Learning to Spear Hunt Among Ethiopian Chabu Adolescent Hunter-Gatherers

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Abstract

Research indicates that children in small-scale cultures acquire many subsistence skills and knowledge relatively easily and quickly at an early age. However, the precise age and the developmental sequence of acquiring skills and knowledge are seldom described. Considerable debate also exists as to the importance of particular modes (e.g., vertical, horizontal, and oblique) and processes (e.g., role of teaching) of cultural transmission. This chapter examines some of these debates by focusing on how Chabu hunter-gatherer adolescents learn to spear hunt. Informal and structured interviews and systematic behavioral observations (focal follows) were utilized to try and understand when and how adolescent males learned to spear hunt. Data indicate that Chabu adolescents start learning to spear hunt in middle childhood (6–7 years of age) through play hunting (i.e., role-playing and collaborative learning) with their peers and listening to stories from their fathers. Adolescents learned the various skills and knowledge of spear hunting at different ages from multiple people, and they preferred to go on actual hunts with knowledgeable people and close friends. The data provide some support for model-based selective trust hypotheses. Oblique modes of cultural transmission were more common than vertical and horizontal forms of transmission during the acquistion of adolescent spear hunting and data from focal follows revealed that various forms of teaching were important to learning how to spear hunt.

Keywords

Hunter-gatherers · Chabu · Spear hunting · Teaching · Social learning

6.1 Introduction

Learning the skills and knowledge to make a living during childhood is an essential aspect of the human experience that enhances adult competence and defines humanity (Zarger 2010; MacDonald 2010). Learning the skills to make a living can be complex and is impacted by the acquisition of other cultural skills and knowledge such as cooperation, sharing, and gender roles (Bock and Johnson 2004). Thus, although learning subsistence strategies through trial and error occurs, learning from others frequently takes place because the opaque nature of complex cultural elements makes the former strategy costly to learners (Gergely and Csibra 2006; Harris 2012). Cultural learning in small-scale cultures is essential to the acquistion of diverse skills and knowledge (Boyd et al. 2011; Henrich 2008).

Spear hunting of large animals is as old as the history of modern humans, but few studies with contemporary foragers have examined this topic. Studies indicate that the Neanderthals were successful hunters of ungulates

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(MacDonald 2010; Schmitt et al. 2003). However, the use of projectile weapons such as throwing spears coevolved with the emergence of particular cognitive abilities and bilateral asymmetries in the strength of the upper limbs (Williams et al. 2014; Schmitt et al. 2003). Employing throwing spears was an important technological shift that likely occurred with modern humans and was one feature that distinguished modern humans from Neanderthals (Wong 2014).

Few studies exist on the acquisition of spear hunting skills and knowledge in an active forager group. MacDonald (2007, 2010) examined cross-cultural descriptions of forager hunting and found that learning how to hunt involved several interrelated processes. She found that children and adolescents learned how to make and use hunting weapons primarily through observation and practice, while they learned animal behavior through play hunting and observation and imitation of animals. MacDonald's study explained general features of how children learn to hunt, but it did not discuss specific processes of how children learn to spear hunt.

The Chabu are forager-farmers of southwestern Ethiopia. Chabu men often spear hunt several times a week and do not use guns. Spear hunting is more complex than other subsistence activities among the Chabu because it requires extensive skill, knowledge, and physical competence and is hypothetically more likely to be acquired later in life, i.e., in adolescence (Bock 2005). We consider the following hypotheses:

1. Adolescents will prefer to learn from more successful hunters rather than close friends or family.
2. Adolescents will acquire a limited amount of spear hunting skill or knowledge from fathers due to the demographic nature of many small-scale cultures (i.e., divorce and adult death rates).
3. Teaching (i.e., modification of behavior to enhance learning in another) will be common because many of the skills and knowledge associated with spear hunting may be opaque (not obvious) to the learner.

Evolutionary reasoning and research in child development indicate that young children selectively trust knowledgeable sources (Harris and Corriveau 2011; Harris 2012). Preferential selection of information sources is greater if the skill seems to be difficult but acquirable (Henrich 2008). Natural selection favors cognitive capacities for model-based biases and compels learners to rank potential cultural models along the line of the model's competence with a particular skill or knowledge. Consequently, learners are hypothesized to pay attention to and imitate the most skilled and successful individuals (Henrich 2008; Henrich and McElreath 2003).

Demographic studies of small-scale societies indicate that foragers are characterized by high adult death and divorce rates (Hewlett 1991a, b; Hewlett and Cavalli-Sforza 1986). For instance, a study from the Aka foragers found that only 58 % of adolescents 11–15 years of age lived with both natural parents due to a 25 % divorce rate and regular adult deaths from infectious and parasitic diseases (Hewlett 1991a). Studies on the Hadza foragers also estimated that only 20 % of adults remained married to the same person during their life and the divorce rate was 49/1000 per marriage year (Marlowe 2010). On the other hand, mastering foraging skills such as large game hunting is complex and it comes later in life (MacDonald 2010). Under demographic conditions of divorce and death of parents, children and adolescents are hypothesized to grow up with and learn subsistence skills from nonparental adults.

Anthropologists vary in their positions regarding how children in small-scale cultures acquire subsistence skills and knowledge. Cultural anthropologists emphasize the roles of experience (Lancy et al. 2010; MacDonald 2010), observation, participation in adult activities (Gaskins and Paradise 2010), and play (Chick 2010; Bock and Johnson 2004; MacDonald 2010). They argue that in small-scale societies, teaching or guidance from adults is absent or limited (Lancy and Grove 2010; MacDonald 2010). Evolutionary approaches, on the other hand, recognize the presence of various processes of learning including teaching, observation, emulation, imitation, and collaborative learning (Hewlett et al. 2012). Some argue that one form of teaching, called natural pedagogy, is a human universal because the opaque nature of many elements of human culture makes other forms of learning processes, such as observation and imitation, insufficient for cultural learning (Hewlett et al. 2012; Gergely and Csibra 2006).

6.2 Ethnographic Background

The Chabu are primarily foragers but are in a transition to becoming forager-farmers. They reside in three regional states of Ethiopia in the tropical forests of the southwestern part of the country: Oromia, Southern Nations, Nationalities and Peoples' Regional State (SNNPR) and Gambella Regional State. The Godore River divides the boundary between SNNPR and Gambella state in most parts of the Chabu territory.

The habitat of the Chabu is in the wettest part of Ethiopia and receives rainfall for several months each year (March to October). Dense forests with multiple species of trees, edible fruits, and vegetation characterize the physical environment. According to Ren'ya (2007), who studied Majang farmers in nearby Chabu settlements, Aningeria altissima, Cordia africana, and Celtis zenkeri are the dominant tree species in the area. Climate is relatively warm and humid. There are two seasons, dry and rainy.

The Chabu were not represented in the national population and housing census of Ethiopia conducted in 2007 so the accurate size of the total population is not known, and existing

estimates vary. We have census data from nine villages with a total population of 405. We estimate that the total size of the Chabu population to be between 1500 and 2000 once the census for the remaining 12 settlements have been conducted.

Chabu subsistence strategies consist of hunting, gathering, small-scale farming, trade and exchange, and fishing. Major game animals hunted by the Chabu include buffalo, duiker, bush pigs, bushbucks, and antelope. Gathering roots of wild food plants such as gabo, koo/hoo, molon, goje, and boda supplements their subsistence. Women undertake most gathering tasks although men also participate in gathering either independently or with women. Small-scale farming complements their foraging subsistence. Farm products include banana, taro, cassava, maize, and papaya. Males clear the forest while women plant, weed, and harvest crops. Men practice beekeeping and fish in small streams and sometimes sell both in markets for cash.

Chabu men and women have regular experiences with markets; they attend small local markets and exchange various items with their neighbors. Chabu households raise and sell some chickens and eggs and buy clothes, salt, soap, tobacco, cooking oils, hair oil, alcohol, axes, spears, and machetes at markets. Men may sell game meat, fish, and honey, while women produce pottery and sell it in the market every few weeks.

The Chabu were mobile foragers until the late 1990s when they started to settle and farm due to attacks from neighboring ethnic groups. Currently they are semisedentary where people move within a certain distance for foraging, while family members reside in a relatively permanent location. Settlements range in size from 5 to 100 persons. Several Chabu also live in the government-established town of Yeri.

6.3 Methods

Since 2012, we have visited the Chabu four times for a total of 6 months. We conducted a house-to-house census of 112 households in the villages we visited to determine demographic characteristics and how people in each village are related to each other. Data about spear hunting was collected through informal and structured interviews and systematic behavioral observations during fieldwork in the spring of 2013.

6.3.1 Open-Ended and Semi-Structured Interviews

The first author conducted open-ended and semi-structured interviews with 28 boys, ages 9 to 16, representing more than 80 % of the total number of adolescents from the villages visited. The interviews covered adolescents' family composition (whether or not the adolescents' parents were alive, married, or divorced), with whom they were living at the time, their knowledge about spear hunting and the names of major game animals, their spear hunting experiences and from whom they learned to spear hunt, the name of and relationships to the people they first spear hunted with, and their preferences regarding hunting partners.

Open-ended and semi-structured interviews were also conducted with 51 adult men about the age they started to spear hunt, from whom they learned to spear hunt, how they learned to spear hunt, at what age they expected their sons to go spear hunting, how spear hunting was transmitted to their sons, the types and seasons of hunting, and how often do they go hunting.

6.3.2 Systematic Behavioral Observations

The first author conducted four focal follows of adolescents on spear hunts with adults. He recorded any event related to learning to spear hunt as they occurred, including verbal communications, physical gestures, adolescents' interactions with tools/spear, adults' demonstrations of spear handling and forest trail clearing and marking signs, pointing to footprints, etc. Observations were interrupted two times for about 15–20 minutes because the observer could not keep up with the adults or adolescents when they were running after game.

The first focal follow involved two boys, ages 9 and 10; it was the first spear hunt for both boys. One boy was with his father and another was with a nonparental adult who was related to the boy by marriage, a relationship called engete. The two adults were not related to each other. The second focal follow involved one adolescent and one adult related to each other by marriage (engete); the adult was married to the adolescent's aunt. It was the third spear hunting trip for the adolescent.

The third focal follow was conducted with a hunting group, which consisted of three adults and eight adolescents. Group members were related to each other either by biological kinship or friendship. One of the adults was the brother of two adolescents in the group, whereas all the adults were from different clans (komoy) but were friends and living in the same settlement. Other adolescents were also friends. Most of the adolescents had spear hunted at least two times. While in the forest, the group divided into two groups and entered the forest from two different directions. However, both groups communicated with each other by different sounds until they found game. This kind of group-coordinated hunt involving dogs is called dirba (see next section for details). The observer followed the group

with a focal adolescent, two other adolescents, and one adult until the end of the hunt when both groups met in the forest and they found and killed game.

6.4 Results

6.4.1 Overview of Chabu Hunting

On average, Chabu men go spear hunting two to three days a week depending on the availability of meat from a previous hunt and on the season of the year. If meat is available, a hunter waits until it is finished before hunting again. They go two to three days a week during ciica (dry season) and once a week during the season for clearing forests for farming. Hunting with a snare is practiced throughout the year. Hunting is entirely men's work. Sharing game meat with other people in the neighborhood is a widespread norm among the Chabu. However, sharing game meat from small animals such as a duiker or hedgehog is limited to individuals who participated in the hunting; neighbors may share cooked meat in the house of hunters. The meat from big animals like antelope is shared among all neighbors and relatives. Sometimes, if the game is too small to share with others, hunters do not bring it home and roast and consume it in the forest.

Types of hunting identified by Chabu males:

1. Golla involves hunting with spears while a dog is in training. Only the dog's owner does this type of hunting. During the training the success of a dog in catching game animals is not disclosed to other people until the dog becomes a mature hunter. The Chabu say that dogs lose their ability if owners disclose their achievements at the early stage of hunting.
2. Chakan is a type of hunting that involves only spears and no dogs. It is undertaken during the rainy season when game animals are sleeping. Adolescents and adults with limited experience do not undertake this type of hunting except for training purposes because it requires hunters to be careful not to awaken animals. If it involves training the adolescents, experienced adults lead on the trail while the trainees follow.
3. Lughe is the type of hunting practiced during the dry season and involves waiting and killing the targeted game animals along rivers and streams when they come to drink. Experienced adults undertake it while hanging out under the shade of the riverside. Dogs are not needed in this type of hunting.
4. Dirba is a type of hunting that involves a well-trained adult, a dog(s), and sometimes adolescents learning to hunt. Usually, people go dirba individually or in a group of friends (cooperative hunt), relatives, fathers, and sons. However, only strong adults go dirba hunting because it requires more energy to run long distances with dogs. Informants described it as a risky task but a reliable hunting technique; it is risky for a hunter because it involves walking/running long distances through the forests and underbrush and climbing mountains and, in the worst case, a game animal may injure both the dog and the hunter. Informants mentioned that the risks might range from light to permanent injuries. In the worst case, it may involve the death of the dog and the hunter. Dirba is considered a faster and more reliable technique than other types of hunting because if a strong adult hunter goes with his dog, the chance he will get the game is high. The dogs play significant roles in identifying, chasing, and capturing game animals. Sometimes a dog mistakes nongame animals for game animals and misguides the hunters. Due to the physical demands of this type of hunting, adults over 50 years old usually do not go dirba hunting; they prefer to go chakan, lughe, and trap hunting.
5. Kambo (or ambo) (snare hunting) is commonly practiced throughout the year. In particular, it is frequently practiced during farming seasons when it is not convenient to spear hunt. Snares are particularly essential for adults who are not able to go further in the forest and do other types of hunting. It is considered the safest type of hunting and consumes less time compared to other techniques but is less reliable as it takes a long time, sometimes several days to a week, until the snare catches a game animal. Often adults change the place of snares if no game is caught within a week's time. Traditionally a snare is prepared from local materials, but most people today use fiber strings purchased at the markets. Traditional strings remain important for children and adolescents who learn and practice hunting with traps, as market strings cost money and are not available for everyday use. Spears are necessary with snare hunting, as men use them to kill animals in the snare.

The spear (bake) is an important instrument for almost every type of hunting. It has two parts; the shaft (gere) can be made with three types of woods (goje, kur, and wein), and metal tips of various shapes and sizes are purchased or traded at local markets. A hunter makes a gere for himself and his son/s.

There are six basic categories of spear, each differing in the size/length of both the shaft and the metal parts. These are:

1. Bambele has a large and elongated tip, requiring a long shaft.
2. Guruchek has a long metal base that fits the shaft.
3. Doinkoche or donkoche has a very short, sharp point.

4. Dimoyi has a sharp point and metal base that is equal in length to the wooden shaft to which it is fitted.
5. Bodoy has a big base covering the shaft, but the sharp tip (point) is shorter.
6. Sengo or chooloke is a very small "spear" with no metal tip, which is prepared for children as they go on their first hunt or until they learn how to handle an actual spear.

Figures 6.1 and 6.2 illustrate different types of spears mentioned above.

Fig. 6.1 Chabu children and adolescents with sengo and donkoche spear types

Fig. 6.2 Adults with bamble (left and right) and dimoyi (center) spear types

Chabu men throw spears during hunting and the distance varies depending on the proximity of the game animals and whether or not dogs are involved in hunting. If a dog is not on the spear hunt, then a hunter often needs to throw the spear a great distance. Chabu men estimated they might sometimes come as close as 10 m to their target before throwing, but that it was often much further. If dogs are involved in hunting, hunters have to be careful not to spear the dog. Game caught by traps is jabbed from a short distance.

6.4.2 Physical and Social Setting of Learning

In order to understand the sociocultural contexts that influence knowledge transmission and acquisition, it is important to understand with whom children interact with and spend most of their time. We use children's family composition and their current residential locations as proxy variables to determine sociocultural and demographic contexts of cultural transmission.

Two aspects of adolescents' family composition were examined: whether both biological parents were alive or not and whether both parents were living together or divorced. Typically, a Chabu family consists of parents and children less than 10 years old living in the same house. Grandparents and adolescents usually live in separate houses. Particularly, male adolescents (ateni) and female adolescents (koto) are expected to have their own sleeping house starting at age 9 or 10. Fathers or older brothers construct houses for younger family members. Male and female adolescents live separately, but adolescents of the same sex may share a room/house. While ateni learn to construct their sleeping houses between 9 and 10 years of age, brothers or fathers construct a house for koto. The houses are only for sleeping purposes and the parent's house is a place for dining and socializing.

Fifty-seven percent of the male adolescents reported that the marriages of their parents ended with divorce; only about 32 % had both of their biological parents living together and about 10 % had one parent that died (see Table 6.1).

Table 6.1 Status of biological parents of the male adolescents

Parental situation	Number	Percent
Both biological parents are alive and married	9	32.14
Both parents are alive but divorced	16	57.14
Only the father is alive	2	7.14
Only the mother is alive	1	3.57
Total	28	100

The second measure, the current residence of adolescents, was used as a proxy of learning ecology. About 32 % of the adolescents reported they lived with both parents, but most adolescents were living with a single parent or nonparental adults (see Table 6.2). This is connected to the family composition of the adolescents mentioned above.

Table 6.2 Residence of adolescent males

Adolescents living with	Number	Percent	Location
Both biological parents	9	32.14	Patrilocal
Mother with stepfather	2	7.14	Matrilocal
Mother only	1	3.57	Matrilocal
Father with stepmother	7	25.00	Patrilocal
Mother's brother	8	28.57	Matrilocal
Others (older brother)	1	3.57	Patrilocal
Total	28	100	

Following divorce or death of a husband, a woman usually moves back to the village of her family and raises her children as a single mother until she remarries and goes to another place. When a mother remarries and moves out to a different settlement, her children remain with her family, learning basic hunting knowledge and skills from adults other than their biological father. In rare cases, children of divorced parents live with their fathers.

6.4.3 Learning to Spear Hunt

6.4.3.1 At What Age and From Whom Adolescents Learn to Spear Hunt?

Cross-cultural research indicates great variation in the age at which adolescents learn to hunt. MacDonald (2010) examined the variation in age at which children start participating and found that children in most cultures begin to accompany adults as they go on (extended) hunting trips, net hunt, and/or check snares and also begin to hunt small game such as lizards and birds on their own at around the age of 5. Children in some cultures (e.g., the Penan) start hunting with fathers at the age of 5, with uncles at the age of 9–10, and with siblings or friends when they reach the age of 14–15. In others such as the Ju/'hoansi, adolescents begin accompanying their fathers, uncles, or older brothers in hunting mongoose, genet, hare, and game birds at the age of 12.

Behavioral observations and structured interviews indicated that Chabu children start learning to spear hunt from different people at different stages of their life. They reported that their fathers, older adolescents, and both paternal and maternal uncles helped them to learn to spear hunt by encouraging them to participate in role-playing and going on actual hunts. Children from the age of 6 to 7 start listening to the stories from their fathers about hunting and at the same time start participating in hunting "role-playing," that is, playing at hunting among themselves and with older adolescents in their camp or nearby forests. Chabu children also learn how to hunt small animals like birds with traps at the ages of 7 and 8 from different individuals. Adolescents reported learning trap hunting from their fathers (18 %), friends (25 %), mother's brother (21 %), other adults (18 %), and older brothers (14 %). Spear hunting starts between ages 9 and 12 as the children become physically mature and motivated by role-playing and by other children who went hunting and talked about their experiences in the village. However, adolescents do not become regular hunters until the age of 14 or 15 years of age.

The decision to go hunting can be made either by the adolescents themselves, fathers, or other adults. Most of the time, adolescents are self-motivated to initiate their first spear hunt, but sometimes other adults and uncles encourage them. About 57 % (16/28) of adolescents reported they had asked their fathers, cousins, and uncles to go on their first hunt. Adult informants also confirmed this statement mentioning that children usually ask to go on their first hunt at an early age but that it is the father who decides if the child is ready or not. Fathers refuse the request if they think that the child is not ready for spear hunting. Children develop experience in the forest by accompanying their fathers to kalse (kalche). Kalse is the name for a camp in the forest where Chabu men prepare beehives, harvest honey, butcher and divide game, and sometimes stay the night if they are on a hunting trip. Children start going to kalse at 10–12 years of age. Fathers take children/adolescents to kalse after they have killed a game animal to show them the dead animal and demonstrate how to butcher and divide it. Eventually, children go on actual hunts.

In some cases, if a child is not active enough to ask to go into the forest, a father or another adult with whom the child lives encourages him to go on a hunt. Twenty-one percent (6/28) of the adolescents reported that the first time they went hunting was when their fathers, uncles, or cousins asked them to go. However, as interviews with adults indicated, children often asked to go on spear hunts at an early age and that the father refused these first few requests because he did not think they were ready. Some of the adolescents (14 %, 4/28) confirmed this, reporting that they asked their fathers and were refused at least three times. One adult informant described such a course of events with his own son, saying, "my son asked me to go hunting when he was 9, and I told him to wait until he will be ready. Before I let him to go, I refused two requests. However, when he turned 13 and I realized that he was ready, I prepared a spear for him and asked him to go with me."

6.4.3.2 Early Stages of Learning to Hunt

Interviews indicated that how early an adolescent started to spear hunt was influenced by family composition and the residential pattern of the children/adolescents. Adolescents who spent late childhood with nonparental adults such as

maternal or paternal relatives were more likely to go on their first spear hunts earlier than children who grew up with their fathers. Adolescents that reported they first went spear hunting with friends and other adults related that they were able to go at the time they wanted, though they couldn't remember the exact age they went for the first time. They did not report any resistance to their interest of going on the hunt from either friends or adults suggesting that they may have first spear hunted when they were 9–10 years old. On the other hand, children who lived with their biological father had adequate information about hunting at an early age. Less than half (43 %, 12/28) of adolescents reported that they learned about the names of game animals from their fathers as a child. Fathers usually tell children stories about their hunting experiences, names and behavior of game animals, signs, and likely dangers and risks associated with spear hunting with dogs. Adult males also said their fathers had played a crucial role in teaching them spear hunting when they were children by telling them stories, giving them small spears, and encouraging them to go to the forest. However, as mentioned above, some adolescents reported that their fathers refused their requests to go on an actual spear hunt saying "you are not ready," mentioning the risks and safety issues to discourage them from starting to hunt too early.

Learning to spear hunt or spear hunt among Chabu adolescents, particularly in middle childhood (6–12 years of age), is collaborative. Evidence for collaborative learning is role-playing, practiced early in life among children and on into adolescence. During role-playing, adolescents help each other learn the basic ideas of spear hunting with a dog. Parents, other adults, and older adolescents encourage the younger ones to participate in the play. During the play, adolescents who have prior experiences of spear hunting organize and guide the younger ones in play. Adolescents reported that participation in spear hunt role-playing motivated them to go on an actual hunt. Adolescents who have experienced hunting often encourage fellow adolescents to go on actual hunts. Role-playing was also mentioned as a useful technique for adolescents to build on knowledge they had acquired listening to their fathers and/or other adults.

6.4.3.3 The First Spear Hunt

We asked all adolescents about with whom they first went spear hunting as another way to try and understand from whom adolescents learned to spear hunt. Interview data indicated that 39 % of the children went on an actual spear hunt with maternal uncles (relatives) and only 11 % (3/28) went with their fathers (see Table 6.3). The remainder of the adolescents went with other adults and with experienced friends.

Table 6.3 With whom adolescents first went spear hunting

First spear hunting experience	Number of adolescents that mentioned	Percent
Never went hunting	2	7.14
Father	3	10.71
Older brothers	3	10.71
Mothers' male relatives	11	39.29
Father's male brothers	3	10.71
Friends (about the same age and a little older)	4	14.29
Other adult	2	7.14
Total	28	100

The majority of the adolescents stated that they acquired substantial knowledge about hunting, including the names and behaviors of different animals, by listening to their fathers. However, out of 11 adolescents observed during the focal follows, only one adolescent went with his father, two were with their older brothers, and others were with nonparental adults.

The experience of the first spear hunt is important for adolescents as it reveals their level of skill and knowledge. However, learning is a process and adolescents could never master learning to spear hunt in one trip. They need to learn the complex skills and knowledge required for spear hunting through several trips. We asked them follow-up questions about from whom they felt they learned the most about spear hunting. Most adolescents reported that they learned skills and knowledge about spear hunting from different groups of people including their maternal and paternal uncles (39 %), older brothers (11 %), and other adults (21 %). Some of the individuals in the "other adults" category included cousins, cross-cousins, and grandfathers of the interviewed adolescents. Only 18 % said that they learned from their fathers.

The results presented above indicate that Chabu adolescents learn to spear hunt primarily from nonparental adults and peers (oblique and horizontal transmission). This is in part due to the sociocultural and demographic contexts (i.e., role-playing in middle childhood and high divorce rates) described elsewhere in this paper.

Interviews with adult informants, however, suggested a different pattern from observation and interviews with adolescents. Adults over 25 years old were asked from whom they had learned to spear hunt. About 80 % (41/51) of informants reported that they learned hunting from their fathers, 10 % (5/51) said that they learned hunting skills from their older brothers, and only 8 % (4/51) reported maternal uncles as their source of spear hunting skill and knowledge. In informal contexts, Chabu men and women

were asked about general cultural models concerning how a boy learns to spear hunt and every Chabu responded by saying "his father." The adults' responses about learning to spear hunt from fathers indicate father's roles are important, but it is not clear if it is due to the proximity early in life or due to symbolic or cultural expectations of fathers.

6.4.3.4 Selective Trust

Adolescents were asked with whom they preferred to go on spear hunts. Nearly half of the adolescents (43 %) indicated that they preferred to go spear hunting with adult men, such as maternal uncles or cousins. About 28 % said they preferred to go with friends or an older brother, and only 14 % mentioned a preference to go with their fathers. These data are consistent with the adolescent data (but not adult data) that indicates that oblique transmission is particularly important, horizontal somewhat less so, while vertical transmission in adolescence is low (see Table 6.4)

Adolescents identified various reasons for selecting different individuals as their preferred hunting partner. Table 6.4 shows that 54 % of the adolescents preferred spear hunting with individuals who were recognized as the best hunters, had extensive forest knowledge, or were exceptionally good teachers. Attachment figures (father and friends) were preferred by about 29 % of the adolescents (father 11 %, friends 18 %). Those who preferred to spear hunt with peers often said that they went spear hunting with their friends because they were close and spent most of their time together. It was difficult to tell from informal observational data whether adolescents selected their models based on skill/knowledge or intimacy as most individuals in the villages spent time together, drinking chemo/qaaro (a drink prepared from wild or domesticated coffee leaves) or sharing food with everyone.

Friends are mostly of similar age and are kame (cousins or having some kind of blood relationship) and engete (related by marriage). Seventy-five percent (21/28) of the interviewed adolescents reported that the friends they mentioned as their role-playing and preferred hunting partners were their paternal or maternal relatives (kame), while others were fira/pira (friends). Of the seven adolescents who said they preferred their friends as hunting partners, two mentioned their brothers, two mentioned maternal cousins, and one mentioned mother's brother. This is consistent with the settlement pattern of the Chabu where, in most cases, brothers, cousins, relatives, and people of the same descent gropus (komoy) live in the same villages.

6.4.4 Learning Processes: How Do Adolescents Learn to Spear Hunt?

As mentioned in the introduction, spear hunting among Chabu men is complex and difficult and requires detailed and continuous learning. Given existing evolutionary studies of social learning, we predicted that learning to spear hunt among the adolescents would involve teaching (i.e., modifying behavior to enhance learning in another, Kline 2014). Behavioral observations during spear hunts and structured and semi-structured interviews with adolescents are used to examine this prediction.

6.4.4.1 Structured and Semi-Structured Interviews

Interviews with Chabu adolescents indicated that they learn to spear hunt through multiple processes, including listening, observation, demonstration, advice from others, and participation in hunting. Most adolescents reported that they learned spear hunting knowledge about the names, behaviors, and signs of game animals as well as the potential risks of hunting by listening to stories told to them by their fathers. This usually took place in early or middle childhood before they participated in spear hunt role-playing. Upon returning from spear hunts, fathers and other adults provided detailed stories of hunting experienced and explained the risks of hunting (including attacks by animals, snakes, etc.). In terms of skill acquisition, adolescents reported that in the forest they had a chance to observe adults demonstrate how to track and spear the animals. Adults also advised the

Table 6.4 Preference for hunting partner and reasons for selective trust

	With whom do adolescents prefer to go spear hunting?						
Reasons to prefer a partner	No preference	Father	Older brother	Mother's brother	Friends	Other adults	Total
No preference	14.29(4)						14.29(4)
He is my father; gives me good meat		10.71(3)					10.71(3)
We are friends					17.86(5)		17.86(5)
He gets game easily			3.57(1)	10.71(3)		10.71(3)	25.00(7)
He helps me to learn				7.14(2)		3.57(1)	10.71(3)
He knows the forest trail well				3.57(1)	7.14(2)	7.15(2)	17.86(5)
Other reasons		3.57(1)					3.57(1)
Total	14.29(4)	14.29(4)	3.57(1)	21.43(6)	25.00(7)	21.43(6)	100(28)

adolescents how to track game and avoid risks while on hunting. Adolescent informants also mentioned that fathers (11 %) and nonparental adults (57 %) provided an opportunity for the adolescents to kill an animal (see below), demonstrated how to kill game, and explained how to butcher and divide the game to share with others.

6.4.4.2 Focal Follows

During the focal follows, adolescents were seen listening (and paying attention) to adult hunters, observing the adults, asking questions, imitating the adults' action, and seeking approval from adults. They copied adults' actions such as spear handling, clearing trails, and tracking footprints after adults. Adults also frequently guided and instructed adolescents in different ways: responded to adolescents' questions, showed them how to make trails in the forest, teased adolescents when they made mistakes, and corrected them. For instance, adults corrected spear mishandling four times. They frequently told adolescents to be quiet while on hunt. Adults pointed to and identified tracks of different animals, indicated potential directions where game animals might be found, warned them not to go stray, and described forest boundaries. Table 6.5 summarizes types of teaching and their observed frequency during the focal follows.

Table 6.5 Ways to modify their behaviors to enhance learning to spear hunt

Teaching techniques	Frequency observed during focal follows
Opportunity scaffolding	3
Demonstration of skill	4
Explanation of skill	4
Sensitivity to the ability of learner/ protection	9
Verbal instruction	46
Pointing	23
Teasing	5

The table above shows that various forms of teaching, verbal instruction in particular, are critical to learning how to spear hunt.

6.4.4.3 Descriptions of Behaviors Observed During Focal Follows

1. Opportunity scaffolding—learning to kill game. A father or an adult is expected to give the adolescent the chance to "kill" the animal to encourage the adolescent to hunt in the future. In an interview conducted right after a focal follow, one adult explained his actions, which were witnessed in a focal follow. He saw a game animal (a porcupine). He waited a long time to give the adolescents a chance to kill it, indicating the direction where the adolescents should look for the animal. However, he didn't tell them the exact place where he located the animal. Finally, when he realized that none of the adolescents could figure out the exact location, he killed the animal, called the adolescents, and let them "kill" it. Then the focal adolescent and two others came, stabbed the animal with their spears, and butchered the game. The adolescents cleaned and butchered the game under close supervision by the adult who killed the game, who also participated in dividing the meat among the hunters.
2. Opportunity scaffolding—providing appropriate technology. Focal follows or interviews showed that adults provided adolescents with pointed spears just before the hunt.
3. Demonstration. In focal follows, adults demonstrated and corrected children on how to hold spears, showed how to find a way out of the forest, and demonstrated how to clear forest trails.
4. Explanation. Focal follows revealed that adults showed animal tracks and explained to the adolescents the type of animals that had made them, how recent the tracks were, and potential directions that the animals might have gone.
5. Sensitivity to abilities of learner/protection. During focal follows, adults placed children/novices between them. In the forest, adults told children not to stray.
6. Verbal instruction. Children were told to be quiet several times during focal follows. Adults responded to children's questions several times during spear hunts.
7. Pointing. Adults pointed to tracks of particular game animals and the limits of their territory (e.g., large trees, trails); they crumbled leaves to mark the trail.
8. Teasing. Adults asked boys which direction to go after reaching the main trail, and when children made mistakes, adults laughed at and teased the adolescents. Then adults told the adolescents the right direction to go.

6.5 Discussion

The study of learning to spear hunt among Chabu adolescents has implications for both cultural anthropology and evolutionary hypotheses about social learning.

First, we predicted that adolescents would prefer to learn from successful hunters rather than close friends. Results provided some support for the hypothesis. A majority (54 %) of Chabu adolescents supported the model-based selective trust hypothesis and preferred to go spear hunting with individuals with particularly successful hunters or those with good skills or knowledge. Interestingly, being a good teacher was also identified as a skill adolescents preferred in

a hunting partner. But attachment figures, such as fathers, older brothers, and friends, were also mentioned (41 %). Skill, knowledge, and success were also important considerations with these intimate individuals because several adolescents said they preferred to learn from their fathers and friends because they knew how to hunt well and gave them "good meat."

The second prediction was that adolescents would not acquire much from biological fathers because spear hunting was likely to be acquired in adolescence, a time in which fathers were less likely to be around due to demographic features common to small-scale cultures (divorce and high adult death rates). Chabu demographic data were consistent with other demographic studies in that only 32 % of adolescents had both biological parents living and still married. A slight majority of adolescents (57 %) still lived with their fathers (32 % with both biological parents and 25 % with father and stepmother). But even with about half the fathers present, the vast majority of adolescents (over 80 %) indicated that they went on their first spear hunt and preferred to go spear hunting with other adults (often maternal uncles) and sometimes with friends. The data indicate that oblique transmission is particularly important in adolescence and that horizontal and vertical transmissions are not as important.

However, the data also suggest that fathers, friends, and other adult men play crucial roles in leaning to spear hunt at different ages. Biological fathers seem to be important in early and middle childhood (ages 5–10) because most adolescents reported that they first acquired basic knowledge about hunting by listening to their fathers. Fathers were also reported to play a significant role in teaching adolescents about basic knowledge about spear hunting including the dangers and risks of starting to spear hunt too early. None of the adolescents mentioned that they learned about hunting risks from other adults or from their friends. As children reached middle childhood, collaborative learning/spear hunt role-playing became an important method of learning. Role-playing was reported to be important for strengthening the knowledge and skills they acquired from their fathers and encouraging them to be good hunters in the future. This finding is also consistent with the assertion that children's play is important for both physiological and subsistence skill development (Bock and Johnson 2004). As children get older and want to go on actual spear hunts, the role of nonparental adults, especially maternal relatives, becomes important.

Our third prediction was that teaching (i.e., modification of behavior to enhance learning in another) would occur in the transmission of spear hunting because the skills and knowledge associated with hunting are often complex, difficult, and opaque. Contrary to cultural anthropologists' assertion that teaching is absent or limited in cultural learning in small-scale societies, data from structured interviews and focal follows indicated that teaching, including verbal instruction, were common. Various other forms of teaching observed included demonstration, opportunity scaffolding, teasing, and pointing.

An unexpected result was the difference observed between adult and adolescent men in who they identified as having been prominent sources of spear hunting skill and knowledge acquisition. Interviews with adult men indicated fathers were primary, while interviews and observations of male adolescents indicated that other adult men were particularly important. It may be that the adult men were thinking about the multiple roles of fathers across all ages of development or the general cultural expectations about fathers, whereas the adolescents were asked specific questions about with whom they first went spear hunting and with whom they preferred to spear hunt and were also observed in spear hunts. In other words, different methods may have contributed to the different results. Overall, as suggested by Reyes- Garcia et al. (2009 and Chapter 4), multiple individuals contribute to cultural learning, especially with complex skills and knowledge that develop throughout life.

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