobands at a time of maximal scarcity in late winter/early spring (vernal equinox). According to anthropologist, Mandryk, "while cultural success or failure is ultimately environmentally driven, the operative factor (or solution) resulting in cultural failure is social" (Mandryk, 1993, p. 67 (insert added)).

Based upon Tungusic (Evenki) and Numic (Ute) etic and emic data, the solution to challenges in marginal environments (Goebel, 1999, p. 223 on Siberian paleo-environment), periodic ceremonial aggregations, was to a notable degree social and symbolic. Both peoples dispersed into microbands for most of the year, but came together periodically for purposes of food-sharing, exogamous mating-finding, and alliance or information-sharing networks. Similar macroband spring revival rites (Evenks *ikenipke* or "revivals" and Ute Bear Dance), occurred for both groups around the time of the vernal equinox. While these gatherings were undoubtedly advantageous, taken alone they may not have been sufficient to guarantee cultural survival. To maximize the chances of cultural survival, such biologically-motivated social efforts had to be preserved and transmitted inter-generationally through a complex of socially-constructed and shared symbolic representations in ritual, myth, and rock art.

This raises a question at issue addressed in this paper: how could non-literate peoples preserve and transmit symbolic representations related to religious beliefs and ritual practices cross-culturally and over considerable time, and if so, by activating what memory enhancing mental capacities? Furthermore, what adaptive function would these symbolic representations have served for non-literate hunter-gatherers? This paper analyzes ethnographic accounts and field observations to explore a repertoire of memory-enhancing cultural strategies, notably symbolic representations, centered around Evenki and Ute Indian macroband spring revival rite aggregations. Furthermore, it discusses memory-enhancing strategies that account for the recurrence of similar symbolic representations above change cross-culturally.

Evenki Bear Restoration Rites

A.I. Hallowell (1926) studied Northern Hemispheric (boreal) bear cults in Siberia, focusing on Tungusic groups in the Amur River and Sakhalin Island regions, and in North America. Only briefly does he mention the Tungusic

Evenki (in northern Siberia today, but once from the Yenisey River to Lake Baikal) and he goes so far as to exclude the Ute Indians of North America from his list of boreal peoples with bear cult rites, which he limited to *post mortem* rites (Hallowell, 1926, p.145, fn. 627). Partly to redress this omission, this paper will focus on a Siberian (Evenki) and a North Amerindian (Ute) bear restoration macroband (communal) rites and reasons for their recurrence. The Evenki fall Bear Festival and Spring Revival rites, like the Ute spring Bear Dance, comprise a ritual cycle for which bear hunting and postmortem rites apparently played a symbolically significant part.

Yenisey (Western) Evenki

According to ethnographic accounts (etic) and ancient oral traditions (emic), Tungusic, proto-Evenks colonized Southern Siberia from the Ob and Yenisey River in the west to the Okhotsk Sea in the east (Astakhov, 1966a; Goebel, 1999; Okladnikov, 1981). Made up of numerous small groups, these Evenki clans adopted names often related to their territorial rivers (Erbogachenskiye, Zapadnye (Yenisey), Podkamennaya Tunguska, Symiskiye, Vitim, etc.). Due to their wide distribution in small bands with low population densities, these Tungusic peoples (and possibly their neighbors, as in the Amur today) relied upon aggregations of neighboring clans for fall bear festivals and spring revival rites, effectively to address challenges in exogamous mate-finding, food-sharing during late winter scarcity, and alliance forming.

Their cosmology stemmed from a unique amalgum of Mongolian and non-Tungusic beliefs. First, we identify the Mongolian belief in a three-tiered cosmological structure (upper-human-lower worlds), accessed by way of the clan tree (upper) and by a river portal (lower) that emerges into the human world and in beliefs about the cosmic balance of dualities (male-female, birth-death, etc.); as well as rites whereby dancers can “ascend to the sky” (Humphrey, 1996, p. 247 on Buryats, horse Evenks and Yakuts). On the other hand, Evenki religious beliefs incorporate widespread Eurasian beliefs (non-Tungusic, possibly Ugrian-speaking peoples from the Ob River) in a bear totemic ancestor (male) who hunts the cosmic “elk” (red deer) cow and was regarded as a spirit-helper or a cultural hero (on Ugrian peoples in Siberia: Balzer-Mandelstamm, 1996 on Khanty; Chichlo, 1980 on Xant (Vogules) and Mans (Ostyaks); Kulemzin, 1972 on Xant; Sokolova, 1966 on Xant cited in Chichlo, 1980).

Evenki Fall Bear Festival

The Bear Festival in the fall and the Spring Revival rites around the vernal equinox comprise the key events of the ritual bear restoration cycle. The

Evenki Bear Festival involves a sequence of action scripts beginning with hunting and killing the bear in its lair, addressing it in kinship terms and asking its forgiveness before preparing its carcass and portioning out the meat for the feast. Next, the Bear Festival, which most likely took place in a circular brush corral with east-facing entrance and a central pole (Anisimov, 1963b), is comprised of a series of events, beginning with a communal feast (*sivajba*) and a bear pantomime dance in which adolescent boys and girls imitated the gait and gestures of a bear while others sing songs about the bear ancestor and hero (Vasilevich, 1980, p.130). In this context, marriage alliances among Tungusic Evenki and between Evenki and their non-Tungusic allies are arranged, based upon reciprocal sister exchange (Anisimov, 1958a,b, 1963; Shirokogoroff, 1966, p. 196; Vasilevich, 1971, p. 23; 1980, p. 127; Paproth, 1976, p. 139; De Sales, 1980, p. 179).

The Yenisey Evenki's tale of "Xeladan and Ngamondri" preserves the myth of bear ancestry and the origin of the bear pantomime dance by which participants seek to revive their bear-ancestor, thereby assuring the return of plant and animal food resources. The tale recounts how an Evenki girl, Xeladan, is abducted by the anthropomorphized frozen clan river, Engdekit, how she spends the winter with the bear, Ngamondri (non-Tungusic, possibly Finno-ugrian "bear" people), and kills and dismembers him at his request. When she returns to her village, she finds that he has made reindeer (game) plentiful, in response to which the Evenki people perform a ceremonial Round Dance in his honor (Vasilevich, 1980, pp.110–112; Alekseyev, 1993; Turov, 2002 on Tungusic round dances). The myth of Ngamondri, preserves beliefs about an Evenki cultural hero (non-Tungusic) who, by dying, helped bring game to the Evenki in spring.

After the feast and communal Round dance, the bear skull receives special treatment, dressing with ribbons and prayers, as it is attached to a cedar tree with a shaved forked top (*kongi*) in a remote area of the forest (*taiga*) (Hallowell, 1926, pp. 60–81 on Native American use of *kongi*; Vasilevich, 1971a; Rockwell, 1991, pp. 40–41). This postmortem rite, called "seeing the bear off," assures that it successfully embarks upon its spiritual journey to the upper world, where it implores the deity Êksri to release the souls of unborn animals in the spring. The final event is a purification rite for participants, using cedar or tobacco smoke (Alekseenko, 1968 on Ket purification rites with smoke; Vasilevich, 1980, p. 131).

Spring Revival Rites

Continuing the symbolic cycle begun with fall rites, Evenki spring revival rites (*ikenipke*) were communal (macroband) gatherings to ensure the bear-ancestor's revival (from death or hibernation) and subsequent "increase" con-

strued broadly in ecological and human terms (Anisimov, 1963b; Vasilevich, 1971a; Turov, 2000). All religious ceremonies were clan wide and obligatory for every member of the clan; the performance of these ceremonies relates to “the care and duty of the whole clan”; “the concepts of rebirth of nature, the multiplication of animals, and the insurance of success in future hunts are also connected with these ceremonies” (Anisimov, 1963a, p. 116; Vasilevich, 1963, pp. 46–47; 1971b, pp. 40–41, on “to shamanize” in Tungusic Manchu meaning a performance to narrate or sing clan stories, nor exclusively trance or séance; Humphrey, 1996; Kehoe, 2000).

In addition, Anisimov maintains that “every member of the clan, without exception, is permitted to use the ceremonial equipment”; “the right to use this equipment during these ceremonies and to enter into ‘shamanizing’ activity with its aid is an obligation for every clan member” (Anisimov, 1963a, p. 116; also, Humphrey, 1996; Kehoe, 2000). In contrast to an understanding of shamanistic activity restricted to a healing specialist in trance (Eliade, 1964), it was the collective responsibility of the clan “to shamanize” (*nimngakan*: to narrate, report, or sing a clan story); often by *iaia(n)* or elderly, experienced person” (Vasilevich, 1963, pp. 46–47).

In Evenki three-tiered cosmology and mythology informing the Bear Festival and Spring Revival rites, the Mistress of Animals resides in the upper world (*ugu buga*) where she maintains control over the souls of unborn animals; humans reside in the middle world (*duluga buga*), which includes the clan territory (defined by hunting and fishing ranges); and deceased ancestors (*buni*) reside in the lower world (*khergu-ergu buga*), in which exists the top-to-bottom reversal of the human world. Through the fall postmortem rites, the bear “spirit of the ancestors” (*khargi, mangi*) and Master of the Lower World ascends to the upper world by way of the clan tree, a larch (*turu*), to implore the Mistress of Animals (*Kheglen*, elk/maral) to release the souls of unborn animals into clan territory. The Evenki prayer to Kheglen asks, “Grandmother *bugady*, give us animals, send us a catch! to release game animals into clan territory” (Anisimov, 1963b, p. 177), to escort these souls out of the lower world. The bear’s return to the human world with game animals takes place at the clan river “portal” at the clan center (rocks and clan tree or *bugady mushun*). The bear’s return in the spring with game animals and vegetation, coincided with the thawing of rivers for fishing, as well as the clan’s reproductive success and good health.

Middle Yenisey River Petroglyphs

Separated by about 12 000 miles and several millennia, petroglyphs on the Middle Yenisey River and in western Colorado and eastern Utah depict bears standing upright in front of or climbing a tree (McNeil, 2001, 2005).

Predominant in the rock art and in close proximity to natural springs and game trails, glyphs depict brown or grizzly bears either leading herds of game animals (aurochs, red deer, moose, boar) or close to petroglyphs depicting game tracks (elk, mule deer, bison, pronghorn, rabbits).

Taken together, the location of Minusink Basin (Middle Yenisey River) rock art sites on south or east-facing cliffs overlooking a river, as well as the numerous bear images depicted in conjunction with herds of frequently procured (reindeer) or less often captured game animals (moose, aurochs, red deer), suggests that these were clan sanctuary and spring interclan aggregation sites. Given their location in ancient (proto) Evenk territory, this rock art imagery has narrative features that relate to the mythic cycle of the totemic bear-intermediary (*khargi*, *mangi*) in its journey of ascent to the upper world by way of the clan tree (*туру*) in the fall and its reemergence into the human world in the spring, leading a herd of game animals. Notably, these rock art sites (*bugady mushun*) are situated near a dense collection of Kokorevo Culture short-term habitation or seasonal aggregation sites.

For Evenks, the Yenisey as their clan river united the three worlds of the universe. As Anisimov's Evenki ethnographic accounts report, "The headwaters originate in the upper world, on the upper course of mythical clan river being where the receptacle of souls of animals reside before birth, "which is controlled by the cosmic "elk" whom the bear solicits (Anisimov, 1963b, pp. 204–205). Middle Yenisey River Minusinsk style images (Francfort and Sher, 1995), located furthestmost to the west, appear to be associated with the mythic headwaters of the upper world (in the west) where the cosmic elk-marmal and ancestral bear meet (Sher *et al.*, 1994, Plate 5) and where the river's mouth empties into the underground sea of the nether world" (Anisimov, 1963b, p. 166).

In contrast, the rock art sites due east of the "mythic headwaters" (at Ust-Tuba II and Shalabolino; see McNeil, 2005, pp. 4–5, fig. 2–3 maps) suggest sites of emergence from the lower world back into clan territory. This appears to be the clan sanctuary where *mangi* embarks upon and completes his cosmic journey, ascending the clan tree in fall and emerging from the river portal with herds of game animals in early spring. The features of this site that testify to its importance as an Evenki clan center, and possible fall and spring aggregation site, include the heavy concentration of petroglyphs with bear restoration narrative elements that correlate with Evenki-specific mythology and restoration beliefs of the bear ancestor ascending the clan tree (McNeil, 2005, p. 11, fig. 11, and p. 12, fig. 12) and later leading game animals from the lower world into clan territory (Francfort and Sher, 1995, Plate 39; McNeil, 2005, p. 10, fig. 9; Pyatkin and Marynov, 1985, in McNeil, 2005, pp. 12–13, figs 13–14).

Situated propitiously at the river portal of emergence (spring-fed), the clan lands (sacred rocks and trees) are identified with places for hunting wild game, fish, and waterfowl. Out of hundreds of Angara-style petroglyphs at Shalabolino, on an eastern tributary, the Tuba River, twenty-two bear petroglyphs depict brown bears in several poses, most prominently, one bear climbing a leaf-less deciduous tree (Fig. 1); two bears standing upright (poss. sow with cub) next to a natural fissure (portal) in the rock (Fig. 2); and a bear standing



Figure 1. Mykalent copy of a petroglyph depicting bear climbing a tree and spirit figure above, at Shalabolino site on Tuba River. Photo provided by E. Miklashevich, Kemerovo State University and Museum of the Archaeology and Ethnography of Southern Siberia.



Figure 2. Mykalent copy of a petroglyph depicting an adult bear (right) and a cub (left), rock fissure to right. From Pyatkin and Martynov (1985).

among game animals and humans in boats (Mikhailov 1894, p. 67 and Vasilovich, 1963, pp. 58–60 on soul's journey by boat; Pyatkin and Marynov, 1985; McNeil, 2005, p. 12, fig. 13). The Angara-style petroglyphs at these sites depicting bears and game animals are represented in four distinct sub-styles that mirror the stages from death to birth (McNeil, 2005, pp. 13–14, Tables 1–2).

Ute Bear Restoration Rites

In the arid, High Desert environment of the Great Basin-Colorado Plateau (Basin-Plateau) region Paleoindian and Archaic hunter-gatherers survived by digging roots and foraging, trapping and netting small game, fishing in the

Colorado, San Juan, and Green Rivers, and less frequently by hunting large game (elk, big horn sheep, mule deer, antelope, and rarely, mountain lion, black bear and grizzly (Fowler, 1986, pp. 79–81; Eddy, 1991, p. 214). Proto-Numic (Mongoloid), Uto-Aztecanspeaking ancestors of the Ute, are believed to have migrated from the Sonoran Desert region of southern California, and from there (*ca.* 6000–3500 B.P.) spread throughout the Great Basin region (Aikens, 1994, p. 36).

Despite having access to a variety of food resources during summer months, proto-Numic Basin-Plateau colonizers living in widely-dispersed networks of “intermarried and cooperating family clusters” (Steward, 1970, pp. 113–116) faced somatic challenges due to intermittent drought, as well as reproductive challenges resulting from low population densities (Meltzer, 2002, pp. 33–36). As with small bands of colonizers at the end of the Upper Paleolithic in Southern Siberia, proto-Numa faced exogamous mate-finding risks associated with male out-ranging and inbreeding, thus devising a similar social adaptive strategy to ameliorate these somatic and reproductive challenges: “multi-cluster” (macroband) aggregations of intermarried families (Steward, 1970, p. 114, p. 130).

According to Julian Steward (1970), Ute band intermarriages occurred in a zone 100 miles wide (or from 10–15 to 30–50 miles away) and “supra-community institutions” involving cooperation among nuclear families existed (p. 124, p. 132). Similarly, Numic oral traditions report that the oldest and most widely-observed inter-family seasonal aggregation in the Basin-Plateau region was the Ute Bear Dance, a spring bear restoration rite. Several Ute local bands and neighbors would come together at a prepared site for courtship, matrilineal marriages, food sharing, trading and socializing. As an annual macroband aggregation, the Bear Dance served as a social adaptive strategy tacitly intended to address somatic and reproductive needs by facilitating food-sharing and exogamous mate-finding.

Ute Bear Dance

Late nineteenth century ethnographer, Verner Reed, maintained that the Bear Dance (*mama-kwa-nhkap*) is “the oldest of all the Ute ceremonies” and there was “no tradition antedating the dance itself on which the ceremonies are founded” (Reed, 1896, p. 237). This claim was corroborated by Omer Stewart’s Numic informants (1942, p. 322), as well as by Numic oral history (Courland, 1971, pp. 34–42 on Hopi clan origins from bear carcass; Pettit, 1990).

Scattered ethnographic evidence suggests a vestigial connection between the Ute Bear Dance and bear hunting and postmortem rites. While bear hunting

was rare for Ute people (with bow and arrow, in its lair), more for ceremonial than for subsistence purposes (Callaway *et al.*, 1986; Lowie, 1915, p. 826; Stewart, 1942, p. 243). After the kill, the bear was addressed as Grandfather, Grandmother, or Aunt (kinship terms) and the “bear remains were disposed in a particular way.” For example, White River Ute report that “head and skin are placed on a tree away from camp” (Goss, 2000, p. 47, recalling *kongi*).

Despite the rarity of bear hunting or *post mortem* rites throughout the Basin-Plateau region (Stewart, 1942; Fowler, 1986), the Ute Bear Dance was reported to be in the ancestral past – and continues to be in a more secularized form today, a widely-observed spring revival ceremony among many Numic peoples and their invited non-Numic guests. According to Numic oral traditions and ethnographic accounts, the Bear Dance represents the Numa’s intertribal collective efforts to help restore the bear-ancestor to life at the end of winter when it comes out of hibernation, as well as to help it find food and a mate. The Ute’s health and well-being collectively are believed to be dependent upon the bear’s revival and safe return to the human world in the spring, a belief that suggests an ancient totemic bear-ancestor (Teit, 1900, 1909, 1910–1913; Bogoras, 1918; Bunzel, 1933; Parsons, 1939; Opler, 1941; Shepard and Sanders, 1985; Rockwell, 1991; Smith, 1992, 1993).

Ute Indians believe in bear kinship, their primordial ancestors being bears who transmogrified into a race of Indians, and who, upon dying, changed into bears and roamed the forests and mountains (Opler, 1941; Stewart, 1942; Smith, 1992). Like the Evenki in Siberia, Ute recount tales about ancient times when bears instructed humans on how to do the bear dance (Sommier, 1885, pp. 216–218; Alekseenko, 1968). The Ute myth recounting the origin of the Bear Dance focuses on bear pre-mating behavior “when the bear first comes out of hibernation” (Goss, 2000, p. 46) in the spring and “dances” back and forth with trees in the forest. This meaning compliments the human courtship and marriage aspect of the Ute Bear Dance (Cole, 1990, p. 85, fig. 23).

Ute oral traditions include beliefs about bear-Ute kinship in the primordial past, as well as tales about how the Ute learned to do the bear pantomime dance. Reminiscent of “Xeladan and Ngamondri” that combines both beliefs, Marvin Opler recorded a folktale about two Ute brothers, who went out hunting for elk and came across a she-bear who abducted one of the young men, kept him in her lair for the winter and released him in the spring, so that he could return to his people to teach them how to do the “back and forth” step bear dance (Opler, 1941, p. 25; Stewart, 1942, pp. 243, 326, 348; McNeil, 1999, p. 136, fig. 3, the myth depicted in petroglyph 5MN228, western Colorado; Goss, 2000, p. 46).

The annual Ute Bear Dance was a widely-observed, interclan spring revival rite throughout the Basin-Plateau region, performed traditionally around the

vernal equinox. The Bear Dance was performed for social as well as religious reasons: to restore the health of their bear-ancestor after hibernation, whose return in the spring corresponds with the revival of nature; to prevent certain illnesses and to share food; to communicate with dead ancestors (smoke as path of souls); and to create a venue for courtship and exogamous marriages (matrilocal) among widely-dispersed bands.

Moreover, as in Evenki bear cult cosmology, the Ute Bear Dance is informed by a “bear restoration” symbolic complex, i.e., a cycle of death/departure and rebirth/return. The ceremonial site and performance include: (1) spring bear restoration rites (male/female dancing) in a circular brush corral, marked by a prominent tree or pole; (2) the pole holds a ritualistically drawn image (flag) that depicts a standing, tree-climbing, or dancing bear, as do Ute rock art images; (3) bear pantomime dances are performed by a all dancers; a few reports of a clan elder (not a shaman) appearing suddenly in a bear robe (Pettit, 1990, p. 92); (4) dancers reverse conventional gender roles, that is, uncharacteristic female assertiveness and male passivity in courtship; (5) ritual native tobacco smoking to send messages to deceased ancestors (smoke as “path of souls”) or for protection from disease (Kálmán, 1968, pp. 89–91).

Like the Evenki ceremonial enclosure (Anisimov, 1963b), the Ute Bear Dance takes place inside a circular brush corral that is constructed with either upright forked cedar trees (Lowie, 1915, p. 826, Navajo Springs, CO; Wroth, 2000, p. 210, fig. 132; McNeil, 2001, p. 304, fig. 4, buckskin painting; personal observation May 25, 2003, Ignacio, CO, Southern Ute 2003) or with sticks and logs (Reed, 1896). Its opening faces east (sun rise) and a tree and/or (flag) pole is set either near the entrance or in the rear of the corral (Lowie, 1915, p. 827). In one case (Lowie, 1915, p. 827), a tree appeared in the center of the east-facing entrance to the dance site, a sprig that is temporarily planted there at one stage of the performance, (or a Southern Ute Bear Dance in 2003, two young cedar tress decorated with eagle feathers were planted at the corral entrance). Ute refer to the dance corral as a “cave of sticks”, like the bear’s den.

Ute bear dance flags on tall poles depict several variants of an upright bear facing a tree (Lowie, 1915, p. 826); the bear alone or with “family” standing or dancing, facing a male Indian, who has a cedar tree behind him; a bear standing in front of a newly leafing deciduous tree (McNeil, 1999, p. 138, figs 6–7); and a bear clearly standing in front of or climbing a leafless deciduous tree, while a second shadow of a bear is shown upside down, as if descending the tree. (Wroth, 2000, p. 207, fig. 129).

While similar to Evenki rock art images and myths about the bear ancestor’s journey of ascent up the clan *turnu*, Ute ethnography or oral traditions say nothing about “climbing bear” iconography being related to beliefs about the

bear spirit helper ascending to the upper world to ask for the release of game animals. Instead, Ute oral traditions recount how bears scratch on trees in the spring around mating time, thus appearing to dance back-and-forth with the tree; how a Ute man hibernated with a she-bear and taught him how to do the bear dance, sacred knowledge that he was instructed to share with Ute people; how the spring Bear Dance begins with the first sound of thunder and its ostensible purpose is to restore the bear (whose emergence corresponds with the return of game and plant life), and so the Ute people, to good health and to find a mate in the spring. The primary musical instrument for the Ute Bear Dance is the morache (rasp), which is used to imitate the sound of thunder (Martynov, 1991, p. 21 on “bear” meaning thunder in Siberia; Pettit, 1990, p. 91; McNeil, 1999, p.137, fig. 4).

The Ute Bear Dance, a bear pantomime dance which lasts on average four days, purports to imitate the bear after hibernation, standing upright and moving back and forth scratching a tree (Reed, 1896; Lowie, 1915, 1924; Steward, 1932; Callaway *et al.*, 1986, pp. 350–353). In addition, the dancers move their arms imitating the motion of the forepaws of bears or put their arms around each other in a bear hug. While an elder (“chief” or “medicine man”) has been observed to dress in a bear robe and impersonate the bear (Steward, 1932), the Bear Dance did not involve a “bear shaman” or, for that matter, any shamanic performance (dancing and trancing). He may also play the role of the “cat man,” carrying a switch, who “doctors” any dancers who fall from exhaustion (Reed, 1896, p. 239; Steward, 1932, p. 264; 1970, p. 115 (on Ute shamans as healers), p. 124; Opler, 1941, pp. 22, 25).

In addition to “doctoring,” the Bear Dance incorporates an actual medicine ceremony to protect the smoker from pneumonia or consumption. Several men (sitting on the sidelines) smoke dried kinnikinnick leaves, ostensibly to protect deceased relatives and friends, as well as the living from bear attack as well as from disease. Finally, Ute women, like the she-bear, believed to be the aggressor in courtship and mating, choose their male dance partners and lead in the dance, a line dance with women and men on opposite sides facing each other. This gender role reversal may reflect, in part, the Ute matrilineal marriage custom, as well as Native America flexible notions about gender in general (Lang, 1996, pp. 187–192; Mandelstam Blazer, 1996, pp. 169–171 on Khanty rituals of reversal; Schmidt, 2000, p. 199 on shamanic gender crossing and reversal).

Several times during the four days of the Ute Bear Dance male participants pass a pipe filled with native tobacco. Like the widespread belief among indigenous people in Siberian, tobacco smoke serves as a “path of souls” to the spirit world of the ancestors (Bogoras, 1902, 1918). For Numic peoples (and many

North Amerindians), tobacco smoke carries messages to friends and relatives in the Land Beyond, where they are simultaneously conducting their own Bear Dance (Anisimov, 1963a, p. 165 on Evenki; Reed, 1896, p. 240 on Ute).

Colorado Plateau Rock Art

In western Colorado, on south-facing rim-rock overlooking Shavano Valley in the Uncompahgre Plateau (traditional Tabeguache Ute territory), we identify a pre-contact Ute aggregation site. Ideally situated near a major aquifer-fed spring and winter game trails, the rim rock and nearby rock features display petroglyphs of bear and game tracks and, most notably, two separate tree-climbing bears and a third bear “in ascension”. The site layout mirrors the three-tiered universe: spring at lower world (5MN40), game trail, tracks and ambushes in middle (human) world (5MN27) and Split Rock cave (portal from lower world) (5MN66), and cosmic or sky world (5MN5) on rim rock above (Clifford Duncan, Ute elder, in conversation).

Stylistically dated Late Historic Ute Indian Style (A.D. 1830–1880) (Cole, 1990, pp. 82–96, p. 238), this panel shows reuse of an Archaic panel that resembles the image on a Bear Dance flag (Figure 8; Buckles, 1971, pp. 1072–1074; Smith, 1974, p. 221; Cole, 1990, pp. 82–96; p. 238; McNeil, 1999, 2005). Attributed to the Uncompahgre (Tabeguache) Ute, the panel (from left to right) depicts two images of a bear climbing a tree (Fig. 3). While the first tree-climbing bear is more lightly and roughly pecked, the second image shows more recent (re)pecking, and is especially interesting because of a dotted path leading from a natural fissure in the rock (to the right of the image) to the base of the tree image. This narrative feature recalls the Evenki belief only hinted at in Ute bear hibernation folklore, in the bear’s ascent back to this world through a portal in the rock face at the clan sanctuary.

Further to the right and just off center and above the other two bears stands the visual centerpiece of the panel (Fig. 4). This more elaborately detailed, third bear is standing (or dancing) above the other two and appears to be situated at the pentacle of a forked path or tree top. While the first two bears appear to be in the process of ascending a tree, the third cosmic or spirit bear appears to have arrived at the end of its path/journey in the spirit realm. Identified as Ute from its tripartite, Uncompahgre-style paws (a Ute stylistic signature), the pecking of what appears to be liquid, breathe, or song spewing forth from its mouth suggests how the bear gives “bear medicine.” A similar, although less skillfully executed glyph, appears in Nine Mile Canyon, Utah and Ute Uncompahgre-paw style “dancing” and walking bears are on a panel that overlooks the Colorado River north of Moab, Utah. All three rock art



Figure 3. “Three Bears” petroglyph with Ute Uncompahgre-style pawed “cosmic bear”, Shavano Valley, western Colorado. Photo by J. McNeil.



Figure 4. Close-up of “cosmic” bear in Fig. 3. Photo by J. McNeil.

sites (and dozens more depicting Ute bear paw petroglyphs are located within about 100 miles of each other in traditional Ute territory).

“Bear Restoration” Cognitive Domain

For Tungusic Evenki and Numic (proto-Ute) hunter-gatherer societies, symbolic representations (in oral narratives, ritual practices and site designs, and rock art iconography) served the evolutionary function of reinforcing biologically-motivated social strategies crucial to survival in marginal environments. The evidence that their bear restoration rites and symbolic representations are surprisingly similar cross-culturally raises an important question about why certain types of religious rites and symbolic representations are more likely than others to be acquired (learned, remembered) and transmitted, “thereby constituting those stable sets of representations that anthropologists call ‘cultures’” (Boyer, 1994, p. 391).

Recent research in cognitive psychology on enhanced memory (Boyer, 1994, 2002; Whitehouse, 1995, 2000; Sperber, 1996; McCauley and Lawson, 2002) “provides critical insights into the connections between religious ritual and memory dynamics” (McCauley and Lawson, 2002, p. 6). Moreover, according to McCauley and Lawson, enhanced memory, “is a relevant consideration in understanding the process of cultural transmission, especially in non-literate societies” (McCauley and Lawson, 2002, p. 6).

The question of most interest in this paper is why certain cultural representations (public and mental) are widespread or what “selective pressures” account for their “comparatively more faithful transmission” (McCauley and Lawson, 2002, p. 40)? I want to end this paper by exploring cognitive reasons for the similarity in Tungusic Evenki and Numic (proto-Ute) ritual and symbolic phenomena, as well as for their acquisition and transmission, that appears to recur “above chance” across different cultural environments (Boyer, 1994, p. 404).

Micro-Processes and Mental Representations

Recently researchers in culture, cognition and memory have studied the cognitive micro-processes at the psychological level that affect the distributions and widespread recurrence of certain kinds of mental representations, notably those involved in religious rituals. According to Sperber’s (1996) “epidemiological” approach to the distribution of mental representations, micro-processes at a psychological level (“memes”) account for cultural change because they “boost the probabilities of accurate memory” (see Dawkins, 1982; Dennet, 1995). Because “replication of mental representations is the

rare limiting case, rather than the norm,” the variability of cultural representations in transmission, maintaining that, like genes, the mutation of memes is common for cultural transmissions. (Sperber, p. 31).

According to Sperber’s “two attractors” model, religious rituals persist because they tend to gravitate toward one or the other of two arrangements,” in other words, “[r]esemblance among cultural items is to be explained... by the fact that transformations tend to be biased in the direction of attractor positions” (Sperber, p. 108). Agreeing with Sperber, McCauley and Lawson further point out, that while some memes survive and flourish, other disappear from the “meme pool” as a result of “selective pressures” (McCauley and Lawson, 2002, p. 41). McCauley and Lawson argue that (1) they evolve either “in the direction of rituals that involve low levels of sensory stimulation (“pageantry”), resulting in low levels of emotional arousal; these rituals are repeated and have comparatively high performance frequencies (e.g., communion, penance, sacrifices).” Or (2) They evolve “in the direction of rituals that incorporate higher levels of sensory stimulation and emotional arousal and are non-repeated, i.e., rituals in which each participant serves in the role of their patient only once” (e.g., baptism, circumcision, wedding, funeral) (McCauley and Lawson, p. 42).

Expanding further upon Sperber’s “two attractors” model, McCauley and Lawson offer a ritual form hypothesis to identify vectors that contribute to memory enhancement of religious rituals: frequency, sensory stimulation of non-repeated “special agent” or repeated “special patient” rites. Like Sperber, McCauley and Lawson maintain that “cognitive factors (“attractors”)... can increase the probabilities of comparatively more faithful transmission, resulting in greater stability” (McCauley and Lawson, 2002, p. 45 (insert added)). As a result, “some cultural representations are more likely to persist than others” because cognitive constraints come into play during natural cycles of transmission that “will typically steer cultural representations towards one of the attractors again” (McCauley and Lawson, p. 42).

According to McCauley and Lawson’s ritual form hypothesis, the vast majority of religious rituals conform to these two attractor models. The two most common fall into cell I and cell IV forms: the repeated “special patient and/or special instrument” rite with high frequency and low pageantry (cell I) and the non-repeated “special agent” (or a culturally postulated superhuman or CPS-agent) rite with low frequency and high pageantry (cell IV).

In applying these criteria to Evenki and Ute spring revival rites, we find that both religious rituals, on the one hand, corroborate McCauley and Lawson’s “special patient with special instrument” ritual form and, on the other hand, weakly support the predicted first attractor model (e.g., low frequency/high

pageantry). For example, both rites use dancer-participants as “special patients” who (at least in the Ute case), along with a special instrument, the morache (rasp), function as enablers in reviving the hibernating bear, a CPS-agent. Regarding the first attractor model, whereby ritual frequency is inversely proportional to level of sensory stimulation, both of these annual spring revival rites reflect a relatively low level of frequency (over the course of a person’s lifetime) and relatively low to moderate level of sensory pageantry (e.g., one’s best clothes, colorful shawls, dancing imitating bear gestures). This description conforms with what McCauley and Lawson categorize as a more rare type of ritual form, cell II.

While in terms of replication, it is noteworthy that both rites conform to the same rare ritual form, this analysis also raises major issues pertaining to transmission and memory. If it is accurate that both rites were infrequently performed (relatively, in a person’s lifetime) and had fairly low sensory stimulation (even some tedium over 4+ days), then might there be other cognitive mnemonic supports that would increase the probability of fairly faithful transmission over time?

In the Evenki and Ute rituals, we find several similar cognitive memory enhancing strategies. First, there were attention-drawing actions, some of which were stimulating to the senses (colorful apparel, bear pantomime, the catman using a switch to encourage dancers or to “doctor” dancers fallen in exhaustion, etc.). Other actions drew attention because they violated either social norms or ontological categories. With regard to social norms in courtship being violated, we find the reversal of gender norms in dance partner selection whereby men, who typically take the initiative in courtship, must passively accept the woman’s invitation to dance (to be courted). Moreover, ontological categories are violated wherein dancers “become” bears through impersonation in order to revive the bear and, lo and behold, the revived bear CPS-agent appears near the last day of the rites (violating communally-shared ideas of cause/effect).

In a second memory enhancing strategy, the ritual dance over several days, with its concurrent pastiche of embedded rites (mourning, wedding, and purification) faithfully follows a sequence of actions. According to psychologists, the cognitive foundation of memory is scripts, “a cognitive representation for ‘a predetermined, stereotyped sequence of actions that defines a well-known situation’ (Schank and Abelson, 1977, p. 41). As McCauley and Lawson explain the importance of scripts to memory, “The script gives shape to recollections for such action, since it is “a knowledge structure in long-term memory that specifies the conditions and actions for achieving a goal” (Barsalou, 1992, p. 76, in McCauley and Lawson, 2002, p. 49).

Furthermore, they argue, “Although participants may be unable to distinguish particular past performances, the attributes those performances share constitute the framework of the thoroughly familiar routine that the script represents. The scripts, rather than representations of individual episodes, are the resulting knowledge structures that inform recollection” (McCauley and Lawson, 2002, p. 49).

In both Evenki and Ute spring revival rites, nearly identical ritual scripts were (into historic times) remembered and repeated annually: all bands and neighbors are invited to the revival rites (“festival”); related bands make the journey to the host site; dancers impersonate the bear; the mourning ceremony sends messages to deceased relatives; couples join in marriage; and individuals undergo rites of purification for healing and protection from harm. But, would these mnemonic supports be sufficient to explain similarities in Evenki and Ute spring revival rites and symbolic representations?

Symbolic Representations as External Memory

Arguably the most important mnemonic strategy in cultural transmission, as well as in human evolution, was the creation of external memory supports or “cognitive prostheses involving symbolic codes” (McCauley and Lawson, 2002, p. 54). They may have emerged, in part, in response to the cognitive constraints associated with low frequency and low sensory stimulation (cell II) type religious rituals. These external memory supports were a common feature of religious rituals in non-literate, imagistic cultures (Whitehouse, 1995, p. 197).

To offset the mnemonic problems, Evenki and Ute seasonal revival rites rely upon culturally constructed external mnemonic (iconic imagery in rock art and other venues, as well as ritual action scripts and oral narrative scripts) support in the imagistic mode (Whitehouse, 1995, p. 197; McCauley and Lawson, 2002, p. 105). Because communally-shared episodic memories could have been fairly faithfully replicated over time, they would have become stabilized in the form of cognitive structures, such as the scripts and unique “schemas” (McCauley and Lawson, 2002, p. 105), encoded in seasonal revival embedded ritual practices, site design, and rock art iconography.

Recurrence Above Chance

I would like to end this analysis of memory enhancing cognitive strategies underlying these rituals by focusing on the category of symbolic representations that are cognitively optimal for transmission or, according to Pascal Boyer (1994, 2001), those that reflect “recurrence above chance” intergenera-

tionally. We must begin by referring to cognitive research regarding mental mapping, as well as how beliefs and their symbolic representations stem from mental constructs. These mental constructs, called “domains of knowledge,” represent widely-shared adaptations targeting “recurring problems that an organism faces.” Moreover, “domains are generally seen as highly (though not universally) shared among members of a species, not idiosyncratic solutions to individual problems” (Hirschfeld and Gelman, 1994, p. 22).

What seems paradoxical about knowledge domains, but is not, is the notion that they are similar in the way they are constructed (“hardware”), yet context-specific in their content (“software”). They are constituted in response to specific social and environmental circumstances by a process of mental cross-mapping of various “repertoires” from other domains in the brain. A specific domain of religious representations (such as that of three-tier cosmology, with bear restoration symbolic representations as a subset) might consist of repertoires that are themselves constituted by context-specific (not innate, universal, or “archetypal”) information. (See Jung, Piaget, and Chomsky on “innate” or “universal” mental representations).

According to Boyer (1994, pp. 404–407), the “cognitive optimum” for the recurrence of certain religious symbolic representations relies upon the delicate balance between explicit attention-holding, counterintuitive ideas (on the one hand) and tacit commonsense, intuitive knowledge (on the other). While religious beliefs universally use attention-drawing and focusing counterintuitive ideas that violate community standards of intuitive expectations, these ideas do not function alone. Rather, they are cognitively bolstered by common sense, intuitive knowledge based on widely-shared experiences in social context.

For example, the Tungusic Evenk “bear restoration” religious domain is constituted by socio-historically and environmentally specific beliefs, assumptions, generalizations and inferences transmitted through instance-based generalizations, such as rituals and related symbolic representations. Specifically, Evenki bear restoration religious beliefs are an amalgam of at least four conceptual repertoires that combine general purpose cognition with counterintuitive ideas (Boyer, 1994, p. 395): (1) the ontological: 3-tiered universe and “ideas about the existence of non-observable entities” (Mistress of Animals, souls of unborn animals, bear Master of the Lower World and souls of deceased ancestors); (2) the causal: “causal links between entities in the ontological repertoire and observable events and states of affairs” (spring revival rites that cause the bear CPS-agent to entreat the deity, Kheglen, to release the souls of unborn animals); (3) the episodic: “description of a certain range of actions

and interactions, connected to 1 and 2 above: cyclic journey between worlds and emergence from the river “portal,” and communal “shamanizing” or the narrative script (origin of bear dance stories); and (4) social roles or agency categories: “a catalog of representations concerning different roles of agents, such as: the deity in the upper world who controls the release of unborn game animals; the bear CPS-agent who has power to act as intermediary between human, upper and low worlds and to facilitate the release of souls of unborn game animals, thus bringing Increase in the form of food, mates and health (medicine, protection) to the people; dancers who “become” the bear CPS-agent (a sort of communion), healers who contact deceased ancestors in spirit world and can heal the sick.

With relevance to the transmission of Evenki religious representations about the bear’s restoration, Boyer argues that the “cognitive optimum” to assure survival or “recurrence above chance” consists of the mutual reinforcing of explicit counterintuitive (attention-drawing) ideas in conjunction with implicit intuitive knowledge, based upon shared understandings about how the world operates, and hence how these norms can be violated for memory-enhancing effect (Boyer, 1994, p. 404).

According to numerous ethnographic accounts of Tungusic Evenki peoples in Siberia, the Evenki “bear restoration” religious domain evolved from a particular socio-historical (Eurasian + Tungusic) contextual reality. Moreover, Evenki bear restoration symbolic representations in narrative, ritual, and iconic modalities coincide with Boyer’s notion of a cognitive optimum achieved through a balance of intuitive and counterintuitive ideas. And, while some might argue that Ute bear restoration symbolic representations can be accounted for solely through Ute and Evenki shared intuitive contextual realities (marginal environments), this claim fails to consider the recurrence of Evenki-specific bear restoration counterintuitive ideas in oral narratives (folklore and beliefs), ritual (Bear Dance and embedded rites), and iconography (Bear Dance flag and signature Ute rock art imagery and site context).

Table 1 illustrates, first, how Evenki bear restoration symbolic representations consist of an amalgam of socio-ecological tacit intuitive ideas and a religious knowledge domain consisting of ontological, episodic, social, and causal repertoires, all of which violate communally-shared understandings of how the world works and how agents operate in it. Secondly, it illustrates how Ute bear restoration symbolic representations reflect the high recurrence “above chance” of Evenki-like counterintuitive bear restoration ideas.

Table 1
Recurrence of bear restoration symbolism

Intuitive + (default/explicit)	Counterintuitive (Evenki)	Counterintuitive (Ute)
Sky, mountains, game trails, caves, dens, river, potable springs, clan tree and rocks	Ontological: (N) 3-tiered cosmos accessed by clan tree (<i>туру</i>), where CPS-agents, Kheglen (<i>elk/maral</i>) resides and bear visits. (R) sacred cedar circular dance corral (portal), open to east, on river with pole/ <i>туру</i> . (I) Bear climbing clan tree (<i>туру</i>) glyph	(N) Bear intermediary, spirit-helper to Numic peoples. (R) Ute Bear Dance cedar circular dance corral, open to east, on river or spring with pole. (I) Shavano site: 3-tiered cosmos with spring portal and cosmic bear glyph; tree-climbing bear.
Game and plants return in spring; bear leaves den, scratches/climbs tree; bands travel to and aggregate at ritual site	Episodic: (N) Bear teaches Evenki to do bear dance. (N), (R), (I) Bear makes journey to upper world via <i>туру</i> and persuades Kheglen to release souls of unborn (animals, humans). (N), (I), (R) Bear returns to human world via river/spring, “portal” from lower world, bringing game animals into clan territory.	(N) Ute tales about how they learned the bear dance from bear orally and visually by scratching a tree, seeking food, mate (see default). (I) Flag depicts bear standing in front of leafless or cedar tree (see default). Rock art depicts bear climbing tree and upright (cosmic?) bear w/o tree at river/spring (portal) with deer/elk. (R) Bear Dance cedar corral suggests a den, open to east, on river/spring (portal).
Host band sends invitation; elders officiate over revival rite and “shamanize” (sing/tell stories); communal hunting; dancers imitate bears; musicians play, couples wed; healers minister.	Social/roles: (N) CPS-agent controls birth of game and bear intercedes on behalf of humans. Bear husband and bear dance teacher myths. (R) During the spring revival rite, elders officiate; dancers “become” bears; the spirit-helper bear appears at the dance; and healers purify and contact deceased	(N) Bear provides increase (food, mate, health). Bear dancers revive the bear. Myths of the bear husband (or wife) and bear as dance teacher. (R) During the spring revival rite; elders officiate; healers purify; bear appears. Bear pantomime dancers “become” bears; musicians awaken the bear from hibernation. Ute

Table 1 (cont.)

Intuitive + (default/explicit)	Counterintuitive (Evenki)	Counterintuitive (Ute)
	ancestors in spirit world. (I) Bear leads game animals at river portal and clan rocks.	use tobacco, as path of souls, to contact deceased ancestors.
Bear emerges/spring returns, serves as a model for how humans can procure food, a mate, and healing medicines.	Causal: (N), (R) Bear causes Kheglen to release game animals into clan lands and spring to return. Dancers (rite) cause bear to return (with spring/ game) (dancing and playing a special instru- ment). Bear is credited with human increase (food, mate, health).	(N), (R) The bear panto- mime dancers revive the bear who, in turn, provides increase (food, mate, health). Bear returns (with spring/ game) as a result of revival rites (dancing and playing a special instrument).

This table shows the recurrence of intuitive and counterintuitive ideas in Evenki and Ute “Bear Restoration” symbolic representations from three modalities: oral narrative (N), ritual (R) and iconography (I). Ute symbolic representations show some default from myth to folklore, especially with regard to oral narrative (N).

However, while Evenki ideas were explicit in all three modalities and the intuitive was tacit, the “default background” (Boyer, 2001, p. 87), in the Ute case these counterintuitive ideas are explicit in all modalities, but more so in ritual and iconography than in oral narrative. Moreover, in Ute oral narrative one finds a couple of instances of the “default factor” (Boyer, 2001, p. 87) whereby the tacit intuitive “default background” (e.g., bears climb and scratch trees; bears descend into dens/caves and emerge from them in spring) moves to the foreground to replace the explicit counterintuitive ideas (bear as CPS-agent ascends to the upper world and later ascends from lower world via a river or spring portal).

When transmission occurs over a long period or without adequate external memory supports, explicitly counterintuitive ideas (myths, religious beliefs) can default to more easily remembered or communally-shared intuitive or secular (folkloric) ideas (Boyer, 2001, p. 87). Consequently, Evenki counterintuitive ideas appeared to have recurred in Ute ritual and iconographic symbolic representations “above chance,” although less frequently in oral narrative. The mnemonic variance in modality may be due to the greater degrees of communally-shared, external memory supports found in annually repeated rituals with predictably sequenced scripts, attention-drawing or flashbulb events, as well as, in religiously and culturally important iconic imagery (Table 1).

In other words, more mnemonically stable imagistic modes (McCauley and Lawson, 2002, p. 105, on Whitehouse, 1995) of communally transmitted counterintuitive beliefs occurred in macroband performances, such as spring revival rites with bear pantomime dances in circular brush corrals, as well as in rock art or other forms of iconography depicting a bear climbing a deciduous tree (larch or birch).

In sum, we are faced with the tantalizing prospect that Tungusic Evenki religious beliefs might have been transmitted inter-generationally during the colonization of western North America. In any case, the Ute Round and Bear Dances appear to exemplify a process of cultural transmission, naturally partial and vulnerable to default over time, and ultimately adaptive to the new contextual realities of living in the Basin-Plateau region.

Conclusion

While MacDonald and Hewlett (1999) stress that “analysts of prehistoric and contemporary forager mobility need to consider the entire gamut of concerns, from somatic to reproductive” (MacDonald and Hewlett, 1999, p. 513), past studies tend to under represent social adaptive strategies. Periodic aggregations, such as spring revival rites and their related symbolic representations, emerged through processes of natural selection in response to reproductive and somatic demands, thereby playing an important role in sustaining alliance and mating networks, as well as in fostering group identity (MacDonald and Hewlett, 1999, p. 512).

Based upon the Evenki and Ute cases, the success of hunter-gatherer biologically-motivated social networks depended upon a complex of communally-shared symbolic representations (ritual, myth, and rock art) that were preserved and transmitted by the larger community (macroband) intergenerationally. For the Evenki and the Ute, spring revival rites and bear restoration symbolic representations appear to have helped to maintain social networks (mate-finding, food and information-sharing, and alliance-forming) crucial to both cultural and individual survival.

In closing, recent research in cognitive psychology on enhanced memory and mental mapping is advancing our understanding of the cognitive and cultural construction of symbolic representations and the probability of their recurrence cross-culturally. In contrast to theories that argue for the cognitive origin of symbolic representations in innate mental modules or altered states, evolutionary psychology provides persuasive evidence that culturally-contextualized ritual and symbolic expression were an important by-product of human cognitive evolution and an integral part of social adaptive strategies key to the survival of hunter-gatherer colonizers in marginal environments.

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