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Contents lists available at ScienceDirect

Journal of Human Evolution

journal homepage: www.elsevier.com/locate/jhevol

News and Views

The relevance of persistence hunting to human evolution

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ARTICLE INFO

Article history:

Received 9 February 2008

Accepted 7 July 2008

Keywords:

Endurance running

Foragers

Homo

Hunter-gatherers

Persistence hunting

Tracking

Introduction

Based on the physiology and running performance of modern humans, Carrier (1984) suggested that endurance running to pursue prey was important in the evolution of hominins. Bramble and Lieberman (2004) provided a review of the morphological evidence suggesting that endurance running is a derived capability of the genus *Homo*, originating about two million years ago, and may have been instrumental in the evolution of the human body form. Recently, I provided data based on direct observations of persistence hunting (Liebenberg, 2006). Pickering and Bunn (2007) maintained that the behavioral pattern that selected for long-distance endurance running (ER) in the genus *Homo* remains unclear, but that it seems likely that hunting and scavenging contributed minimally, if at all. In particular, they maintained that nothing in my data contradicts the statement that persistence hunting (PH) with ER is extremely uncommon, even among people employing sophisticated tracking skills in the most ideal ecological environment for the behavior.

Here I argue that the fact that ethnographic data on PH are rare does not imply that it was extremely uncommon. Given the context within which PH was observed, the data that we have available are consistent with the possibility that it may have been common in the past. A simple form of PH may have contributed to the evolution

of ER in early *Homo*. In addition, sophisticated PH may have contributed to the evolution of modern human intellectual abilities.

Context of recent observations

The statement that “over the course of 20 years, only two of the ER hunts observed by Liebenberg were spontaneous” (Pickering and Bunn, 2007: 436) is misleading. Firstly, I should clarify the context within which I conducted my field research over the course of 20 years. As an independent researcher (with no funding), I would have liked to have witnessed more hunts, but I simply did not have the financial means to do so. Between 1985 and 1990, and between 1992 and 1997, I was unable to visit the Kalahari. From 1991, my work focused on creating employment opportunities for trackers. Even when I did engage in purely academic research, it did not always occur in a hunting context. It therefore did not always provide opportunities to witness spontaneous PH.

When I first visited the Kalahari in 1985, the !Xõ and /Gwi no longer lived a nomadic hunter-gatherer way of life. Apart from hunting and gathering plant foods, they also engaged in other economic activities. !Nam!kabe (who ran the PH in 1985), spent some time working in a gold mine in Johannesburg. !Nate (who ran the PH in 1990) spent time tracking lions and leopards for a commercial big-game hunter and worked as an unskilled laborer on a government road-building project. Karoha (who was filmed doing the PH in 1998 and 2001) recently has been spending time doing “traditional dancing” at a tourist lodge. Social problems such as alcoholism meant that the only way I could study their exceptional tracking skills was to travel with two to four hunters to a remote pan (where they could not get access to alcohol), set up camp and then go out on hunts from there. Under the circumstances, the best I could do was to simulate short periods of “hunting days.”

Given the context described above, only 46 “hunting days” provided the opportunity to witness spontaneous PH. In July 1985, August 1990, February and March 1991, and June 1992, I worked with !Nam!kabe, !Nate, Kayate, /Uase, and Boro//xao of Lone Tree in Botswana. These 46 days are not representative of observations I made “over the course of 20 years.” They represent 46 days of hunting with hunters who practiced PH.

Pickering and Bunn (2007: 436) maintained that “perhaps these four men were uncommonly good at this particular rare technique or were lucky twice.” I do not think luck had anything to do with it. When they decided to do the PH, they were very confident that the conditions were right and that they would succeed. Given the right

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conditions, PH had a much higher success rate than hunting with the bow-and-arrow (Liebenberg, 2006).

I worked with five hunters, with a hunting group consisting of two to four hunters, but most often three hunters at a time. During the 46 days, the number of large animals they killed included two kudus (PH) and one wildebeest (bow-and-arrow) (Liebenberg, 2006). In a hunter-gatherer context, adults were able to make a living for the whole band by working on average about two to three days per week (Lee, 1979). This means that 46 “hunting days” would represent 15–23 weeks in a traditional hunter-gatherer context. So the three large antelope killed in the 46 hunting days represent about 6.8–10.4 large antelope per year. For an average group size of three hunters, this gives about 2.3–3.5 large antelope killed per hunter per year. While hunting success varies, Lee (1979) estimated that over the long run, a hunter averaged about two or three large antelope a year. The success rate of the hunters I worked with is therefore consistent with the observations made by Lee (1979). They were, therefore, not “uncommonly good.”

My recent observations provide a very small sample, but they are the only data based on direct observations that we have on persistence hunting. It is easy to dismiss it by saying that the hunters were “uncommonly good” or “lucky.” But that leaves us with nothing that could be significant to human evolution.

Ethnographic context

Pickering and Bunn (2007) pointed out that persistence hunting is ethnographically quite rare. One possibility is that most anthropologists working in the Kalahari simply did not see PH even when it did happen. While the bow-and-arrow draws attention to itself, PH does not require any special weapon that would prompt an anthropologist to ask questions about it. Unless they already knew about PH, they may never have thought to ask about it, and hunters may simply never have volunteered to talk about it. One hunter told me that other people who came to study them stayed in the village and only wrote down whatever hunters told them when they came back from a hunt. Silberbauer (1981), who does mention PH, did participate in hunts (although it is not clear whether he participated in a PH). But how many anthropologists actually went out with hunters in the Kalahari to witness what they did first hand? How many anthropologists were prepared to run in the hottest time of the day, when temperatures can reach 42 °C, to witness a PH? When they decided to do the PH that I witnessed in 1990, !Nate initially told me that I could not run with them because “white men cannot do this.” Even when anthropologists did go out with hunters, the hunters may have been reluctant to do a spontaneous PH. Maybe it was not PH that was “extremely uncommon,” but anthropologists who were able to observe it.

Silberbauer (1981: 215) maintained that PH was “seldom used alone, as the chances of success are slender unless the quarry is weakened by injury, illness, or hunger and thirst.” This may have been an assumption, because all the animals run down in the hunts that I observed were healthy. When I first recorded PH in 1985, my initial reaction to what the hunters told me was disbelief and a tendency to explain it away. At the time, I thought Silberbauer's explanation made sense (Liebenberg, 1990). Only after I witnessed the PH in 1990 did I realize how effective this method is. Persistence hunting may have appeared to have been uncommon relative to bow-and-arrow hunting. The bow-and-arrow is the most flexible method, allowing a large number of opportunities, but the success rate per attempt is very low. In contrast, favorable conditions for PH occur less often, but the success rate per opportunity is much higher (Liebenberg, 2006). Even if hunters spent most of their time attempting bow-and-arrow hunts, and seldom undertook PH, the meat yield from PH may have been significant (Liebenberg, 2006).

The perception that PH was seldom used may not reflect the significance of the technique.

Historical context

Extensive fencing began in Botswana in the 1950s, devastating wildlife in the central Kalahari and making it increasingly difficult to hunt (Silberbauer, 1965; Child, 1972; Owens and Owens, 1985). In 1992, !Nam!kabe told me that wildlife was not as abundant as it was in the past, and that they were struggling to hunt.

/Gwi hunters' techniques in the central Kalahari during the period 1958–1966 included bow-and-arrow, snaring, catching springhare by means of barbed probes thrust into warrens, running down (PH), spearing, clubbing, and meat robbing, but did not include hunting with dogs or horses (Silberbauer, 1981).

Hunter-gatherers in the Kalahari have moved away from a significant dependence on hunting since the 1960s (Marshall Thomas, 2006). When the decade-long drought broke in the late sixties, there was a rush of Tswana and Kgalagari pastoralists and their herds into the central Kalahari, which had an impact on hunter-gathers (Silberbauer, 1981). Tanaka (1976, 1980), who conducted fieldwork during 1967–1968 and 1971–1972 with the /Gwi and //Gana, wrote that “when dogs are available to help, antelopes, small carnivores, and warthog are hunted with spear.” This seems to indicate that, at that time, dogs had not yet been fully introduced to the ≠Kade Pan area. Lee (1979) reported the use of dogs by the !Kung in the Dobe area of the northern Kalahari in the period 1963–1973. In the southern Kalahari, the ≠Khomani were forcibly removed from the Kalahari Gemsbok National Park in 1937 (DeGregori, 2002). In 1985, when I visited Ngwatle Pan in the southern Kalahari, !Xō hunters only used dogs and snares. Also in 1985, the !Xō hunters at Lone Tree in the central Kalahari complained about one old man who hunted with dogs, because he was chasing the animals away. This meant that they had to walk much further from the village to hunt with bow-and-arrow, as animals were becoming skittish. Today, hunters mainly use dogs and some hunt with horses, which are much more efficient than hunting with bow-and-arrow or PH (Liebenberg, 2006).

Once dogs and horses are introduced into an area, other hunting methods become less competitive. In addition, diminished wildlife has made it increasingly difficult to hunt. The recent observations of PH may well represent the tail-end of a dying tradition. Persistence hunting may have been much more common in the Kalahari in the past. Furthermore, it is likely that PH may have been more important before the invention of the spear-thrower and the bow-and-arrow, or the domestication of dogs.

Ecological context

Pickering and Bunn (2007) maintained that PH was restricted to very open and very hot habitats, such as the central Kalahari, portions of the American Southwest, and the interior of Australia (Lowie, 1924; Sollas, 1930; Schapera, 1930; McCarthy, 1957; Lee, 1979; Silberbauer, 1981; Steyn, 1984). Pickering and Bunn (2007) further maintained that arid environments where ground is sparsely covered with vegetation do not characterize the habitats reconstructed for early *Homo*, while savanna-woodlands do typify the environments in which early *Homo* is inferred to have lived.

During prolonged periods of drought, such as between 140,000 and 70,000 years ago, expanding deserts resulted in active dune fields in the northern Kalahari (Cohen et al., 2007). The existence of fossil sand dunes beneath parts of the central African rain forest indicate that there were active sand deserts during the Pleistocene (Tricart, 1974). The arid conditions of the southern Kalahari may therefore have stretched over a much larger area than today. A large part of southern Africa and possibly parts of central Africa could

have been ideal for PH. Major steps in the evolution of African hominins, and in particular the origin of the genus *Homo* and the evolution of *Homo erectus*, are coincident with shifts to more arid, open conditions near 2.7–2.5 Ma, 1.9–1.7 Ma, and 1.1–0.9 Ma (deMenocal, 1995; Trauth et al., 2005).

The present central and northern Kalahari consists of a mosaic of savanna-grasslands and savanna-woodlands. The sparsely vegetated dune fields of the southern Kalahari are the easiest terrain for PH. Moving north across the central Kalahari towards the northern Kalahari, tracking conditions become more and more difficult, with increasingly thicker vegetation and areas of woodland. As arid areas expanded and contracted with climate change, a combination of environmental change and population pressure would have selected for increasing levels of tracking skills. Habitats in Africa such as the Kalahari may have played a role in selecting for ER and PH during periods of drought, alternating with wetter periods.

Evolutionary hypothesis

Pickering and Bunn (2007) were reluctant to assign to early *Homo* the impressive tracking skills of the Kalahari San. On the other hand, Lieberman et al. (2007) maintained that the reasonable null hypothesis should be that early *Homo* had the cognitive skills necessary to track. Even among modern trackers, however, different levels of tracking can be distinguished that require fundamentally different cognitive abilities.

A simple form of PH may have first developed in easy-tracking terrain, such as the arid, sparsely vegetated, sandy southern Kalahari. In these conditions, it may have been possible to run down animals with simple/systematic tracking. Simple tracking may be regarded as following footprints in ideal tracking conditions where the prints are clear and easy to follow. Systematic tracking is a more refined form of simple tracking, and it requires an ability to recognize signs in conditions where footprints are not obvious or easy to follow. Both simple and systematic tracking involve inductive-deductive reasoning. The difference lies in the degree of skill (Liebenberg, 1990).

Early *Homo* may have developed simple PH in easy-tracking terrain during periods of drought. Hunters may initially have concentrated on young animals or animals weakened by injury, illness, hunger, or thirst. Modern hunter-gatherers only work 2–3 days a week, and an average of two or three large antelope per hunter per year (in addition to smaller animals and plant food) is sufficient (Lee, 1979). In addition, the filming of the PH in 2001 showed that if a hunter had the opportunity (for example, if antelope were more abundant), then it is physically possible to run down two kudus in eight days (Liebenberg, 2006). It is therefore conceivable that, if prompted by severe pressure to survive, early *Homo* could have compensated for less sophisticated intellectual abilities by spending more time on attempted PH. Even if their success rate per attempt was much lower because they may have lost the tracks more often, their overall success may have been sufficient.

When the ground is harder and the vegetation cover thicker, it may not be easy to see tracks, making speculative tracking essential. Speculative tracking involves the interpretation of signs, creating a hypothesis to explain what the animal was doing, and then using this hypothesis to predict where the animal is going. In contrast to the inductive-deductive reasoning used in simple/systematic tracking, the hypothetico-deductive reasoning required for speculative tracking involves a fundamentally new way of thinking (Liebenberg, 1990). The creative hypothetico-deductive reasoning required in speculative tracking is also important in other complex human behaviors, such as doing scientific research (Liebenberg, 1990; Carruthers, 2002, 2006). Modern trackers use

a combination of systematic and speculative tracking (systematic/speculative tracking), depending on the terrain. The sophisticated form of PH practiced by modern hunters in difficult-tracking terrain may have been a very recent development in human evolution.

Conclusion

As pointed out by Lieberman et al. (2007), Pickering and Bunn (2007) made several flawed assumptions. Persistence hunting may have been more common before the invention of the bow-and-arrow or the domestication of dogs and horses. The apparent scarcity of ethnographic records of PH does not imply that PH was rare—it could simply be that anthropologists who were able to observe PH were rare. Over the last 50 years, hunter-gatherers in the Kalahari have experienced drastic changes, and the recent observations of PH may simply represent the tail-end of a dying tradition. In the absence of a better hypothesis, PH and scavenging remain plausible explanations for the evolution of ER.

Acknowledgements

I thank Dan Lieberman and Dave Carrier for critical readings of the paper. I also thank the late !Nam!kabe, !Nate, Karoha, /Uase, Kayate, and the late Boro//xao of Lone Tree in the central Kalahari, Botswana.

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