McDONALD INSTITUTE CONVERSATIONS

Towards a Broader View of Hunter-Gatherer Sharing

Edited by Noa Lavi & David E. Friesem

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With contributions by
Olga Yu. Artemova, Ran Barkai, Nurit Bird-David, Adam H. Boyette, Hillary N. Fouts, David E. Friesem, Peter M. Gardner, Barry S. Hewlett, Robert K. Hitchcock, Emmanuelle Honoré, Jean Hudson, Robert L. Kelly, Noa Lavi, Jerome Lewis, Sheina Lew-Levy, Alan J. Osborn, Spencer R. Pelton, Magalie Quintal-Marineau, Erick Robinson, Kenneth Sillander, Penny Spikins, Gilbert B. Tostevin, Bram Tucker, George Wenzel & Thomas Widlok

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This monograph is a result of a conference we organized at the McDonald Institute for Archaeological Research at the University of Cambridge on 'Sharing among hunter-gatherers', which aimed to promote a wider notion of sharing. We are especially indebted to Nurit Bird-David and Peter Gardner for being our source of inspiration for the theme of this conference and for their endless support and encouragement along the road. We also thank Jerome Lewis who was extremely supportive and helpful in making the conference both attractive and successful.

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Noa Lavi & David E. Friesem,
Cambridge, October 2019

Chapter 12

Identifying variation in cultural models of resource sharing between hunter-gatherers and farmers: a multi-method, cognitive approach

Adam H. Boyette & Sheina Lew-Levy

> Earlier this morning, I was on a trail returning from collecting *ndosi* caterpillers with a group of teens and young adults. We met a group of Ngandu sisters who [I know] from the village and whom I've always found particularly ornery and mean... Much to character, the oldest…grabbed the bucket of *ndosi* carried by Gono and started pouring them into her own, angrily berating Bolomu for not paying his debt. Gono resisted a little, so the young woman grabbed the bucket, put it on the ground in front of Bolomu and told him to fill his order or she'd hit him hard ('*Mbi pika mo shoni*'). He put some in her bucket and the parties parted. The Aka laughed about the incident afterward, continuing to collect *en route* [back to camp].
>
> Boyette's field notes,
> 19 August 2010, 9:22 a.m.

As the other papers in these proceedings attest, resource sharing is without question a key value among hunter-gatherers, or foragers, and sharing norms and institutions structure a great deal of daily social life (Lee & Daly 1999; Wiessner 1982, 2005). Norms such as demand sharing (Peterson 1993) also impact larger scale movements of people over time, as individuals or families leave if they are not satisfied with the generosity of other members of their community (Woodburn 1982) or they wish a share of resources elsewhere – a pattern which may be key to the resilience of mobile foragers (H.M. Lewis et al. 2014). However, foragers are not the only peoples who 'share'; anthropology has a long history of studying acts of giving across cultures, the associated social norms and their instantiations (e.g. Malinowski 1922; Mauss 1954). Yet, few studies have explored how neighbouring foragers and farmers living in the same environment differently conceive of, and socialize for, sharing. It is our contention that, in order to understand the norms that guide resource sharing amongst foragers, or any other peoples, we must consider the articulation of sharing with other core values. As others have before us (e.g. Bird-David 1990; B.S. Hewlett 1991), we utilize the striking contrast in such values apparent between foragers and their agrarian neighbours, in this case, Aka foragers and Ngandu farmers from the Congo Basin, to identify the underlying cultural models which motivate sharing in their respective cultural contexts. More specifically, we explore how autonomy among the Aka, and communalism and hierarchy among the Ngandu, shape the beliefs and practices surrounding sharing.

Our approach to understanding sharing in this chapter is drawn from cognitive anthropology (Holland & Quinn 1987; D'Andrade & Strauss 1992; Strauss & Quinn 1997). As such, we are interested in finding evidence for how cultural models – cognitive structures that organize and motivate thought and feeling – guide individual decision making among a group of people who share a culture (Shore 1996; Descola 2013). Cultural models are often implicit but are instantiated in social norms and practices, such as reciprocal exchange or demand sharing, that govern resource sharing. Importantly, the cognitive anthropology approach does not assume that everyone in a culture acquires exactly the same cultural model. For example, children's everyday experiences of observing sharing and receiving feedback for their own sharing behaviour (Boyette & Hewlett 2017) help forge their understanding of cultural models of sharing, but these experiences vary depending on individual differences, availability of kin, resources, and social structure (Boyette 2019; Crittenden 2016). Thus, an important aspect of the cognitive perspective is that individual experiences differ to varying degrees and thus cultural models are shared to the extent that

experiences are shared (Shore 1996), especially in childhood (see Gardner and also Tostevin this volume on expectations of variation in cognition). In other words, the cognitive approach permits us to consider intra-cultural variation as well as differences between cultures. Additionally, a cognitive approach takes cultural models to be hierarchically nested such that higher order models orient and motivate behaviour in context-specific ways. We refer to higher order cognitive structures which organize many cultural models as 'foundational cultural schemas' (D'Andrade 1992; Shore 1996), which are similar in concept to Descola's 'integrated schemas' (2013, 104, 415, note 29). Foundational cultural schemas are early developing and influence thought and feeling across multiple domains of life among a group sharing a culture.

We find the theoretical framework of cognitive anthropology useful because it allows us to test specific hypotheses about how people from two cultures with contrasting cultural models – manifest in contrasting norms – make decisions. In this case, we are especially curious about when one should share and how one should deal with others who do not share, in relation to contrasting Aka and Ngandu foundational cultural schemas. Here, our hypotheses are derived from cultural and evolutionary anthropological insights into sharing among foragers and farmers.[1]

Sharing in forager and farmer thought

In most cases, forager groups have long-standing ritual and economic relationships with nearby agrarian peoples, as is the case among the Aka and Ngandu. Yet, thinking about sharing is observably different between the two societies. Bird-David (1990) contends that for foragers, 'sharing' consists of an obligation to give and an open invitation for others to demand that things are shared (also Peterson 1993). This perspective on sharing is, in Bird-David's view, observable in how foragers speak of themselves in relation to their environment. Their environment gives to them what they need as would a caring parent, and they in turn give to their family, conceived of as all of those who identify as members of the wider forager community. In contrast, farmer exchange relationships are based on reciprocity; whatever is given is a contract which requires repayment. Their relation with the environment shows evidence of this view as well, as farmers must struggle against the environment to reap their subsistence, and view the environment as a vengeful ancestor that gives only when they behave according to cultural norms. In other words, farmers must give in their behaviour towards others, whom they view in terms of different kinship relations, for the environment to reciprocate.

Elsewhere, we have described sharing as one of three foundational cultural schemas among Congo Basin foragers, including the Aka, and proposed they are held by other mobile foragers as well (B. S. Hewlett et al. 2011; Boyette & Hewlett 2017a, 2017b; Lew-Levy et al. 2017, 2018). As a foundational schema, sharing among foragers permeates not just the domain of resource sharing but how people conceive of labour (Bliege Bird 1999), space (Hewlett, this volume), joy (J. Lewis 2016), childcare (B.S. Hewlett 1989) and more. The other forager foundational schemas are respect for autonomy and egalitarianism. Respect for autonomy means that people are free to do what they want, and no one can coerce others (Gardner 1991). Egalitarianism means that all people are given equal respect, and that, in principle, no individual has more power than another. This combination of schemas is unique among the world's peoples in that – beyond being the most egalitarian of all known societies – only among foragers is there the unique articulation of respect for individual autonomy and a strong expectation of constant, widespread sharing. The Endicotts have referred to this behavioural complex as 'cooperative autonomy' (K.M. Endicott 2011; K.L. Endicott & Endicott 2014), and have noted the conflicts that can emerge when individual interests do not clearly articulate with obligations to others. Ameliorating such conflicts is part of the social education of young foragers (Turnbull 1978; Briggs 1998; Boyette 2019).

Less work has dealt explicitly with foundational schemas among small-scale subsistence farmers (e.g. LeVine et al. 1994). However, our characterization based on work with the Ngandu and from other ethnographic descriptions of (at least other Bantu) farmers suggests at least three schemas govern thought and emotion among these peoples: communalism, hierarchy, and a material basis to social relations (B.S. Hewlett et al. 2011). Communalism refers to the ethos of putting the needs of the family (often the patrilineal household and clan) above the needs of the individual. Hierarchy refers to a strict order to social relations based on gender, age, and status (typically wealth or prestige). A material basis to social relations implies that the strength of social bonds is tied less to emotional attachments but to a history of material gifts. For example, in remembering lost family members, Ngandu adolescents spoke of the gifts their loved ones gave them more than the loss of their presence (B.L. Hewlett 2005). Each of these schemas hypothetically impact thought regarding sharing. For example, Bird-David's (1990) characterization of farmer sharing as reciprocity among kin evokes the measured giving that is couched within a hierarchical social system and the importance of exchange of goods to the strength

of these relationships. Communalism defines the aim of much resource exchange – to advance or maintain the status of the family in relation to the community.

Sharing and early life experiences

Early life experiences are key in imparting the foundational schema of sharing, which persists throughout childhood and into adulthood (Lew-Levy et al. 2018; Boyette in press). Among foragers, various authors have noted that the socialization for sharing occurs as early as infancy (B.S. Hewlett et al. 2000). For example, among the Nayaka, the feeding of infants is framed as sharing (Bird-David 2008). Furthermore, though positive feedback is a rare form of teaching among foragers (B.S. Hewlett & Roulette 2016; Boyette & Hewlett 2017a), Bakeman et al. (1990) found that San parents encourage and celebrate San infants when they offer objects to others. Also among the San, infants as early as six weeks are socialized into a sharing institution, *hxaro*, in which children are encouraged to invest in relationships by distributing wealth. Once forager children are able to walk, they are encouraged to participate in sharing through everyday life experiences, such as by distributing plates of food between households in the evening (Bird-David 2008; K.L. Endicott & Endicott 2014; Crittenden 2016; Boyette & Hewlett 2017b). By middle childhood, as children spend more time in playgroups where they not only imitate adult sharing but also return from foraging trips with food to share, the sharing practices so central to the foraging ethos have been formalized (Crittenden 2016; Crittenden & Zes 2015).

Among the Aka specifically, children report that they know how to share correctly by 10 years old (B.S. Hewlett & Cavalli-Sforza 1986). Boyette (2019) shows that, when asked, Aka children as young as four are explicit that when they acquire a resource, it is to be shared. They report being taught to share by a number of individuals, especially their mothers. Consistent with sharing being a foundational cultural schema that is learned early in life, children largely say they share because it is simply something one does, and because others will think they are selfish or will speak poorly of them if they do not. Additionally, children also enforce sharing norms among others. Before middle childhood, norm enforcement is more direct; some children say they would announce to the group if someone has hidden food or they would reprimand them for not sharing. However, after middle childhood, norm enforcement becomes less direct; children say they will do nothing, or most commonly, they say they will not share with that person in the future. Boyette (2019) argues that this developmental change in norm enforcement is a result of the cognitive changes that occur during the transition to middle childhood, when children develop a robust theory of other people's minds, allowing them to recognize that, if they are to maintain their autonomy, they must respect others' as well – including their choice not to share. Thus, children's testimony illustrates the early developing value for resource sharing as well as the sequential cognitive integration of the foundational cultural schemas of sharing and respect for autonomy during development.

Less is written about Ngandu or other farmer sharing practices. However, there is equally active socialization of sharing, and the foundational schemas are clearly implicated in the pattern observed among adults and children (Boyette 2013). For example, meals are shared in a hierarchical fashion, with men served first, usually receiving the best portions. Among children, older children are typically made responsible for younger siblings and share with those under their care. Material exchange as a basis for social relationships can be seen in how age-peers share with one another. For instance, there is an institutionalized sharing relationship between maternal cousins in which, Boyette was told, a *koya* (the kin term for this relationship) must be given anything they ask of their cousin. Such relationships create alliances outside of the patrilineal family, but more research needs to be done on their function. In childhood, boys share food and material items with their friends, sometimes to the exclusion of other boys nearby. Fouts & Lamb (2009) have shown evidence of the early socialization of this behaviour pattern. Among the Bofi farmers, living in the savannah region just west of the Ngandu in the Central African Republic, conflicts between toddlers were commonly over possession of material items. In contrast, Bofi forager toddlers' conflicts were typically over proximity to favoured social partners. While we have seen Aka, Mbendjele and Hadza forager children fight over material possessions, a hierarchical pattern to sharing and its role in relationship maintenance is distinct to farming groups like the Bofi and Ngandu.

Evolutionary approaches to resource sharing

While the cognitive approach helps us to understand the origins of cultural meaning behind such things as resource sharing, evolutionary theory reminds us that what people say and think are not always the same as what people do. Evolutionary researchers are interested in the ultimate inclusive fitness benefits of giving away resources, especially food (Gurven 2004), so the focus is on observable behaviour trends over time. In evolutionary studies, degree of related-

ness and reciprocity are the most reliable predictors of forager food sharing (Gurven et al. 2002; Gurven 2004; Allen-Arave et al. 2008; Schnegg 2015), and these seem to hold even among settled groups, although the scope of sharing decreases (Allen-Arave, Gurven & Hill 2008; Gurven, Hill & Kaplan 2002). Theoretically, kin-selection and reciprocity are stable organizing principles of sharing because they avoid the free-rider problem. In other words, people are more motivated to give, and not just take, if they get something in return. Future returns may be immediate, such as material goods, or delayed, such as evolutionary fitness through the survival and reproduction of those with whom they share genes.

In terms of individual decision making in the contexts of sharing, then, evolutionary theory predicts that people consider the likelihood that others will reciprocate if they are shared with, making reputations for cooperating (i.e. sharing) key to maintaining cooperative exchanges (Macfarlan, Quinlan & Remiker 2013). Additionally, punishing those who do not cooperate, theoretically, stabilizes cooperation in human groups, as people are less likely to free-ride if they know there are sanctions (Roberts 2008; Henrich et al. 2006). Thus, evolutionary theory suggests that, in general, giving to kin, reciprocal exchange, attention to reputations, and punishment of those who do not reciprocate should be universally valued.

Evolutionary theory is not as clear about what we should expect regarding children's sharing and how children learn to share (Gurven 2004; Crittenden et al. 2013). Life history theory suggests that, during our long evolutionary history of living as foragers, learning to extract difficult to access resources (e.g. game meat, honey, roots and tubers) took so long to master that childhood lengthened to provide for time to learn. Consequently, human children are not net producers of food until adolescence and early adulthood (Kaplan et al. 2000; Crittenden et al. 2013). Thus, sharing should occur from older to younger generations, as children are not net producers of calories, and thus need provisioning throughout the learning years. While this theory focuses on learning skills, humans must learn much more (Boyd, Richerson & Henrich 2011), including how to share, and cultural transmission theory suggests that humans acquire ideas, beliefs, norms and practices through multiple modes (e.g. parents vs. peers vs. institutions) and processes (e.g. observation, teaching) (Cavalli-Sforza & Feldman 1981; Boyd & Richerson 1985). Parents are expected to be important transmitters because of their proximity and genetic interest in their children's success. Empirical studies tend to find evidence that parents are the main transmitters of cultural knowledge, and that other people become more important later in life (B.S. Hewlett et al. 2011; Kline, Boyd & Henrich 2013).

In what follows we attempt to integrate the cognitive perspective – which emphasizes individual experiences in a culture as shaping motivations – with evolutionary expectations – which emphasize universal motivations to cooperate or punish – through an analysis of Aka and Ngandu decision making around sharing situations as presented in a formal survey. We propose a set of hypotheses and use methods from cognitive anthropology and psychology to test whether Aka and Ngandu respondents systematically make judgements about similar sharing situations that are consistent with their foundational cultural schemas and the expectations of evolutionary theories of cooperation. Additionally, we explore people's perceptions about the socialization of sharing in order to investigate cultural models and evolutionary predictions of how children share and sharing is learned.

Ethnographic setting

Data for this study were collected between July and September of 2010. The Aka and the Ngandu[2] who participated in this study lived in and on the periphery of the northwestern part of the Congo Basin tropical forest in the southwestern Lobayé Province of the Central African Republic (CAR). The two groups have historical trade and fictive kinship relationships going back at least a few hundred if not a few thousand years (Vansina 1990). The Aka long ago borrowed the language of the Ngandu, after which the two languages diverged while remaining mutually intelligible (Bahuchet 1993). The recent generation of Ngandu understand DiNgandu, the traditional language, but speak Songo, the trade language of CAR, in the village where this research was conducted. Many Aka men and some women can also speak Songo. This linguistic environment is one illustration of the nature of the inter-ethnic relationship in this ethnographic setting: frequent and flexible (largely economic and ritual/ethno-medical) inter-ethnic exchange, but relatively stable and conservative social segregation.

While some Aka aspire to live among the Ngandu for the material resources and education (i.e. literacy) village life provides, they strongly identify as BaYaka: people of the forest (J. Lewis 2002). By some measures, half of the calories the Aka consumed come from agricultural foods (B.S. Hewlett 1991). However, the Aka still went into the forest daily to collect a variety of seasonal resources (nuts, mushrooms, honey, caterpillars, wild game) and *koko* leaves (*Gnetum* spps.) all year round. The interview data for the study was collected among Aka living in forest camps 2-4 hours walk

from the Ngandu village and with individuals living in camps established at that time on the periphery of the village, in traditional Aka spaces in-between cacao plantations and the Ngandu manioc (cassava) gardens. 'Forest camps' typically consist of around five to seven nuclear families related through kinship, who each live in a *mongolo* – the traditional one-room dome house constructed by women. In the 'village camps', there might be more families living at the same site, and some men have built larger mud-brick houses in the Ngandu style, as these can be reoccupied after time in the forest. In both settings, the houses are typically centripetally organized and close in distance, reflecting a cultural model of shared space (Hewlett et al., this volume).

The Ngandu who were interviewed all lived within the central three neighbourhoods of the village, each of which had a population of roughly 100 people. The Ngandu are swidden horticulturalists (farmers for simplicity) who cultivate manioc, corn, peanuts, plantains, and several minor crops. Most families also engage in small-scale commerce, selling market goods or extra produce from their home. Ngandu live in patrilineal, extended family compounds, consisting of one or more larger houses and a kitchen, oriented to create more privacy for the family than is ever possible among the Aka.

Hypotheses and qualitative predictions

We conduct statistical tests of the following hypotheses:

1. The Aka and Ngandu will both demonstrate consensus in their responses to our formal survey as analysed using cultural consensus modelling (Romney, Weller & Batchelder 1986; Romney, Batchelder & Weller 1987), indicating a coherent cultural model of sharing in each group.
2. The Ngandu will have higher consensus than the Aka, as foragers' foundational schema of respecting autonomy permits more individual variation in sharing behaviour (see Gardner, this volume), whereas the schemas of hierarchy and communalism place individual autonomy below maintaining the social order.
3. Aka responses to the survey questions will indicate an overall tendency towards unconditional sharing and conditional punishment of selfishness (i.e. more likely to respect another's autonomy not to share). In contrast, we expect the opposite among the Ngandu.

As our survey tool included qualitative as well as quantitative data, we also investigate the following qualitative predictions:

1. Aka justifications for their responses to the hypothetical sharing situations will more often reflect a cultural model of unconditional sharing as compared with the Ngandu, while Ngandu responses will more often reflect sharing for reasons of reciprocity, enforcing norms of sharing, or reputational gain.
2. Respondents should indicate a perception that children learn to share from parents, and that sharing of food and non-food items should be directed from older to younger individuals, as predicted by evolutionary models of resource sharing.
3. Sharing will be ranked highly in terms of what people think are the most important things children should learn, as it is expected that it must be actively socialized (Boyette 2019; Boyette & Hewlett 2017b).

Methods

Sample

A sample of Aka and Ngandu informants were interviewed by the first author and a trained Ngandu field assistant, or by the field assistant alone. A small sample of Aka children (younger than approximately 18 years old, n=10) were interviewed but were omitted from the current analysis. The final sample consisted of 53 Aka (57 per cent female; mean age=32.4 years, SD=8.9 years) and 46 Ngandu (46 per cent female; mean age = 31.5 years, SD=9.4 years).

Survey design

The structured interview design was constructed to gather data on decision making in situations concerning resource sharing norms in general and among children specifically. The survey included two types of questions: forced choice responses and free-lists. The cultural domain of conditional resource sharing was probed with 22 forced-choice questions where respondent was asked how sharing should occur between individuals within the community (e.g. would you share with someone who is selfish?). The status and reputation of the giver and receiver (i.e. was the giver or receiver generous/selfish/stranger/family), and the role of the respondent in the situation (e.g. giver/third-party observer) varied across questions (Table 12.1). This design permits analyses of the degree to which reputation is a condition for judgements about sharing, and accounts for differences in how an individual would choose to share versus how they think others should share. Informants were asked to respond whether they thought the hypothetical situation would happen 'Always', 'Sometimes', or 'Never'. Informants

were asked to choose between 3 options instead of a Likert-scale standard of 5 options to decrease informant and field assistant fatigue. Based on pilot work with a 5-point scale, a 3-choice method improved our sample size and the accuracy of informant responses, but still allowed for a test of the tendency for informants to choose a conditional ('Sometimes') versus a non-conditional response ('Always' or 'Never'). They were then asked to describe why they gave the response they did, providing insights into their decision making. These two sets of data, forced-choice and justifications, were analysed separately.

Four free-list questions (Table 12.1) concerned children's sharing. They were chosen to understand adult views of how children learn to share, who they share with, and where sharing practices and norms fall within adult priorities in the socialization of children. For each question, informants were asked to list as many items as they could think of. If they stopped, they were asked once more if that was all. The interviewer (AHB or a field assistant) aimed for at least 5 responses per informant.

Analysis

Informal cultural consensus modelling was used to test the hypotheses that the pattern of informant responses to these forced-choice questions were evidence of a cohesive cultural model in each group (Weller 2007). For this analysis, categorical responses were coded as ordinal (1, 2 or 3) and the matrix of informant responses (observations/rows) to each question (variables/columns) was transposed so that the rows were questions and columns were informants. Missing values were filled randomly with either a 1, 2, or 3 as the analytic procedure does not permit missing values (only 7 missing values were present in the dataset). A factor analysis was then performed on the data using the principal-factor method, which computes factor loadings using the squared multiple correlations as estimates of communality. Factor analysis was done using Stata IC statistical software. Aka and Ngandu informant responses were analysed separately under the assumption that each maintained independent cultural models concerning the analytical domain of interest (Romney, Weller & Batchelder 1986). The factor loadings from the first factor were treated as the competence scores and were extracted for analysis (Weller 2007).

In order to test the hypothesis that the Aka responses were consistent with a cultural model reflecting more unconditional sharing and more conditional punishment (respecting autonomy versus enforcing social norms), we treated the questions and the categorical responses as a psychometric scale with two subscales, 'Sharing' and 'Autonomy'. For this analysis, we

Table 12.1. *Interview questions and associated hypothetical domain.*

Forced-choice response questions	
Would you share with someone who refused to share with you before? ***	Sharing
If a child is selfish, is it necessary that someone punishes them? ***	Autonomy
Do you share with others who do not share? **	Sharing
Do generous people share with other generous people? *	Sharing
Do children punish other children if they see them not sharing? *	Autonomy
Do you share with strangers? **	Sharing
Is it good if a child is selfish in front of a stranger? *	Autonomy
Is it good to share with someone who is generous? *	Sharing
Is it good to share with someone selfish? ^	Sharing
Do children share correctly without being taught? ^	Sharing
Do generous people share with selfish people? ^	Autonomy
Do children punish adults who they see not sharing with others? ^	Sharing
Do children share with other children who do not share?	Sharing
If someone is selfish, must someone else punish them?	Autonomy
Do selfish people share with selfish people?	Sharing
Do you punish someone who you see not sharing with another?	Autonomy
Is it good if children/your children are selfish? (Reverse)	Sharing
Do your children share correctly without instructions?	Autonomy
Is it good if an adult in your family is selfish in front of a stranger?	Sharing
Is food more important to share than other things?	Sharing
Do selfish people share with generous people?	Sharing
If someone shared with you before, do you share with that person?	Sharing
Free list questions	
Who teaches children to share?	Socialization
Who do children share food with?	Socialization
Who do children share non-food items with?	Socialization
What are the most important things to teach children?	Socialization

Bold font indicates a Chi-square test result for a significant association between ethnicity and response choice at the p≤0.05. These were chosen for qualitative analysis.

^p≤0.10, *p≤0.05, **p≤0.01, ***p≤0.001

reverse coded the responses to 7 questions such that for all questions, a response of '1' is consistent with a cultural model of unconditional sharing and conditional punishment, and a response of '3' is consistent with conditional sharing and unconditional punishment. We examined the reliability of the scale and its sub-domains using Cronbach's alpha statistic. Finally, we generated aggregate response scores for each informant for the whole scale and for the Sharing and Autonomy subscales by summing their responses across the questions and dividing by the total number of responses.

Our qualitative predictions regarding intercultural variation in responses to individual questions were evaluated using the untransposed dataset and including the justifications for each response. All forced-choice responses were subject to Chi-squared tests of association. For those questions which had responses with Chi-square results at $p \leq 0.05$, we performed a content analysis of the response justifications to identify major themes to provide qualitative insights into what was driving the variation in forced-choice responses.

A salience analysis was conducted on the free-list responses. The free-list salience index was calculated following Smith (1993) using Microsoft Excel Version 14. The calculations included the frequency at which items were mentioned across lists, and the order of mention in the list. To account for the order of mention, the percentile rank was calculated in the following manner: the sequence at which an item was mentioned ('beginning at zero, so that for any item in any list, the sequence numbers state how many items were mentioned before that item in that list', Smith 1993, 2) was subtracted from the total count of items mentioned. This number was divided by the total count of items mentioned, and multiplied by 100. The item's salience index was calculated by finding the gross mean percentile rank for all respondents. The frequency at which each item was mentioned was also calculated. Finally, the net rank at which an item was mentioned across respondents was calculated as well. For the question, '*What are the most important things to teach children?*', Mann Whitney U tests were conducted on the percentile rankings for teaching sharing, using ethnicity as a predictor variable.

Results

The results of the factor analysis supported the assumption that the questions tapped into a cohesive cultural domain, in support of Hypothesis 1. For the Aka, the first factor accounted for 45 of the variance in the data. For the Ngandu, the first factor accounted for 53 of the variance. The average level of agreement, or cultural 'competence' in the domain of interest, is 0.67 (SD=0.10) among the Aka and 0.72 (SD=0.11) among the Ngandu (1.0 would indicate 'perfect knowledge' of the domain). The difference in mean competence is statistically significant ($t=-2.51$, $p<0.01$, one-way t-test) indicating a higher average level of consensus among the Ngandu, in support of Hypothesis 2 (Fig. 12.1).

Evaluation of the 22 questions as a psychometric scale (with 7 questions reverse coded), indicates reasonable reliability (Cronbach's alpha=0.65). Analysis of the aggregate scores indicates a significantly greater mean score for the Ngandu ($t=-2.92$, $p=0.002$), consistent with Hypothesis 3, that the Aka would respond according to a cultural model emphasizing

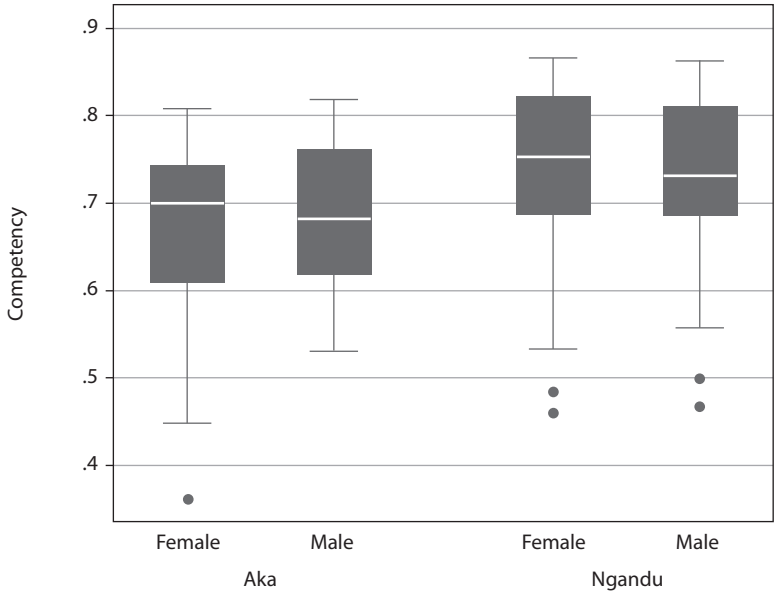

Figure 12.1. *Box plot of cultural competency scores for Aka and Ngandu men and women.*

Table 12.2 *Per cent of forced-choice responses by ethnicity and domain.*

		Always	Sometimes	Never
Sharing	Aka	38	46	16
	Ngandu	29	54	17
Autonomy	Aka	39	42	18
	Ngandu	34	43	23

unconditional sharing and conditional punishment (Table 12.2). The subscales are slightly less reliable (Sharing: alpha=0.53, 14 items; Autonomy: alpha=0.63, 8 items) but consistent with the overall scale, indicated more responses among the Aka that are supportive of unconditional sharing (t=-2.82, p=0.003) and respectful of individual autonomy not to share (t=-1.77, p=0.04).

In examining the variation in responses to individual questions at the ethnic group level, Chi-square tests of association demonstrate that responses to 8 questions were significantly different between the two groups at the p≤0.05 level (Table 12.1). A closer look at the justification for informants' responses to these questions reveals thinking consistent with our predictions: When Aka informants said they would always share, justifications often referred to 'kindness', or a general norm that one shares because it is good to share. In contrast, while some Ngandu also justified their responses with reference to 'kindness', fewer said 'Always'. Those who did choose 'Always' justified their response at least as frequently by saying they would share because the other person might reciprocate, or, in the case of sharing with someone selfish, to teach them to share. As one Ngandu man put it, '*To serve them a lesson on selfishness*.' That is, to demonstrate the social norm.

For example, in response to the question, 'Would you share with someone who is generous?', 53 per cent of the Aka responded 'Always' and 44 per cent of these informants said they would out of 'kindness'. In contrast, 30 per cent of the Ngandu answered 'Always', and 21 per cent justified their response with reference to 'kindness' while just as many referenced reciprocity. Similarly, in response to the question, 'Do you share with others who do not share?', 23 per cent of the Aka said they always would, and of those all but one said they would out of 'kindness'. Only a single Ngandu said they would always share with others who do not share, and they too would do so out of kindness, '*For him my good heart*.' There was less variation in justifications for responses of 'Always' to the question, 'Do you share with strangers?' Most Aka and Ngandu who gave this unconditional response said they would share out of kindness or for the potential of future reciprocity. However, again, twice as many Aka said 'Always'.

There was less variation in justifications to the questions regarding socialization of sharing and punishment for not sharing – our domain of 'Autonomy'. However, some responses were consistent with our predictions. For example, in response the question, 'If a child is selfish, is it necessary that someone punish them?', 57 per cent of Ngandu respondents said 'Always' and 4 per cent said 'Never'. In contrast, the same number of Aka, about one-quarter, responded 'Always' as did 'Never', indicating greater respect for children's autonomy. Moreover, 77 per cent of the Aka

Table 12.3. *Rankings of Aka and Ngandu responses to the question: who teaches children to share?*

	Aka				Ngandu			
	Rank	Gross mean	Freq.	Net mean	Rank	Gross mean	Freq.	Net mean
Mother	1	79.5	43	1.6	1	82.5	46	1.8
Father	2	69.6	41	1.7	2	79.7	45	1.8
Grandmother	3	36.5	28	1.9	3	30.9	29	2.1
Aunt	4	21.2	26	2.0	7	13.3	16	1.4
Big sister	5	18.8	19	1.3	10	2.3	3	0.3
Grandfather	6	16.5	17	1.3	5	20.7	20	1.5
Cousin	7	5.9	5	0.5	6	18.5	17	1.3
Big brother	8	5.2	6	0.4	9	4.5	4	0.3
Little bro. of father	9	0.6	1	0.1	8	5.9	8	0.7
Juniors	10	0.6	0	0.1	0	0.0	0	0.0
Sister	11	0.4	0	0.1	11	1.3	1	0.1
Family	12	0.4	1	0.1	0	0.0	0	0.0
Friends	13	0.4	0	0.1	0	0.0	0	0.0
Brother	0	0.0	0	0.0	4	22.1	25	2.2

Table 12.4. *Rankings of Aka and Ngandu respondents to the question: Who do children share food with?*

	Aka				Ngandu			
	Rank	**Gross mean**	**Freq.**	**Net mean**	**Rank**	**Gross mean**	**Freq.**	**Net mean**
Father	1	64.3	46	1.9	1	66.8	40	1.9
Mother	2	63.1	47	2.1	2	65.4	42	2.3
Grandmother	3	30.4	30	1.9	5	36.3	27	1.7
Brother	4	29.7	25	1.2	3	38.2	26	1.5
Sister	5	22.6	21	1.2	4	37.8	27	1.7
Aunt	6	17.5	22	1.6	7	14.2	16	1.4
Big brother	7	16.5	12	0.5	10	9.6	7	0.5
Friend	8	13.5	16	1.2	9	12.1	17	1.6
Big sister	9	12.8	13	0.8	8	12.2	9	0.6
Grandfather	10	12.8	14	0.9	6	14.9	16	1.4
Cousin	11	5.0	8	0.7	12	5.0	8	0.8
Family	12	3.7	5	0.4	0	0	0	0
Juniors	13	3.6	3	0.2	0	0	0	0
Little sister	14	1.4	1	0.0	11	5.1	4	0.3
Little brother	15	1.1	1	0.1	14	2.8	2	0.2
People	16	0.5	1	0.1	16	0.4	1	0.1
Strangers	0	0	0	0	13	4.7	7	0.8
Neighbours	0	0	0	0	15	0.4	1	0.1

respondents who said children should never be punished for not sharing said there was nothing to punish – reflecting their respect for autonomy. However, among both groups, the majority of those who said children should always be punished for not sharing said so to teach them to share. In other words, there is agreement that punishment is to curb selfishness and is part of the socialization of sharing.

Finally, the four free-list questions produced an array of responses. For the question, 'Who teaches children to share?', in total, Ngandu respondents named 11 categories of individuals who teach sharing. Each Ngandu respondent provided an average of 4.6 responses, ranging between 2 and 6 responses. In total Aka respondents name 13 individuals who teach sharing. Each Aka respondent provided an average of 4.06 responses, ranging between 2 and 5 responses. The results indicate that, for both the Aka and Ngandu, mothers were ranked first, followed by fathers and grandmothers. For the Aka, aunt and big sister were ranked 4th and 5th, while brother and grandfather were ranked 4th and 5th among the Ngandu (Table 12.3).

For the question, 'Who do children share food with?', both the Aka and Ngandu named a total of 16 categories of people with whom children should share food. Each Ngandu respondent provided an average of 5.09 responses, ranging between 4 and 7 responses. Aka respondents provided an average of 4.7 responses, ranging between 3 and 7 responses. For both the Aka and Ngandu, fathers and mothers were ranked first and second, respectively. Also, for both the Aka and Ngandu, grandmothers, brothers, and sisters were ranked among the top 3rd through 5th individuals (Table 12.4).

In response to the question, 'Who do children share non-food items with?', in total, Aka respondents named 19 categories of individuals with whom children should share non-food items, while Ngandu respondents named 15 categories of individuals with whom to share non-food items. Each Aka respondent provided between 3 and 7 responses, averaging 4.8 responses. Each Ngandu respondent provided between 3 and 6 responses, averaging 5 responses. Both the Aka and Ngandu named fathers first. Both Aka and Ngandu follow with cousins, aunt, grandmother and mother in varying order (Table 12.5).

Finally, for the question, '*What are the most important things to teach children?*', for the Ngandu, out of 50 items mentioned, sharing was the 5th most important item to teach children (percentile rank=20.43). For the Aka, sharing was the 7th most important item to teach children (percentile rank=12.30). There was no significant difference between Aka and Ngandu respondents percentile ranking of the importance of teaching sharing ($U=1230$, $Z=-1.82$, $R^2=0.17$, $p=0.07$).

Table 12.5. *Ranking of Aka and Ngandu respondents to the question: Who do children share non-food items with?*

	Aka				Ngandu			
	Rank	**Gross mean**	**Freq.**	**Net mean**	**Rank**	**Gross mean**	**Freq.**	**Net Mean**
Father	1	39.9	35	1.9	1	41.4	34	2.4
Grandmother	2	36.2	31	1.7	4	32.3	19	0.8
Aunt	3	34.2	30	1.7	3	35.4	26	1.6
Mother	4	33.4	31	1.8	5	31.1	31	2.6
Cousin	5	25.7	23	1.3	2	35.7	26	1.7
Grandfather	6	23.5	18	0.8	8	20.5	18	1.3
Brother	7	19.3	17	1.0	11	14.4	13	0.9
Friend	8	18.6	15	0.7	6	30.8	23	1.5
Big sister	9	18.2	15	0.8	7	24.6	16	0.9
Sister	10	14.5	14	0.9	10	16.4	14	1.0
Big brother	11	9.9	10	0.7	9	17.1	13	0.9
Mother's fam.	12	3.8	2	0	0	0	0	0
Sister-in-law	13	2.4	2	0.1	0	0	0	0
Little bro. of fa.	14	1.9	1	0	15	1.3	1	0.1
Little sister	15	1.8	3	0.2	12	3.9	3	0.2
Family	16	1.5	2	0.2	0	0	0	0
Juniors	17	1.1	1	0.1	13	2.2	1	0.0
Little brother	18	0.9	1	0.1	14	1.4	1	0.1
Brother-in-law	19	0.8	1	0.1	0	0	0	0

Discussion

Few prior studies have systematically investigated sharing as a cultural domain among foragers from a cognitive perspective (B.S. Hewlett et al. 2000; Boyette 2019). In this chapter, we have demonstrated that Aka and Ngandu responses to a series of questions about hypothetical sharing situations evidence cultural consensus, as we hypothesized. This is not surprising, as resource sharing norms are highly conserved as they serve as the link between resources and social relationships in a culture. However, our analysis of the competency scores demonstrates a significant difference between Aka and Ngandu sharing practices that can best be explained with reference to other core cultural values. Specifically, based on our results, sharing norms are more highly conserved among the Ngandu, for whom social relationships are more strictly governed by foundational schemas of hierarchy, communalism, and a material basis to social relationships. Conversely, the Aka foundational schema of respect for autonomy suggests more acceptance of variability in sharing patterns. Several other of our results confirm the consistent interaction of sharing with other higher order cultural models.

For example, when the questions are treated as a psychometric scale, the consensus in each group can be seen to be differently patterned in line with our hypotheses. Based on evolutionary theory, stable sharing norms are made possible by punishment of those who do not cooperate (Panchanathan & Boyd 2004; Henrich et al. 2006). Our scale measured both the tendency to adhere to a cultural model of unconditional versus conditional sharing, but also unconditional versus conditional punishment of sharing norm violations. Results confirm that the Aka responses were more consistent with having cultural models that motivate unconditional sharing but acceptance of individual autonomy when it comes to not sharing. Those who do not share are free-riders, in an evolutionary sense. Recent theoretical modelling has shown that mobility and demand sharing among foragers can support a high level of free-riders because if the demands outpace the productivity of those who share, they are free to move to a more equitable situation (H.M. Lewis et al. 2014). Thus, in theory and in practice, the threat of fission, instead of punishment, encourages cooperative behaviours – in this case, sharing.

In contrast, the cultural models guiding Ngandu farmer thought motivate more conditional sharing and unconditional punishment. Among subsistence farmers, following and upholding social norms is central to maintenance of familial status and the

social hierarchy. The foundational schema of communalism pits families against each other in competition for status and resources. The justifications Ngandu respondents gave to the forced choice questions are consistent with less tolerance for variation and a motivation to enforce norms by teaching others or demonstrating their own generosity. While the individual justifications for responses were not consistently revealing of variation in the underlying cultural models between the Aka and the Ngandu (e.g. reciprocity and reputation were mentioned by both), the overall scale scores are consistent with our hypotheses and suggest decision making is motivated by different ideas of when one should share, and how sharing should be enforced.

The results regarding the socialization of sharing revealed patterns both consistent and inconsistent with other research. For example, mothers, fathers and grandmothers were the most frequently mentioned and highest ranked individuals nominated as teachers of sharing. This is consistent with other work suggesting parents have the greatest role in the socialization of children (B.S. Hewlett & Cavalli-Sforza 1986; Boyette & Hewlett 2017a; Crittenden 2016), and with evolutionary research suggesting grandmothers may have a unique role in the development of their grandchildren (Hawkes et al. 1998; Hrdy 1999). At the same time, many other individuals were nominated by our informants, indicating that the socialization of sharing is a community responsibility (Boyette 2019).

Interestingly, these same individuals were also commonly mentioned and highly ranked as those with whom children share food and non-food items, with parents again being consistently ranked at the top – and father before mother. These results are inconsistent with the embodied capital hypothesis, a branch of life history theory, which suggests that resources should flow downward to support children's growth and learning (Kaplan et al. 2000). We are not the only researchers to observe the upward flow of resources; among the Hadza, Crittenden et al. (2013) also noted that certain children produced a surplus of fruit, which was then shared with their parents. However, people's responses do demonstrate kin selection in that the top five individuals were close kin, which is consistent with evolutionary predictions. Furthermore, it is possible that people's responses reflect socialization practices. As we have seen, parents are central to the formation of sharing routines among children, and responses may reflect the pathways by which parents motivate giving (e.g. 'Give this to your mother. Give this to your grandmother.'). While this is somewhat speculative, Boyette has seen an Aka mother dip her infant's hand in a pot of honey only then to bring the infants' fingers into her own mouth. This sort of behaviour is reminiscent of Wiessner's (1982) observation of a grandmother placing beads in the hands of a newly walking child, and directing her to take them to someone in order to teach her *hxaro* gift exchange.

That fathers were the top ranked individual whom children share food and non-food resources with, whereas mothers were ranked second and fourth, respectively, is interesting. In both cultures, fathers are seen as providers and perhaps these results hint at a cultural model of reciprocity at work. Certainly, the role of the father in the care of children in early childhood is demonstrably different between the two groups, with Aka fathers being in many ways interchangeable with mothers and Ngandu fathers taking no direct role at all in the lives of their young children other than disciplinarian (B.S. Hewlett 1991). Thus, while we have no evidence in the data presented here, we may see a similar result stemming from contrasting cultural values and norms: Among the Aka fathers are important caregivers and providers of resources, who have strong emotional bonds with their children (B.S. Hewlett 1991). In contrast, among the Ngandu, fathers come first in the hierarchy as the male head of the household who is, in principle, the controller of household resources and whose generosity must be earned through obedience to the social norms, as captured in Bird-David's (1990) account of reciprocity.

Finally, both Aka and Ngandu respondents ranked sharing relatively highly among those things that are most important for a child to learn. This is not surprising and is consistent with our prediction that sharing would be considered something important to actively socialize. As opposed to common labour tasks, sharing norms are not always clearly observable, yet breaking them has important implications for social relationships and the willingness of others to share (i.e. reciprocity). Even among the Aka whom we have shown are motivated by a cultural model of unconditional sharing admit as young as middle childhood that they would not share with someone who did not share a resource (Boyette 2019). Furthermore, sharing norms lend themselves to fewer innovative behaviours than subsistence practices, as sharing relies on a consensus among individuals (as we have shown) and thus children must learn the consensus norms and practices. On the other hand, subsistence practices can more easily be improved based on feedback from the environment, and then adopted by the community at large without such active socialization (B.L. Hewlett 2013).

Conclusion

The widespread sharing of food and non-food items is a uniquely human trait, and, accordingly, has received attention from researchers from a broad variety of fields. However, few researchers have considered how core cultural values and socialization practices lead to the development of cultural models specific to sharing, nor how these cultural models can contribute to our understanding of evolutionary trends. Thus, this paper has made important contributions to the anthropology of sharing among foragers and other small-scale societies by showing that, though both the Aka and Ngandu share, sharing practices are tempered by other core cultural values; for the Aka, by autonomy, and for the Ngandu, communalism and hierarchy. We call for both evolutionary and cognitive anthropologists to consider how diverse methodologies can be used to elucidate the commonalities and diversity of resource sharing among small-scale societies and beyond.

Notes

1 As we emphasize more below, the dichotomy between 'foragers' and 'farmers' that we use here, while in reference to subsistence strategy, is based more upon core values and identity than actual subsistence behaviour. We do not suggest the Aka do not farm, nor that the Ngandu do not also hunt and gather at times.

2 While the majority of informants were ethnically Ngandu, five individuals identified with other ethnic groups but had married into the village or independently established themselves and integrated into the Ngandu community. For simplicity's sake, we will refer to all farmers as Ngandu.

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