

# Embers of society: Firelight talk among the Ju/'hoansi Bushmen

Polly W. Wiessner<sup>1</sup>

Department of Anthropology, University of Utah, Salt Lake City, UT 84112

This Feature Article is part of a series identified by the Editorial Board as reporting findings of exceptional significance.

Edited by Robert Whallon, University of Michigan, Ann Arbor, MI, and accepted by the Editorial Board August 7, 2014 (received for review March 4, 2014)

Much attention has been focused on control of fire in human evolution and the impact of cooking on anatomy, social, and residential arrangements. However, little is known about what transpired when firelight extended the day, creating effective time for social activities that did not conflict with productive time for subsistence activities. Comparison of 174 day and nighttime conversations among the Ju/'hoan (!Kung) Bushmen of southern Africa, supplemented by 68 translated texts, suggests that day talk centers on economic matters and gossip to regulate social relations. Night activities steer away from tensions of the day to singing, dancing, religious ceremonies, and enthralling stories, often about known people. Such stories describe the workings of entire institutions in a small-scale society with little formal teaching. Night talk plays an important role in evoking higher orders of theory of mind via the imagination, conveying attributes of people in broad networks (virtual communities), and transmitting the “big picture” of cultural institutions that generate regularity of behavior, cooperation, and trust at the regional level. Findings from the Ju/'hoan are compared with other hunter-gatherer societies and related to the widespread human use of firelight for intimate conversation and our appetite for evening stories. The question is raised as to what happens when economically unproductive firelit time is turned to productive time by artificial lighting.

Our old people long ago had a government, and it was an ember from the fire where we last lived which we used to light the fire at the new place we were going. . .

Di/xao = Oma, 1998 (1)

Control of fire had an enormous impact on the life of our hominin ancestors. As Wrangham and Carmody have so cogently argued, the use of fire for cooking greatly increased the digestibility of food and effective provisioning of young, allowing for shorter birth intervals (2–4). Fire altered anatomy, particularly brain size and gut volume, and radically reduced chewing time. Fire protected early humans from predators and provided a new context for social interaction when food was brought to a central site for cooking. Modified landscapes after burning (5) and higher caloric returns from cooked foods lowered the costs of foraged foods, and thus the costs of sharing. Finally, artificial firelight altered circadian rhythms and extended the day (6), freeing time for social interaction that did not conflict with time for subsistence work.

Current archaeological evidence indicates that our ancestors had sporadic control of fire by 1 million y ago or longer (7, 8) and regular use after approximately 400,000 ka (9). With or following the control of fire, many developments were unfolding that rendered modern humans “unique” (10): extended cooperative breeding (11–13), higher orders of theory of mind (14, 15), religion (16), language (17, 18), social learning and cultural transmission (19, 20), cultural institutions and their regulation (21, 22), and intergroup cooperation and exchange (23–27). Although much work has been done on the effects of cooking on diet and anatomy, little is known about how im-

portant the extended day was for igniting the embers of culture and society.

There are good reasons to expect that what transpires socially will differ between day and night, particularly with the capacity for language. Sufficiently bright firelight represses the production of melatonin and energizes (6, 28) at a time when little economically productive work can be done; time is ample. In hot seasons, the cool of the evening releases pent up energy; in cold seasons, people huddle together. Fireside gatherings are often, although not always, composed of people of mixed sexes and ages. The moon and starlit skies awaken imagination of the supernatural, as well as a sense of vulnerability to malevolent spirits, predators, and antagonists countered by security in numbers (29). Body language is dimmed by firelight and awareness of self and others is reduced. Facial expressions—flickering with the flames—are either softened, or in the case of fear or anguish, accentuated. Agendas of the day are dropped while small children fall asleep in the laps of kin. Whereas time structures interactions by day because of economic exigencies, by night social interactions structure time and often continue until relationships are right. Foragers make use of daytime efficiently and nighttime effectively.

Here I will explore how the time afforded by firelit hours created a space and context for: (i) more accurate understanding of the thoughts and emotions of others, particularly those not immediately present; (ii) bonding within and between groups; and (iii) the generation, regulation, and transmission of cultural institutions. Flexible residential groups and intergroup networks involving kin and nonkin require more information to reliably read others, as well as cultural institutions to generate the regularity of behavior so essential for cooperation (30, 31). How

## Significance

Control of fire and the capacity for cooking led to major anatomical and residential changes for early humans, starting more than a million years ago. However, little is known about what transpired when the day was extended by firelight. Data from the Ju/'hoan hunter-gatherers of southern Africa show major differences between day and night talk. Day talk centered on practicalities and sanctioning gossip; firelit activities centered on conversations that evoked the imagination, helped people remember and understand others in their external networks, healed rifts of the day, and conveyed information about cultural institutions that generate regularity of behavior and corresponding trust. Appetites for firelit settings for intimate conversations and for evening stories remain with us today.

Author contributions: P.W.W. designed research, performed research, analyzed data, and wrote the paper.

The author declares no conflict of interest.

This article is a PNAS Direct Submission. R.W. is a Guest Editor invited by the Editorial Board.

See Commentary on page 14013.

<sup>1</sup>Email: wiessner@soft-link.com.

This article contains supporting information, including data deposition in *SI Appendices 4 and 5*, online at [www.pnas.org/lookup/suppl/doi:10.1073/pnas.1404212111/-DCSupplemental](http://www.pnas.org/lookup/suppl/doi:10.1073/pnas.1404212111/-DCSupplemental).

might fire time and space have been central to the evolution of such institutions and the building of virtual communities in the mind (14) that include those outside of village limits? Does fire time simply extend the day or does it provide contexts for interactions of a different nature? Are appetites for certain night activities from our forager past carried over into industrialized societies? Such questions also have implications for the present, when electric lighting and digital devices further alter our social and circadian rhythms (6, 32, 33).

I will first investigate the impact of extending the day by firelight using data from day and night conversations among the Ju/hoansi (!Kung Bushmen) of Botswana and Namibia (34–36), and then consider the results in light of other forager societies. Lives of modern foragers cannot be projected back in the past, but they do allow us to understand interactions under some of the conditions believed to have characterized our evolutionary past, and to generate hypotheses. These conditions include: a diet obtained through gathering and hunting; small bands of 15–40 individuals with fluid composition to map onto wild resources (37); residential groups composed of kin and nonkin (24); and fire-centered nightlife. The cultural institutions used for the focus of the analysis will not be unique to the Ju/hoan Bushmen but those that are widely shared by other known foraging groups. These institutions include egalitarian relations (38), kinship systems and dues (39, 40), meat sharing (41), marriage and bride service (42, 43), land rights (44–46), networks cross-cutting groups (47, 48), and shared cosmology and ritual to heal individuals and community (49–51).

### The Ju/hoansi (!Kung Bushmen)

The Ju/hoansi inhabit northeast Namibia and northwest Botswana (34–36, 52); those in the study catchment area number about 3,000 today. In the past Ju/hoansi were largely foragers, exploiting over 100 species of plant foods and 40 species of animals (34). Bantu moved into the area in the 1920s to become neighbors of the Ju/hoansi, adding meat and milk to the diet of some. Since the mid-1970s, lifestyle has undergone substantial change as the Ju/hoansi have been settled in permanent villages with a mixed economy composed of foraging, income from wage labor, sale of crafts, government aid, pensions, gardening, and animal husbandry (1, 53).

As foragers, the Ju/hoansi had seven central institutions that structured social and economic relations: (i) egalitarian social structure, (ii) kinship system, (iii) arranged marriage with bride service, (iv) food sharing, (v) land rights, (vi) *xaro* (*hxaro*) exchange, and (vii) trance healing. (For consistency I have chosen to use the past tense. Because much has changed and much has remained the same, neither tense works.) These institutions, their norms, values, and outcomes are recognized by the Ju/hoansi as being part of their tradition that is passed on and named by linguistic terms.

**Egalitarian Social Structure.** Egalitarian social structure assured that no individual could dominate or exploit others. Egalitarianism was enforced by group members who leveled big shots. Equality facilitated sharing, reciprocity and mobility by leveling the playing field of status relations (54–56).

**Kinship System.** The kinship system consisted of a basic Eskimo terminology system modified by a name-sharing relationship that provided the backbone for connecting people within and across groups and specified accompanying kinship obligations (57).

**Arranged Marriages with Bride Service.** Arranged marriages with bride service created far-flung social ties, assured that children would marry into supportive families and staved off disruptive competition over spouses. Young men who had proved adulthood via hunting success were betrothed to often prepubescent and recalcitrant women, and had to show their patience and worth through 2–4 y of bride service (36, 58–60).

**Food Sharing.** Food sharing created bonds, maintained harmony within communities, and reduced risk through “storing in the bellies of kin.” Specific rules governed sharing with cohunters and close blood kin and affines; conventions were less specific for sharing with more distant kin or coresidents. Meat was shared in waves with recipients giving to their respective kin until every person present received a share (34, 36).

**Land Rights.** Land rights to a *n!ore* (territory) were obtained through bilateral inheritance of rights to an area and activated by assembling a group of kin and occupying the land (34, 36, 61). Land rights were largely maintained by social boundary maintenance, with *xaro* partnerships giving others temporary access (27).

**Xaro (*hxaro*) Exchange.** *Xaro* exchange created vast networks within the Ju/hoan dialect group and beyond. It involved the gifting of nonfood items to defined partners to symbolize an underlying relationship of mutual access to alternate residences, resources, and assistance. The average Ju/hoan in the 1970s had 15–16 *xaro* partners residing between 30 and 200 km away. Between 1964 and 1974 /Kae/kae Ju/hoansi spent 3.3 mo a year away from home residing with *xaro* partners (27, 62).

**Trance Healing.** Trance healing lies at the center of Ju/hoan religion (54, 63–65). Trance healing was the only Ju/hoan activity in which entire bands or coalitions of bands worked together to produce a desired outcome: healing, protection, and mending rifts in communities. Women’s energetic clapping and singing for hours on end supported healers who undertook the painful departure from this world, experiencing “half death.” Healers traveled to God’s (G!ao n!a’s) village, an unknown and fearsome place, where they bargained and battled with the spirits of the dead to prevent them from taking loved ones away. The trance ceremonies often lasted until dawn, produced by the synergy of all.

### Methods and Data

Two different datasets will be used in this analysis. The first dataset is comprised of information on 174 day and night conversations collected in July–August and November 1974 at /Kae/kae and Dobe in northwest Botswana. The purpose of this work was to gain further insight to guide my research at the time. Conversations that involved five or more adults and lasted for more than 20–30 min were summarized and noted for the following variables: topic, main points and people discussed, setting, time of day, participants, initiators, praise and criticism, and when possible, subsequent outcomes (56). In 1998, 2005, and 2013, I visited old friends at /Kae/kae and found discussions about former times useful for jogging my memory.

These conversations cannot be taken as a representative sample of all Ju/hoansi talk. First, larger groups often inspire gossip and encourage good storytellers. Many more mundane chats fill the shorter spaces: discussion of food, a sick child, or a thorn in a foot. Second, the time of the study was an unusually long dry and hungry spell when people converged on permanent waters and foraged less. Third, I did not include the many conversations of groups of women playing with small children because they were fragmented and hard to follow. Fourth, I sought out larger groups, not intimate family discussions at the hearth. Fifth, I slept around the fire and sometimes fell asleep before talk had ended. Finally, conversations change with context. In recent decades when the Ju/hoansi were permanently settled with their own local government, night conversations included discussions of local politics.

A large portion of night conversation involved stories about real people and events of the past one to three generations; when I began to compare day and night talk in 2010, I did not feel satisfied with noted conversations only. Because it was not possible to turn back the clock, I returned to Botswana and Namibia for three 1-mo stints in 2011–2013 to digitally record stories told by people I knew in the 1970s, stories about past hunting ventures, meat fights, murders, marriages, bush fires, getting lost, births, interactions with Bantu, and so on. Sixty-eight stories told by firelight have been transcribed and translated by a team of Ju/hoansi trained by Megan Biesele. (Members of the Ju/hoan transcription group who worked on the recordings include Beesa Boo, Charlie N!aici, Tsemkxao /Ui, and /Ai!ae /Kunta. Analysis of these stories is a work in progress; the recordings will also be used in the Nyae Nyae village schools as a part of cultural education.) These stories give a more detailed understanding of transmission of norms and values, cultural institutions, emotions, kinship

connections, and scope of networks. Points made in the text will be illustrated with stories presented in *SI Appendix*.

### Like Night and Day

When firelight extended the day, did it simply give more time or did it create a qualitatively different time and space? Fig. 1 indicates a profound difference ( $\chi^2 = 43.15$ ,  $p < 0.0001$ ). By day people devoted 31% of their talk to economic discussions: foraging plans, resource availability, hunting strategies, and technology. Another 34% of time was occupied by complaint or criticisms that sometimes regulated norms, and other times were unfounded. Jealousy is the keeper of equality in many egalitarian societies and criticism was motivated by envy approximately one-third of the time. Verbal criticism, complaint, and conflict (CCC) were the spice of Ju/'hoan life that made group living viable (56); if not worked out by talk, people voted with their feet and departed. Two cases in the sample escalated to the point of brandishing poison arrows but the aggressors were physically restrained. Close to 95% of CCC cases were between the parties directly affected by certain behavior, not third parties, as is more common in larger-scale societies (22, 66). The one exception was the leveling of “big shots,” everybody’s sport. Another 16% of daytime conversations were joking sessions, often between individuals in the same sex or age cohort (e.g., raucous sexual joking, adventures of youths). Four percent of conversations centered on interethnic relations; of course people from other ethnic groups were briefly mentioned in many other conversations. When people rested in the shade, occasionally stories were told with background music from thumb pianos, pluriarcs, and musical bows.

In the late afternoon, families gathered at their own fires for the evening meal. After dinner and dark, the harsher mood of the day mellowed and people who were in the mood gathered around single fires to talk, make music, or dance. Some nights large groups convened and other nights smaller groups. The focus of conversation changed radically as economic concerns and social gripes were put aside. At this time 81% of lengthy conversations

involving many people were devoted to stories; these stories were largely about known people and amusing, exciting, or endearing escapades. Storytellers did not praise heroes or moralize; advancing oneself in the moral hierarchy or demoting others was avoided, as was any form of self-promotion. No doubt, listeners gleaned unspoken lessons from stories. When a story was over, others rehashed details, embellished, and discussed. The language of stories tended to be rhythmic, complex, and symbolic, with individuals repeating the last words of phrases or adding an affirmative “Eh he.” Frequently listeners were stunned with suspense, nearly in tears, or rolling with laughter; they arrived on a similar emotional wavelength as moods were altered.

Stories contained little environmental information, although they almost always described what people were eating at the time of the event. Stories expanded the virtual social universe by reawakening feelings for those in far-away places or relating the details of healers’ journeys in trance. Minor daytime disputes waned as talk progressed. As the fire faded to coals, people returned to their respective hearths to settle in for the night as sleepiness set in. Hours later, around 2:00 AM (the “little day”), some adults awoke, smoked, stoked the fire to deter predators, and chatted for a short time.

Both men and women told stories, particularly older people who had mastered the art (54). Camp leaders were frequently good storytellers, although not exclusively so. Two of the best storytellers in the 1970s were blind but cherished for their humor and verbal skills. Stories provided a win-win situation: those who thoroughly engaged others were likely to gain recognition as their stories traveled. Those who listened were entertained while collecting the experiences of others with no direct cost. Because story telling is so important for remembering and knowing people beyond the camp, there is likely to have been strong social selection for the manipulation of language to convey characters and emotions (67).

Stories were not the sole subject of group conversations of the night. At times heated conflicts spilled over from the day and insults were hurled between hearths of the disputants. Pressing economic issues of the day sometimes resurfaced in the evening. Bursts of laughter often filled the night, although concentrated joking sessions were more common by day in single-sex or age cohorts where people could joke freely without violating rules of respect related to kinship or age. Myth and folklore were on the decline in the 1970s but no doubt more important in preceding generations. Biesele’s insightful analysis indicates that myth and folklore (54), like stories, did not directly transmit morals or threaten supernatural sanctioning, but rather turned ordinary rules of cultural logic upside down in most provocative ways. The God’s are, at times, crazy.

The night was also the niche for celebration and ceremonies that linked humans to the spirit world. On 8 of 36 evenings observed, women broke into festive song and dance that flooded the night. On 6 of 36 nights, trance-healing dances were performed; three were smaller ones for healing and three nightlong dances drew in people from three or more camps. Efforts by everybody present contributed to healing the sick, closing social rifts, and restoring spiritual cohesion. Trance dancing was the most inclusive activity of the night, energetically the most costly, and cognitively the most complex.

### Stories, Cultural Institutions, and the “Big Picture”

To tune out of daily life and into stories, literature, or films in the evening is common practice; in that sense, night activities are not remarkable. However, what larger projects are realized by firelight in a society without electronics or the printed word? How are institutions generated, regulated, and transmitted in firelit hours? How do night conversations convey the “big picture”?

Table 1 breaks down day and night conversations by the cultural institutions described earlier. Social regulation was largely the agenda of the day as breaches of norms and values were adjusted

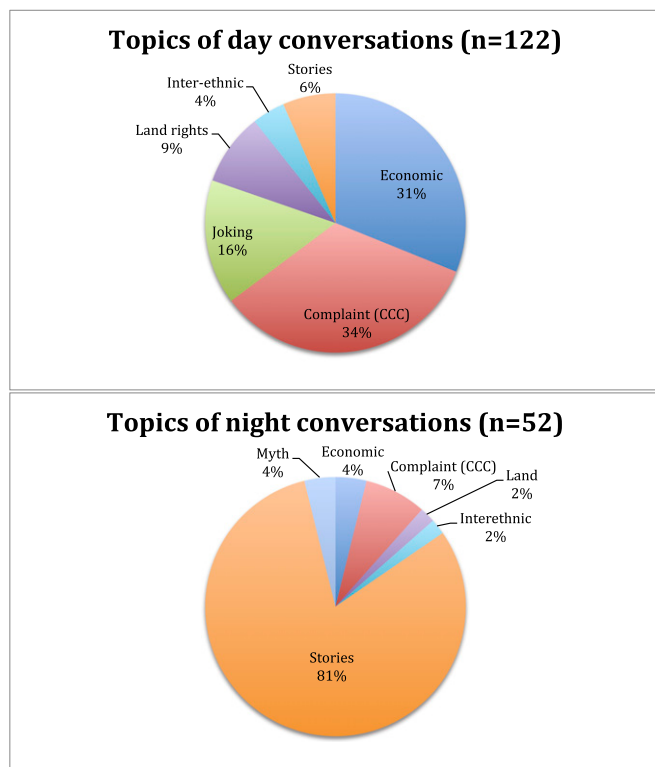


Fig. 1. Topics of day and night conversations compared.

**Table 1. Cultural institutions at the center of day and night conversations**

| Institutions         | Day        | % with CCC | Night     | % with CCC |
|----------------------|------------|------------|-----------|------------|
| Equality/leveling    | 10 (8%)    | 100        | 0 (0%)    | 0          |
| Kinship/dues         | 18 (15%)   | 78         | 4 (8%)    | 25         |
| Marriage             | 11 (9%)    | 55         | 10 (19%)  | 10         |
| Meat sharing         | 20 (16%)   | 70         | 3 (6%)    | 33         |
| Land rights          | 14 (11%)   | 71         | 1 (2%)    | 100        |
| <i>Xaro</i> exchange | 6 (5%)     | 67         | 5 (10%)   | 0          |
| Trance healing       | 2 (2%)     | 0          | 8 (15%)   | 13         |
| Other topics         | 41 (34%)   | 0          | 21 (40%)  | 0          |
| Totals               | 122 (100%) |            | 52 (100%) |            |

Other topics include economic plans, trips to towns, hunting stories, or encounters with animals, and so forth.

by complaint, criticism, and gossip. Sixty-seven percent or more of conversations regarding egalitarian relations, kinship dues, food sharing, *xaro* exchange, and land tenure involved verbal sanctioning. The number of disputes over land was high because of changing residence patterns at the time. *Xaro* was generally an amicable relationship; of the six incidents of *xaro* discussed, three concerned deep conflicts over other issues that came to a head over specific gifts. Day talk thus vented jealousies, enforced norms, and settled a wide range of disputes.

Night conversations covered the same institutional terrain as day conversations but with a very different tone. Complaints and criticism during day talk are significantly more frequent than during night talk (Table 1) (Fisher's exact = 13.02,  $p < 0.0001$ ). For example, whereas day conversations dwelt on current marital disputes, night talk ventured to amusing stories of marriages past. Whereas day conversations centered on the diversion of a specific gift in *xaro* exchange, night conversations related adventures about long-distance journeys for *xaro* in the past (Table 1). The category "other" included economic exploits such as hunting stories, close calls with wild animals, or adventures while traveling to other areas.

Firelit conversations about known people and their exploits often captured the workings of entire institutions in a small-scale society with little formal teaching. Through stories and subsequent discussion, people collected experiences of others and accumulated knowledge of options that others had tried. The nitty-gritty of egalitarianism, food sharing, kinship dues, and land tenure were thus regulated by day; night talk was critical for transmitting the big picture of the workings of marriage, kinship, *xaro* exchange, and cosmology/trance healing. Here I will concentrate on conversations regarding three institutions: arranged marriages, kinship, and *xaro* exchange. Some of the fully translated stories are given in [SI Appendix](#).

**Marriage.** Arranged marriages provided the backbone of regional interaction in Ju/'hoan society. For example, of 77 marriages that were contracted before the Ju/'hoansi became settled, 30 (39%) were between spouses whose camps were between 61 and 200 km apart (60). Because marriages were quiet affairs within small camps, the experience of any one individual was limited. It was through night conversations that individuals gained a broader picture of rites and procedures of marriage. For example, two detailed stories of marriage gave the basic rules, practices, and values around arranging marriages, ceremonies, and bride service, as well as the grammar of etiquette between in-laws ([SI Appendix 1: //Ukxa's Marriage and /Ailae's Marriage](#)). These stories included emotional and personal aspects of marriages involving shy grooms and often prepubescent and recalcitrant brides. Situational variations in marriage gave a range of strategies tried: for example, one story told of two assertive sisters who rejected their prospective spouses for personal reasons and later chose their own spouses ([SI Appendix 2: Two Women Who Chose Their Own Husbands](#)). Young people came to know what to expect; outliers provided models for alternative marriage practices when the Ju/'hoansi settled more permanently.

Marriage built kinship links that formed the basis for *xaro* and other crucial relationships. Elders often gave intricate information on kinship ties while telling such stories by firelight (see [SI Appendix 3: The Gathering at Ti='an=ao](#) for an example of the details of kinship related in stories). The focus on the storyteller, together with the uninterrupted context, facilitated memory of these genealogies for survival. At times storytellers rehearsed the dilemmas of kinship. For example, two recordings tell of a murderous psychopath and the band's wrenching ambivalence about taking violent action against their own kinsman.

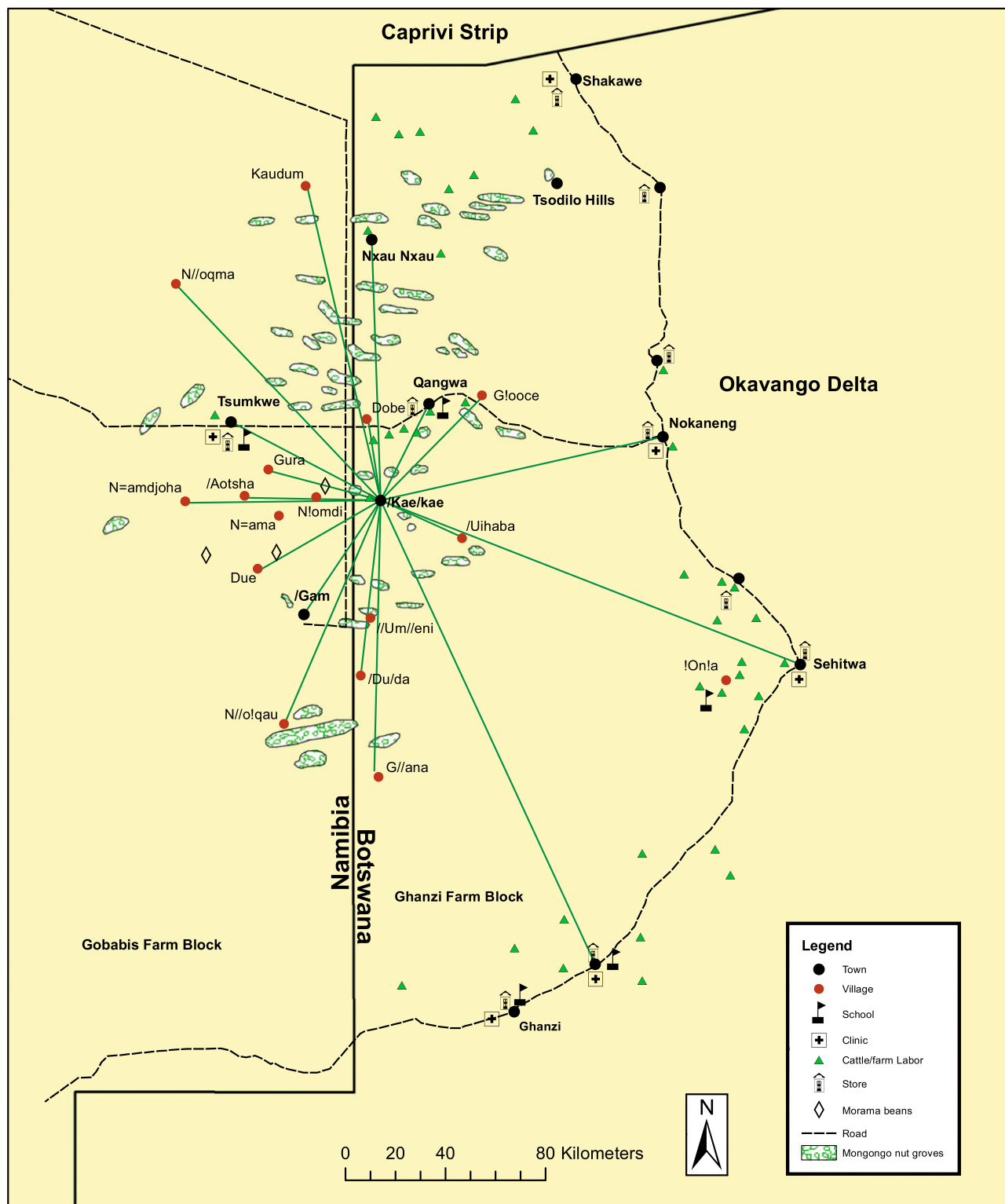
***Xaro* Exchange.** Night conversations also conveyed the broader structure of *xaro* exchange, particularly remembering distant *xaro* partners. Nine of 122 (7%) day conversations included stories about the exploits of people who were direct or indirect *xaro* partners, compared with 41 of 52 (79%) stories told at night. Night conversations used multimodal communication with gestures, imitation, sound effects, or bursts of song that brought the characters right to the hearth and into the hearts of listeners. People went to sleep with absent kin filling their thoughts; not infrequently they left for visits shortly after.

Evening stories also took local views of *xaro* exchange to a regional level. Some individuals who traveled far and wide to do *xaro* told of their journeys up to 200 km to where they encountered people from other dialect or language groups. The map in Fig. 2 gives the number of stories with protagonists from different locations told during my 2-mo notation of conversations at /Kae/kae. The area covered is indeed vast as people sought ties for alternate residences and obtained material goods, such as clay pots and glass beads from the north, small finely crafted ostrich eggshell beads from the south, and metal from both directions.

**Table 2. Spheres of *hxaro* of two bands and individuals in those bands**

| Band                   | No. of other bands in which ego has <i>xaro</i> partners |       | No. of people in other bands with whom ego sometimes coresides* |         | Total no. of bands and people with whom ego's band members coreside |       |
|------------------------|--|-------|---|---------|---|-------|
|                        | $\bar{x}$  | Range | $\bar{x}$   | Range   | Total   |       |
| Band 1 $n = 12$ adults | 5.5  | 2–9   | 165   | 60–270  | 23  | 690   |
| Band 2 $n = 10$ adults | 11.2   | 6–21  | 336   | 180–630 | 35  | 1,050 |

\*These figures were derived from taking: (number of *xaro* partners in other bands)  $\times$  (band size). Because band size shifts, average band size was calculated at 30 adults and children. The size of these spheres of interaction was then checked with descriptions of which bands converged and camped together for a week or longer when resources were plentiful. If anything, these figures underestimate spheres of interaction.



**Fig. 2.** Location of people who are protagonists in stories told by people from four different bands based at /Kae/kae. (Two stories about anthropologists not included). Number of stories from villages shown on map: Qangwa ( $n = 2$ ), Dobe ( $n = 2$ ), Glooce ( $n = 4$ ), Bate ( $n = 2$ ), !Ubi ( $n = 1$ ), Mahopa ( $n = 1$ ), Sehitwa ( $n = 6$ ), Nokaneng ( $n = 2$ ), Tsumkwe ( $n = 9$ ), G!anisha ( $n = 1$ ), /Du/da ( $n = 2$ ), Nxau Nxau ( $n = 1$ ), Kaudum ( $n = 2$ ), N=ama ( $n = 3$ ), Due ( $n = 1$ ), Eiseb ( $n = 1$ ), G/am ( $n = 4$ ), /Aotsha ( $n = 3$ ), Bense Kamp (1), Gura ( $n = 2$ ), /Uihaba ( $n = 1$ ), N!omdi ( $n = 2$ ), N=amdjoha ( $n = 1$ ).

Listeners, enthralled, soaked up knowledge of physical and social geography without bearing the costs of travel.

Another dimension was added to Ju/'hoan imagination of virtual communities when trance healers told of their journeys to

God's village inhabited by spirits who were otherwise remote from life on earth. The trials, visions, and achievements of healers in trance conveyed during conversations after dark were an essential force in motivating participation and rallying cooperation for

trance dances at a level not seen in other realms of Ju/'hoan society (68).

Dense ties between individuals of different bands, kept alive through firelit conversations, gift-giving, and visiting, were used to plan gatherings of up to five to six bands when resources permitted. Virtual communities became grounded as people converged for days to weeks to socialize, engage in *xaro* exchange, educate the young, and arrange marriages. The highlight of gatherings was nightlong dances where renowned healers from different groups danced together and instructed youths in healing. Ritual innovations that spread during such synergistic events could be kept alive when stories of gatherings were told and retold (see *SI Appendix 3: The Gathering at Ti='an=ao* for the story of such a gathering in the late 1940s).

Not all night talk facilitated cooperation. A reputation for violence, transmitted in stories, narrows spheres of interaction because Ju/'hoansi are leery of visiting bands where trouble might erupt. Table 2 gives a sense of the sphere of interaction of adults in two bands at /Kae/kae in 1974. Note the difference between the interactions of Band 1, a more reclusive group in which two persons had committed homicide, and Band 2, a very peaceful and sociable group. These spheres of interaction are similar to those found for the Hadza and Ache foragers (48).

**Technology.** Most technology traveled on *xaro* paths and so became imbued with social meaning. Day conversation dealt with practical aspects of artifacts; night conversation related stories of people and the distant places from where they came. For example, metal projectile points were adopted to replace bone points in the late 1800s and early 1900s by all Kalahari Bushmen. By approximately the 1950s, Bushmen in the four major linguistic groups studied, !Kung (Ju/'hoansi), G/wi, !Xo, and Nharo, had experimented with metal technology and developed points with functional equivalence but pronounced stylistic differences at linguistic group boundaries (69). These differences signaled identity and spurred conversations about Ju/'hoansi norms regarding hunting, ownership, and meat sharing, as well as discussion of people from other linguistic groups. It was during travels to reside with *xaro* partners when stories were exchanged in the evening that men had opportunities to consider innovations made by others, their associated meanings, and decide to imitate or differentiate.

### Day and Night: Other Hunting-Gathering Societies and Beyond

At times I believe that my feet have been set upon a road which I shall go on following, and that slowly the centre of gravity of my being will shift over from the world of day, from the domain of organizing and regulating universal powers, into the world of Imagination...with the coming of dusk, with the lighting of the first star and the first candle...

Isak Dinesen, *Shadows on the Grass* (70)

Does the broad distinction between activities of the day, organizing and regulating, and those of the night around the fire, hold true for other foraging societies? Do the oral traditions of other hunting-gathering societies contain similar information to those of the Ju/'hoansi? By firelight, are people more likely to venture into the virtual world of the imagination, ritual and stories? For the first question, a search in the eHRAF (Human Relations Area Files) for World Cultures turned up passages for 38 primarily hunter-gatherer societies for the word “gossip” used in the context of social control by day when individuals from different household units met for different activities. There was not a single mention of people gathering to engage in sanctioning gossip at night. Economic plans also appear to be discussed largely by day, although events of the day may be retold by night.

With the “lighting of the first star,” higher orders of theory of mind and virtual communities are evoked in most hunter-gatherer societies as people turn to singing, dancing, and religious ceremonies, as well as lengthy story telling. As the Ainu hunter-gatherers of Japan maintain: “The daytime is for their activities and

the night for deities and demons” (71). For 60 hunter-gatherer societies in the eHRAF, there was mention of ceremonies held by firelight involving song and dance for celebration, healing, initiation, mourning, fertility, and other purposes. Song and dance bonds groups through rhythm, coaction, and in many cases, altered states of consciousness. Night was prime time for entrance into imaginary worlds of the supernatural.

Stories are told in virtually all hunter-gatherer societies (72); together with gifts, they were the original social media. Tlingit elders of the Pacific Northwest Coast used to recount stories that extended over 4 d with the fire blazing up to 6–7 feet high (73). Narratives told by firelight include a gradient from tales of known people and events, to legends based on past known events, to folklore about humans and animals, to myths that address origins and order. Some cultures recognize the difference between genres of stories (74–76), although the boundaries may not be rigid. For example, in 2012 three Ju/'hoansi were tragically killed in a bush fire. Within a month stories developed from the initial “news” that spread by day, to detailed and horrifying accounts told at night round the fire, to stories with supernatural elements as the tragedy was attributed to Bantu black magic. Similarly, some Australian Aboriginals have incorporated events from interaction with “white fellas” into their myth of the rainbow python (77).

In most small-scale societies, myths and legends are told by firelight. These stories “reveal the nature of founding design and of its creators by providing vital links between individuals, group-specific sites, and ancestral beings” (78). Australian Aboriginal stories of dreamtime are enacted as social practice in narration and ritual (79). Myths and legends receive mention for 59 hunter-gatherer societies in the eHRAF, standardizing beliefs (80), socializing children (81), supporting reciprocal altruism, and transmitting ecological information (82). As Benson Lewis, a Cibecue Apache put it (74): “Stories go to work on you like arrows. Stories make you live right. Stories make you replace yourself.” Although told at higher levels of abstraction than Ju/'hoansi night narratives, both genres of “storying” in firelit hours keep cultural institutions alive, explicate relations between people, create imaginary communities beyond the village, and trace networks for great distances (83–87).

There is a dearth of work on stories about known people and events in the hunter-gatherer literature. Such narratives are not generally regarded as having the same cultural value as other oral traditions, and thus less frequently transcribed and translated. Exceptions include Briggs' intimate descriptions of night activities among the Canadian Inuit (88) and Burch's insightful analysis of Inupiaq Eskimo stories of alliance and conflict (75). However, such stories are likely to be told in all societies. For example, Nganyintja Ilyatjari from the Pitjantjatjara explains how stories of different genres were told by people of all ages and both sexes were intertwined with most activities but told most intensely by firelight (89). Recording and analysis of such narratives holds much promise for understanding more the complex cognitive processes of mastering interpersonal and regional relations.

### Discussion

Control of fire brought many changes to our human ancestors in terms of energetics, foraging tactics, physical developments, and terrestrial living. The transport of foods to a central place for cooking by day created a new social space; keeping the fire alight at night forged a new temporal space. Data from modern foragers cannot be projected back to interpret the distant past. These data can, however, give us a realistic sense of what practices work for foragers and why, a sense of what could be accomplished in a firelit niche, and grounds to formulate questions and hypotheses regarding the impact of firelight on social and cultural evolution.

The data from Ju/'hoansi day conversations suggest that important cultural etiquettes could have emerged from daytime interactions: basic systems of sharing, respect of possession, expanded cooperative breeding, broader kinship recognition, and

classification (90, 91), social leveling, and perhaps song and dance for bonding (92). Such shared social etiquettes could have generated important templates for some of the social behavior and cognitive dispositions found in all foraging societies.

When the night appears to have really mattered was for the extension of cultural institutions over time and space to link individuals from different bands into larger “imagined communities” beyond village limits, an enterprise that involved complex cognition and time-consuming information transfer. In most hunter-gatherer societies, firelit hours drew aggregations of individuals who were out foraging by day and provided time for ventures into such virtual communities, whether human or supernatural, via stories and ritual. Stories conveyed unifying cosmologies and charters for rules and rites governing behavior. These stories also conveyed information about the nature of individuals in the present and recent past, their experiences and feelings, as well as factual knowledge about long-distance networks, kinship, and land tenure. Stories told by firelight put listeners on the same emotional wavelength, elicited understanding, trust, and sympathy (93), and built positive reputations for qualities like humor, congeniality, and innovation. The capacity for expanding the imagination by night may have deep roots, extending back to the regular use of fire in encampments some 200,000–300,000 ka, a time when evidence for broader intergroup interactions begins to crop up in the archeological record (94–99).

The impact of extending the day by firelight on society and culture opens up a new area for research. What might be done to carry investigations beyond the very preliminary findings presented here? First, further research needs to be done on the physiological effects of different levels of firelight, including hormonal states and moods. Experimental work on the impact of body language and facial expressions by day and by night also might further understanding of why firelight mellows, bonds, and releases inhibitions in such a way as to facilitate journeys into imagined communities.

For archaeology, insights might be gained by focusing on whether the evidence for the regular control of fire corresponds with: (i) the expansion of networks for obtaining raw materials; (ii) the presence of beads and other items likely to have been used as gifts to support friendships outside the group or to express identity in the face of expanding networks; and (iii) art, including rock art, that may indicate the rise of rituals to bond larger groups that assembled only periodically. The use of ethnographic data for generating ideas and hypotheses to aid in interpretation of archaeological material has been regular practice in archaeology since the 1960s (100–102).

There is still much compelling work to be done on the ethnography of the night in other human societies to understand variation, examine ideas presented here, and formulate alternate hypotheses. Much remains unexplored. For example, this study centered on gatherings of five or more people; groups of two to three people did not generate such spirited story telling. The topics of night conversations in dyads or smaller groups need investigation. Most !Kung fireside groups are mixed sex; the conversations of single-sex firelight groups, common among Australian Aboriginal groups, may yield further insights. Comparable ethnographic studies of firelight talk can be carried out in any small-scale societies—not only foraging societies—where people engage in traditional economic pursuits during the day, maintain broad networks, and convene around the fire at night.

For many former foragers, such research is no longer possible because life has changed radically with settlement, government relief food, and greatly narrowed networks. Still, the impact of

change on night conversation merits study to see if basic tendencies hold. Today, when Ju/hoansi spend much of their daytime in villages living off of famine relief and store-bought foods and no longer engage in *xaro* exchange, current night conversations still mellow around the fire and venture into the exploits of distant kin, adventures in towns, local politics, truck stories, elephant stories, or experiences in trance. Youths wander restlessly with mobile phones in the darkness, seeking a digital signal from faraway towers, regardless of whether they have sufficient credits to make a call.

Finally, the question of the impact of increasing social and political complexity on firelight gatherings is an intriguing one. Ekirch's (103) fascinating ethnography of the night in northern Europe from around 1500–1750 describes a period when urbanization led to a more anonymous society, witchcraft beliefs prevailed, crime soared, and the night became villainized. This period was followed by a new era of science and lighting, turning the night into time for public entertainment: song, dance, theater and literature, and ventures outside the household. Throughout the darkest of ages, however, night intimacy, stories, and the transmission of cultural traditions via myth, history, and religious practice persisted behind barred doors.

The appetite for firelight as a setting for social intimacy and openness in conversation remains very much a part of modern life and a potential area for research. Although campfire conversations are infrequent in our daily lives, they are a valued part of scout outings, picnics, wilderness trips, and ecotourist ventures for the personal intimacy and knowledge that is shared. The power of the flame is reproduced in our homes through fireplaces and candles. For example, the Danish spirit of *hygge* (coziness in social gatherings) is mastered by artfully placing candles, “living lights,” to stimulate intimate conversation (104). Stories, although removed from their firelit context, have stayed with us and continue to fill evening hours (105) through books, recordings, and films. Storytelling unfolds early in childhood as 3- to 4-y-olds begin to construct tales of their own and to crave bedtime stories (106). The deaf have strong traditions of storytelling in sign language that can run deep into the night and constitute an important part of their historical traditions, artistic expression, and identity (107). The multibillion dollar publishing industry dominated by sales of stories—fiction, science fiction, history, and biographies—together with the much larger film industry attest to the power of stories. Like hunter-gatherers, we work our imaginations, gain new perspectives, and expand our horizons from stories. Even so, artificial light and digital communication are invading the night worldwide, turning hours of darkness into economically productive time and overriding social time and story time. The day then ends with the flip of a switch, without taking the time to revisit, explore, ponder, and repair relationships, or let the issues of the day fade with the embers.

**ACKNOWLEDGMENTS.** Many Ju/hoansi have contributed their talk and taken time to explain. I am particularly grateful to the late #Oma zho and his son Tsao !xoma, who helped me from 1973 until their deaths in the 1990s, and to Tsao's stepson /Aice !N!aici, who took over. For the 2011–2013 work, I am particularly grateful to a number of master story tellers: the late /Ui n!a'an of !N!omdi, /Kunta Boo, !N!ani Kxao, /Ang!nao Kxao, Sebe Kxao, //Ukxa Kun!oi, and many others. Megan Biesele put extensive effort and resources into training the Ju/hoan transcription team; without the help of Beesa Boo, /Ai!ae /Kunta, Tsemkxao /Ui, and Charlie !N!aici, closer analysis of text would not have been possible. Much work remains to be done. Peter Yaworsky kindly drew the maps. I thank Robin Dunbar for suggesting that I compare day and night conversations to kick off this study. Robin Dunbar, Richard Wrangham, and the guest editor Robert Whallon provided most helpful guidance and comments.

1. Biesele M, Hitchcock R (2010) *The Ju/hoan San of Nyae Nyae and Namibian Independence: Development, Democracy, and Indigenous Voices in Southern Africa* (Berghahn Books, New York).
2. Wrangham R, Carmody R (2010) Human adaptation to the control of fire. *Evol Anthropol* 19(5):187–199.
3. Carmody RN, Wrangham RW (2009) The energetic significance of cooking. *J Hum Evol* 57(4):379–391.
4. Wrangham R (2009) *Catching Fire: How Cooking Made Us Human* (Basic Books, New York).

5. Bliege Bird R, Bird DW, Codding BF, Parker CH, Jones JH (2008) The “fire stick farming” hypothesis: Australian Aboriginal foraging strategies, biodiversity, and anthropogenic fire mosaics. *Proc Natl Acad Sci USA* 105(39):14796–14801.
6. Burton F (2011) *Fire: The Spark That Ignited Human Evolution* (Univ of New Mexico Press, Albuquerque, NM).
7. Berna F, et al. (2012) Microstratigraphic evidence of in situ fire in the Acheulean strata of Wonderwerk Cave, Northern Cape province, South Africa. *Proc Natl Acad Sci USA* 109(20):E1215–E1220.

8. Gowlett JA, Wrangham RW (2013) Earliest fire in Africa: Towards the convergence of archaeological evidence and the cooking hypothesis. *Azania* 48(1):5–30.
9. Dunbar R, Gowlett J (2014) Fireside chat: The impact of fire on hominin socioecology. *Lucy to Language: The Benchmark Papers*, eds Dunbar R, Gamble C, Gowlett J (Oxford Univ Press, Oxford), pp 277–296.
10. Hill K, Barton M, Hurtado A (2009) The emergence of human uniqueness: Characters underlying behavioral modernity. *Evol Anthropol* 18(5):187–200.
11. Hawkes K, O'Connell JF, Jones NG, Alvarez H, Charnov EL (1998) Grandmothering, menopause, and the evolution of human life histories. *Proc Natl Acad Sci USA* 95(3):1336–1339.
12. Hrdy S (2009) *Mothers and Others* (Belknap Press, Cambridge, MA).
13. van Schaik C, Burkart J (2010) Mind the gap: Cooperative breeding and the evolution of our unique features. *Mind the Gap: Tracing the Origins of Human Universals*, eds Kappeler PM, Silk JB (Springer, Berlin), pp 477–496.
14. Dunbar R (2008) Why humans aren't just great apes? *Issues in Ethnology and Anthropology* 3(3):15–33.
15. Tomasello M, Carpenter M (2007) Shared intentionality. *Dev Sci* 10(1):121–125.
16. Durkheim E (2001) *The Elementary Forms of the Religious Life* (Oxford Univ Press, Oxford).
17. Dediu D, Levinson SC (2013) On the antiquity of language: The reinterpretation of Neandertal linguistic capacities and its consequences. *Front Psychol* 4(397):397.
18. Pinker S (1994) *The Language Instinct: The New Science of Language and Mind* (Allen Lane and Morrow, New York).
19. Boyd R, Richerson PJ, Henrich J (2011) The cultural niche: Why social learning is essential for human adaptation. *Proc Natl Acad Sci USA* 108(Suppl 2):10918–10925.
20. Richerson P, Boyd R (2008) *Not by Genes Alone: How Culture Transformed Human Evolution* (Univ of Chicago Press, Chicago).
21. Bowles S, Gintis H (2011) *A Cooperative Species: Human Reciprocity and its Evolution* (Princeton Univ Press, Princeton).
22. Henrich J, et al. (2010) Markets, religion, community size, and the evolution of fairness and punishment. *Science* 327(5972):1480–1484.
23. Dunbar RI (2003) The social brain: mind, language, and society in evolutionary perspective. *Annu Rev Anthropol* 32:163–181.
24. Hill KR, et al. (2011) Co-residence patterns in hunter-gatherer societies show unique human social structure. *Science* 331(6022):1286–1289.
25. Mulvaney DJ (1976) The chain of connection: The material evidence. *Tribes and Boundaries in Australia*, ed Peterson N (Australian Institute of Aboriginal and Torres Strait Island, Canberra, Australia), pp 72–94.
26. Wiessner P (1982) Risk, reciprocity and social influences on !Kung San economics. *Politics and History in Band Societies*, eds Leacock E, Lee R (Cambridge Univ Press, Cambridge, UK), pp 61–84.
27. Wiessner P (1986) Kung San networks in a generational perspective. *The Past and Future of !Kung Ethnography*, eds Bieseles M, Gordon R, Lee R (Helmut Buske, Hamburg, Germany), pp 103–136.
28. Gowlett J (2010) Firing up the social brain. *Social Brain, Distributed Mind*, eds Dunbar R, Gamble C, Gowlett J (Oxford Univ Press, Oxford), pp 341–366.
29. Musharbash Y (2013) Night, sight and feeling safe: An exploration of aspects of Warlpiri and Western sleep. *TJAJA* 24(1):48–63.
30. Greif A (2006) *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade* (Cambridge Univ Press, Cambridge, MA).
31. North DC (1990) *Institutions, Institutional Change and Economic Performance* (Cambridge Univ Press, Cambridge, MA).
32. Aoki H, Yamada N, Ozeki Y, Yamane H, Kato N (1998) Minimum light intensity required to suppress nocturnal melatonin concentration in human saliva. *Neurosci Lett* 252(2):91–94.
33. Lockley SW, Brainard GC, Czeisler CA (2003) High sensitivity of the human circadian melatonin rhythm to resetting by short wavelength light. *J Clin Endocrinol Metab* 88(9):4502–4505.
34. Lee R (1979) *The !Kung San: Men, Women and Work in a Foraging Society* (Cambridge Univ Press, Cambridge, MA).
35. Lee R, DeVore I, eds (1976) *Kalahari Hunter-Gatherers* (Harvard Univ Press, Cambridge, MA).
36. Marshall L (1976) *The !Kung of Nyae Nyae* (Harvard Univ Press, Cambridge, MA).
37. Kelly RL (1995) *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways* (Smithsonian Institution Press, Washington, DC).
38. Boehm C (2009) *Hierarchy in the Forest: The Evolution of Egalitarian Behavior* (Harvard Univ Press, Cambridge, MA).
39. Barnard A (1978) Universal systems of kin categorization. *Afr Stud* 37(1):69–82.
40. Barnard A (1999) Modern hunter-gatherers and early symbolic culture. *The Evolution of Culture: An Interdisciplinary View*, eds Dunbar R, Knight C, Power C (Rutgers Univ Press, New Brunswick, NJ), pp 50–70.
41. Wiessner P (1996) Leveling the hunter: Constraints on the status quest in foraging societies. *Food and the Status*, eds Wiessner P, Schiefelhövel W (Berghahn Books, Oxford), pp 171–192.
42. Apostolou M (2007) Sexual selection under parental choice: The role of parents in the evolution of human mating. *Evol Hum Behav* 28(6):403–409.
43. Walker RS, Hill KR, Flinn MV, Ellsworth RM (2011) Evolutionary history of hunter-gatherer marriage practices. *PLoS ONE* 6(4):e19066.
44. Cashdan E (1983) Territoriality among human foragers: Ecological models and an application to four bushman groups. *Curr Anthropol* 24(1):47–66.
45. Eibl-Eibesfeldt I (1979) *The Biology of Peace and War: Men, Animals, and Aggression* (Viking, New York).
46. Peterson N, ed (1976) *Tribes and Boundaries in Australia (no. 10)* (Australian Institute of Aboriginal and Torres Strait Island, Canberra, Australia).
47. Whallon R (2006) Social networks and information: Non-“utilitarian” mobility among hunter-gatherers. *J Anthropol Archaeol* 25(2):259–270.
48. Hill K, Wood B, Baggio J, Hurtado A, Boyd R (2014) Hunter-gatherer inter-band interaction rates: Implications for cumulative culture. *PLoS One* 9(7):e102806.
49. Hayden B (1987) Alliances and ritual ecstasy: Human responses to resource stress. *J Sci Study Relig* 26(1):81–91.
50. Hayden B (2003) *Shamans, Sorcerers and Saints: A Prehistory of Religion* (Smithsonian Books, Washington, DC).
51. Guenther M (1999) *Tricksters and Trancers: Bushman Religion and Society* (Indiana Univ Press, Bloomington, IN).
52. Wilmsen E (1989) *Land Filled with Flies: A Political Economy of the Kalahari* (Univ of Chicago Press, Chicago).
53. Wiessner P (2003) Owners of the future? Calories, cash, casualties and self-sufficiency in the Nyae Nyae area between 1996 and 2003. *Vis Anthropol Rev* 19(1-2):149–159.
54. Bieseles M (1993) *Women Like Meat: The Folklore and Foraging Ideology of the Kalahari Ju/'hoan* (Witwatersrand Univ Press, Johannesburg).
55. Lee R (1969) Eating Christmas in the Kalahari. *J Nat Hist* 78(10):14–22.
56. Wiessner P (2005) Norm enforcement among the Ju/'hoansi Bushmen. *Hum Nat* 16(2):115–145.
57. Lee R (1986) Kung kin terms, the name relationship and the process of discovery. *The Past and Future of !Kung Ethnography: Essays on Honor of Lorna Marshall*, eds Bieseles M, Gordon R, Lee R (Helmut Buske, Hamburg, Germany), pp 77–102.
58. Howell N (1979) *Demography of the Dobe Kung* (Transaction Books, Rutgers, NJ).
59. Shostak M (2009) *Nisa: The Life and Words of a !Kung Woman* (Harvard Univ Press, Cambridge, MA).
60. Wiessner P (2009) Parent-offspring conflict in marriage: Implications for social evolution and material culture among the Ju/'hoansi Bushmen. *Patterns and Process in Cultural Evolution: Origins of Human Behavior and Culture*, ed Shennan S (Univ of California Press, Berkeley, CA), pp 251–263.
61. Lee R (1976) Kung spatial organization. *Kalahari Hunter-Gatherers*, eds Lee R, DeVore I (Harvard Univ Press, Cambridge, MA), pp 73–97.
62. Wiessner P (1977) *Hxaro: A Regional System of Reciprocity for Reducing Risk among the !Kung San* (University Microfilms, Ann Arbor, MI).
63. Katz R (1984) *Boiling Energy: Community Healing among the Kalahari Kung* (Harvard Univ Press, Cambridge, MA).
64. Katz R, Bieseles M, Denis V (1997) *Healing Makes Our Hearts Happy: Spirituality and Cultural Transformation Among the Kalahari Ju/'hoansi* (Inner Traditions/Bear & Co., Rochester, VT).
65. Marshall L (1999) *Nyae Nyae !Kung Beliefs and Rites* (Peabody Museum, Cambridge, MA).
66. Guala F (2012) Reciprocity: Weak or strong? What punishment experiments do (and do not) demonstrate. *Behav Brain Sci* 35(1):1–15.
67. Boyd B (2009) *On the Origin of Stories: Evolution, Cognition, and Fiction* (Harvard Univ Press, Cambridge, MA).
68. Marshall L (1969) The medicine dance of the !Kung Bushmen. *Africa* 39(4):347–381.
69. Wiessner P (1983) Style and social information in Kalahari San projectile points. *Am Antiq* 48(2):253–276.
70. Dinesen I (1984) *Shadows on the Grass* (Penguin, London).
71. Ohnuki-Tierney E (1981) *Illness and Healing Among the Sakhalin Ainu: A Symbolic Interpretation* (CUP Archive, Cambridge, UK).
72. Brown D (1991) *Human Universals* (McGraw-Hill, New York).
73. De Laguna F (1972) Under Mount Saint Elias. The history and culture of the Yakutat Tlingit. Part 2. *Smithsonian Contributions to Anthropology* 7 (Smithsonian Institution, Washington, DC), 549–913.
74. Basso K (1992) 'Stalking Stories': Names, places and moral narratives among the Western Apache. *Western Apache language and Culture: Essays in Linguistic Anthropology*, ed Basso K (Univ of Arizona Press, Tucson, AZ), pp 99–137.
75. Burch E (2005) *Alliance and Conflict: The World System of the Inupiaq Eskimos* (Univ of Nebraska Press, Lincoln, NE).
76. Rink H (1875) *Tales and Traditions of the Eskimo: With a Sketch of Their Habits, Religion, Language and Other Peculiarities* (Courier Dover, New York).
77. Merlan F (1998) *Caging the Rainbow: Places, Politics, and Aborigines in a North Australian Town* (Univ of Hawaii Press, Honolulu).
78. Tonkinson R (1991) *The Mardu Aborigines: Living the Dream in Australia's Desert* (Holt, Rinehart and Winston, New York).
79. Klaproth D (2004) *Narrative as Social Practice: Anglo-Western and Australian Aboriginal Oral Traditions* (Walter de Gruyter, New York), Vol 13.
80. Coe K, Aiken N, Palmer C (2006) Once upon a time: Ancestors and the evolutionary significance of stories. *Anthropol Forum* 16(1):21–40.
81. Coe K, Palmer C, Aiken N, Cassidy C (2005) The role of traditional children's stories in human evolution. *Etelevchy: Mind and Culture Fall/Winter*:1–30.
82. Scalise Sugiyama M (2001) Food, foragers, and folklore: The role of narrative in human subsistence. *Evol Hum Behav* 22(4):221–240.
83. Myers F (1976) "To have and to hold": A study of persistence and change in Pintupi social life. PhD dissertation (Bryn Mawr Univ Microfilms, Bryn Mawr, PA).
84. Myers F (1991) *Pintupi Country, Pintupi Self: Sentiment, Place, and Politics Among Western Desert Aborigines* (Univ of California Press, Berkeley, CA).
85. Elkin A (1964) *The Australian Aborigines (No. 37)* (Anchor, New York).
86. Meggitt M (1965) *Desert People: A Study of the Walbiri Aborigines of Central Australia* (Univ of Chicago Press, Chicago).
87. Strehlow T (1947) *Aranda Traditions* (Melbourne Univ Press, Melbourne).
88. Briggs J (1970) *Never in Anger: Portrait of an Eskimo Family* (Harvard Univ Press, Cambridge, MA).
89. Ilyatjari N (1991) Traditional Aboriginal learning: How I learned as a Pitjantjatjara child. *Aboriginal Child at School* 19(1):6–12.



90. Chapais B (2009) *Primeval Kinship: How Pair-bonding Gave Birth to Human Society* (Harvard Univ Press, Cambridge, MA).
91. Jones D (2003) The generative psychology of kinship: Part 1. Cognitive universals and evolutionary psychology. *Evol Hum Behav* 24(5):303–319.
92. Mithen S (2005) *The Singing Neanderthals: The Origins of Music, Language, Mind, and Body* (Harvard Univ Press, Cambridge, MA).
93. Kidd DC, Castano E (2013) Reading literary fiction improves theory of mind. *Science* 342(6156):377–380.
94. McBrearty S, Brooks AS (2000) The revolution that wasn't: A new interpretation of the origin of modern human behavior. *J Hum Evol* 39(5):453–563.
95. Marean CW, et al. (2007) Early human use of marine resources and pigment in South Africa during the Middle Pleistocene. *Nature* 449(7164):905–908.
96. Vanhaereny M, et al. (2006) Middle Paleolithic shell beads in Israel and Algeria. *Science* 312(5781):1785–1788.
97. Henshilwood C, d'Errico F, Vanhaeren M, van Niekerk K, Jacobs Z (2004) Middle Stone Age shell beads from South Africa. *Science* 304(5669):404–404.
98. Merrick H, Brown F, Nash D (1994) Use and movement of obsidian in the Early and Middle Stone Ages of Kenya and northern Tanzania. *Society, Culture, and Technology in Africa* 11(6):29–44.
99. Nash DJ, et al. (2013) Provenancing of silcrete raw materials indicates long-distance transport to Tsodilo Hills, Botswana, during the Middle Stone Age. *J Hum Evol* 64(4): 280–288.
100. Yellen J (1977) *Archaeological Approaches to the Present: Models for Reconstructing the Past* (Academic, New York).
101. O'Connell J, Hawkes K, Jones N (1988) Hadza hunting, butchering, and bone transport and their archaeological implications. *J Anthropol Res* 44(2):113–161.
102. David N, Kramer C (2001) *Ethnoarchaeology in Action* (Cambridge Univ Press, Cambridge, UK).
103. Ekirch A (2005) *At Day's Close: Night in Time Past* (WW Norton, New York).
104. Bille M, Sorensen T (2007) An anthropology of luminosity: The agency of light. *J Material Cult* 12(3):263–284.
105. Gottschall J (2012) *The Story Telling Animal: How Stories Make Us Human* (Houghton Mifflin Harcourt, New York).
106. Sutton-Smith B (1986) Children's fiction making. *Narrative Psychology: The Storied Nature of Human Conduct*, ed Sarbin T (Praeger Scientific, New York), pp 67–90.
107. Lane H, Pillard R, Hedberg U (2010) *The People of the Eye: Deaf Ethnicity and Ancestry* (Oxford Univ Press, Oxford).