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Seeds of Science

Forager Facts

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Abstract

Using an anthropology database that details many groups, we summarize how our forager ancestors likely lived on a variety of metrics. Though we have long since ceased to live as hunter-gatherers, its psychological shadow likely still shapes us, and so we would try to understand that lifestyle as fully as possible.

Summary and Introduction

We are economists with a long-standing interest in evolutionary psychology. Economists have particular arguments about how society should function but most of the public finds them weird or even distasteful. For example, economists favor market transactions to solve resource allocation problems while the public tends to find sharing to be preferable. (That people who need organ transplants die waiting for a donor because it is illegal for anyone to sell their own organs is a particularly tragic example of how much the public looks down on market-based solutions.) Why are some people so eager to trust strangers to simply do the “right thing?” We see evolutionary psychology as a powerful way to explain this and other disagreements. In small societies, trust and generosity would be emphasized in cultures where food sharing is common because a refusal to reciprocate sharing would likely lead one to be ostracized from the food sharing pool and make survival more difficult. People have a trust instinct.

We desire to better understand the hunter-gatherer world of our ancestors and have recently come to appreciate the rich collections of relevant data cultural anthropologists have spent decades collecting on the social environments of a wide range of human societies. While we found some systematic collections of these observations, we could not find a systematic summary of the social environment of the subsample of societiesAll right that most resemble the social environment where most human psychology seems to have evolved: small bands of nomadic foragers.

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The cross-culture studies of forager groups that exist tend to have a very in-depth focus on a particular aspect of forager society and lack a “bird's eye view” of how these societies operate on multiple levels (Jaeggi & Gurven 2013; Curry, Mullins, & Whitehouse 2019; Glowacki & Lew-Levy 2022).

This short paper provides a view that emphasizes breadth over depth, with a particular emphasis on early work on these societies, to show how early foragers might’ve lived in a wide variety of dimensions. Using an existing dataset aggregated from diverse ethnographies, we collect statistics on the social environment of the studied cultures which most closely resemble our hunter-gatherer ancestors.

Compared with relatively modern societies, nomadic foragers had similar levels of food and disease, and less murder and suicide. They did not fight over land or resources, and they enforced justice directly and personally. They avoided class divisions like rich vs. poor, shared food more, and their leaders had no formal powers.

Polygamy, premarital sex, and extramarital sex were all widespread, divorce was easy, and men and women were generally considered equal, with some important exceptions. Kids were taught to be more generous, trusting, and honest, and were never punished physically.

Criteria

We draw from an aggregated dataset, the Standard Cross-Cultural Codes (SCCC), composed of over 2,000 variables covering 186 societies from around the globe. Each variable originates from one of several dozen studies that were compiled and edited by Douglas R. White, Michael Burton, William Divale, Patrick Gray, Andrey Korotayev, and Daria Khalturina.

Ideally we would prefer a database on dozens of societies that perfectly preserved the social environment of our distant hunter-gatherers ancestors. Alas, this is not possible. Even relatively isolated societies are in substantial contact with more modern societies, and we cannot exclude the possibility that their ancestors were once refugees from such societies. Furthermore, the marginal places where such isolated folks now reside are clearly not representative of the places our distant ancestors lived; such folks can now only live in places for which modern societies have little use.

As a substitute, we have constructed a subsample of the 186 SCCC societies, a subsample of the societies with the fewest “deviations” from our best guess about the lives of our distant nomadic forager ancestors. Most of our deviation criteria deal

with a society's level of technological advancement, though other variables, including diet and mobility, were also considered.

To construct our sample of civilizations, we first remove all societies that do not get 80% or more of their food from hunting or gathering (v858: coding three or more). We drew "subsistence type" from D. White (1984), after Karen and Jeffrey Paige (l981), excluding societies which engaged in farming, herding, fishing, and so forth as these are methods of food collection that often or always require living in a single location. This left 19 societies of varying closeness to our ideal hunter-gatherers of our distant past.

While our hunter-gatherer ancestors are long gone, we can broadly infer what their lifestyle was like based on common sense. For example, using sails to power watercraft would require textile technology that ancient humans would not have had; land inheritance and fixed settlements would be meaningless to any group that is constantly traveling; the presence of credit markets and currency demonstrate a level of institutional sophistication beyond that of our ancestors. We necessarily had to make assumptions and so we favored strictness whenever feasible; for example, while pack animals could in theory be done by hunter-gatherers, it is usually associated with a more stationary setting.

We used 18 criteria to determine which societies to remove from the dataset. While these are not the only variables applicable to determining which societies most closely resembled hunter-gatherers, these variables represent an appropriate cross-section of the relevant possible information. Each criteria entry below describes the title of the variable, the number of the variable (as defined by the SCCC), the variable values that indicated unfitness for the study, and a brief description of those eliminated values:

1. Import Food Acquisition (v2: three or more), getting food from local market or better
2. Land Transport (v13: two or more), using pack animals or better
3. Water Transport (v15: five or more), using a sail powered craft or better
4. Money (v17: four or more), foreign or domestic money
5. Credit Source (v18: three or more), external money lending specialists
6. Fixity of Settlement (v61: two or more), fixed at any point
7. Large or impressive structures (v66: two or more), any such structures
8. Political autonomy (v81: three or less), tribute paid to a larger society (such as a modern state) or more dependent (i.e. integrated)
9. Level of sovereignty (v83: two or more), any "state" at all

10. Technological specialization (v153: two or more), pottery or more advanced
11. Animal husbandry (v244: two or more), any sort of animal husbandry
12. Subsistence economy (v246: four or more), pastoral or more advanced
13. Inheritance of land property (v278: two or more), any inheritance of this property
14. Taxes paid to community (v784: two or less), any taxes in any form
15. Trade and markets (v1007: four or more), a marketplace or anything more established
16. Labor (v1009, five or more), migrant wage labor or more advanced
17. Population density (v1130, four), 5 people per square mile or more
18. Sources of wealth (v1722, two-five, or eight), wealth from land or cattle

In table 1, groups that met a criterion for inclusions were made blank and groups for which there was no data for a criterion are indicated with a question mark but treated as blank. This is to retain as large a sample size as reasonably possible. To make the uncertainty explicit, an additional value treats any uncertainty as a deviation.

Modern Comparisons

Some variables deserve some context since they are based on the opinion of the ethnographer. To better understand the differences between the hunter-gatherer world and the world of modern society, we consider a handful of more recent civilizations. (There are no societies very similar to our own included in these studies, and the most recent year of focus is 1965.)

Each of these modern societies have either motorized water or land transport; a medium of exchange; permanent settlement; some sort of large or impressive structures; smiths, weavers, and potters; a population density of at least 100 people per square mile[1] and a total population of at least one million people. They are (with the year of focus) Uttar Pradesh (1945), Balinese (1958), Japanese (1950), Siamese (1955), Chinese (1936), Javanese (1954), Turks (1950), and Russians (1955).

[1] Technically the United States has a population density of less than this, though this includes large unpopulated areas of the deserts in the west and the tundra of Alaska. For similar reasons, Canada, Turkey, and Australia have low population densities though they contain high population areas. Bearing this in mind, both the Turks and Russians stayed in the modern sample though they failed the density test.

Table 1: Deviation from Ideal Sample

Society	Import Food Acq.	Land transport	Water transport	Money	Credit source	Fixity of settlement	Large structures	Political autonomy	Level of sovereignty	Technological spec.	Animal husbandry	Subsistence economy	Inheritance of land prop.	Taxes paid to comm.	Trade and markets	Labor	Population density	Sources of wealth	Total Deviations	Deviations + Uncertainty
Andamanese	?					X				X		X			?	?			3	5
Aranda	?														?	?			0	3
Aweikoma	?							X		X					?	?			2	5
Botocudo	?														?	?		?	0	4
Copper Eskimo	?	X				X				X								?	3	5
Hadza	?														?	?		?	0	4
Kung Bushmen	?															X			1	2
Lengua	?	X								X					?	?		?	2	6
Mbuti																			0	0
Micmac	X					X							?		?	?		?	2	6
Montagnais	X					X							X		?	?			3	5
Paiute (North.)	?					X										X		?	2	4
Pomo (Eastern)						X	X								?	?			2	4
Semang					X										?	?			1	3
Shavante	?					X								X					2	3
Siriono	?					X				X					?	?			2	5
Slave	X	X	X	X	X	X									?	?		?	6	9
Tiwi																			0	0
Vedda				X		X				X			X		?	?			4	6

Table 1: Deviation from Ideal Sample

Weak and Strong Foragers

To find good exemplars of forager societies, all societies with more than one "modern trait" were excluded. This brings the total sample to seven (parenthetical notes indication the year of focus): Aranda (1896), Botocudo (1884), Hadza (1930), Kung Bushmen (1950), Mbuti (1950), Semang (1925), and Tiwi (1929). These groups form the "weak" forager dataset.

It is possible that the small amount of "give" allowed in the constraints taints the sample in some significant but unforeseen way. Since a sample with an even higher standard of similarity with hunter-gatherers is still notably large at five (with zero total deviations instead of one or less), we construct general information about these groups in pursuit of forming a more accurate (if more limited) picture. This "strict" forager dataset—groups with no modern indicators—total five: Aranda, Botocudo,

Hadza, Mbuti, and Tiwi. When discussing results we describe this strict sample, unless data is insufficient to provide an accurate picture. In conclusion for the weak and strict conflict, we focus on the strict sample but mention the weak sample in case the difference is due to a smaller sample size.

Parenthetical citations indicate the variable number (which begins with a “v”) followed by the number of observations and if the data set is from the weak (w), strict (s), or modern (m) sample. For example, “v1719 N=5w” indicates that the information came from variable 1719, with five observations from the weak dataset. We mention modern samples only when we feel as though an explicit point of comparison is important to understanding the data.

Strict Foragers at a Glance

Before diving into the data, it is a good idea to briefly review the groups with zero deviations from the hunter-gatherers we seek to understand. The five groups are spread throughout the world: one located in Brazil, two in Africa, and two in Australia. With the exception of the Aranda in central Australia, the groups live in a tropical climate with an average of 1,334 mm of rain a year (1,122 mm if you include the Aranda) and average annual temperature of all societies is 23.2 C (73.8 F) (v189 N=5s, v188 N=5s). The size of the local community can be as large as 100 people but is generally between 10 and 50 individuals (v1756 N=3s). Population density is about 1 person per 1-5 square miles with the Botocudo having less than one person per five square miles (v64 N=5s).

The Aranda (sometimes referred to as the Arrernte or the Arunta) lived in the highland deserts of central Australia, ranging from the Macumba River to the Davenport Range. The local flora was mostly small trees and shrubs; the fauna ranged from kangaroos to a large variety of birds (including emus, ducks, and brush turkeys). Men hunted the fauna with boomerangs while women gathered local vegetation and small animals including seeds, tubers, rats, lizards, birds, and grubs. The Aranda were highly mobile and wandered the desert within an ancestral territory, each belonging to one of five tribes. The land was considered fixed—no Aranda tribe had ever attempted to take the territory of another Aranda tribe. There were no chiefs, but there were elders who oversaw ceremonies (Spencer and Gillen 1899).

The Botocudo lived in the forests of eastern Brazil, hunting and foraging for food. They lived in hovels about four feet high and constructed of branches stuck to the ground. They were completely nomadic and roamed the forest in bands of ten to

twenty families. They ate roots, berries, frogs, lizards, honey, snakes, and larger game which they hunted with bows and arrows. They also made canoes by burning out the inside of a tree. There's much evidence to suggest that they were cannibals and used the heads of their devoured victims for targeting practice (Keane 1884). Blood feuds, not only between tribes but within them, were common and were primarily motivated by revenge for previous acts of violence. No one would remember the original cause for the feud. They choose their leader based on his supernatural power (Nimuendajú 1946).

The Hadza live in the savanna of northern Tanzania and number about 300-400. Men hunt local game and collect honey while women collect tubers, berries, and fruit. They organize themselves into bands of about twenty-five individuals, though mobility between bands is quite high. This high mobility is partially due to the fact that men and women are free to choose their own mates and so men will travel from band to band until a woman reciprocates his interest in her and he stays. Successful hunters have an easier time attracting a mate and in some cases, have more than one wife. However, this success at hunting does not translate into status within the band as a whole. Polygamy is rare among the Hadza but only 20% stay married to the same person their whole life. The Hadza rarely marry outside of their ethnic group and they tend to know everyone in their mating pool before they select a mate (Marlowe 2004).

The Mbuti live in the Ituri Forest of the Democratic Republic of Congo and number 20,000 to 40,000. Ethnologists divide them into two main groups, based on their form of hunting: with bows and arrows and with nets. They regularly trade with the *bakbala*, or local agriculturalists who provide them with tobacco, grown foods, and limited manufactured items in exchange for forest products. This relationship has been maintained for "many years" according to the 1978 source and it is unknown if it overlaps with our year of focus of 1950. The trading, however, is irregular and the Mbuti are able to avoid the *bakbala*'s attempts at control by constantly changing their allegiances. From Hart 1978, page 331:

> *They cleverly alternate trade with begging; gifts with thievery; wage labor with demands made on religious grounds. The bakbala cannot know where the Mbuti's allegiance stands, or keep track of what they owe to whom. In this confused state of flux, the Mbuti preserve their independence, but continue to derive material advantages from the village.*

While it is unclear how dependent the Mbuti are on the *bakbala*, there is little controversy that the Mbuti would continue to thrive if their trading would cease (Hart 1978). Exactly how much these trading relations taint our sample is unknown, but it appears that the Mbuti use the trade goods to simply make their life a little easier and have not significantly shifted their lifestyle. This is captured in that the Mbuti unquestionably fulfill all our requirements (unquestionable in the sense that they had no missing data points for the criteria variables).

Table 2: Food

Variable	*Variable Number*	*Weak Forager*			*Strict Forager*			*Modern*		
		Mean	*Median*	*N*	*Mean*	*Median*	*N*	*Mean*	*Median*	*N*
Supply	678	1.60	1	5	1.67	1	3	1.40	1	5
Famine (occurrence)	1265	2.60	2	5	2.33	2	3	2.86	3	7
Famine (severity)	1267	2.67	3	3	2.50	2.5	2	3.00	4	3
Famine (recurrence)	1269	1.67	2	3	1.50	1.5	2	2.60	3	5

678: 1-constant, 4-starvation; 1265, 1267: 1-very low, 4-very high; 1269: 1-low, 3-high; if N is even, median is average of two middle values

The Tiwi occupy the Melville and Bathurst Islands of Northern Australia. Numbering just over 1,000 individuals during the year of focus, they are separated into nine factions. During the year of focus, missionaries from a local Catholic mission encouraged the Tiwi to adopt monogamy. Failure to comply meant an end to European goods, including foods, clothes, and tobacco. These pressures, however, were countered by Japanese pearl-hunters. The sailors, desiring prostitutes, would trade European goods to bed a local woman. While multiple wives unset the flow of goods from missionaries, it emboldened them from sailors (assuming he was willing to rent them out, a practice forbidden by Tiwi custom; Hart 1954). This was the main political issue of the day among the Tiwi and we mention it here to underline that the trading and political tension does not fundamentally taint our sample. Like the Mbuti, the Tiwi unambiguously fulfill all out requirements for being in the strict forager sample.

Food, Health, and Property

Food supplies are generally constant—though the Aranda encounter periodic or chronic hunger— (v678 N=3s) and “seldom” (occurrence uncommon) variations in food supply (v1719 N=3s). Occurrence of short-term starvations range from low to

high, though it leans to the low end (v1262 N=4s). Occurrence of seasonal starvation is either very low or moderate (v1263 N=4s). Occurrence of famine ranges from very low to very high, favoring the lower end (v1265 N=3s). When famine occurs, it is either very low or very high in intensity (v1267 N=3w), favoring the high end. It's worth noting that the society with the most famine problems—the Aranda—also has by far the lowest annual precipitation: 275 mm or 1.7 standard deviations below the mean. This is also the society which experiences chronic or periodic hunger.

Land shortages (v1720 N=4w) do not occur save in one case which was due to invasion. There is no class stratification (v270 N=5s) nor slavery (v274 N=5s). Most of the time, private property is present (v704 N=3s). Most societies have no rich though one has a few (v1721 N=3s), and they derive their wealth from means of production other than cattle or land (v1722 N=3s). No society has any poor or dispossessed people (v1723 N=3s, v1724 N=3s). All land has communal rights only (v1726 N=3s). Societies either have no marketplace or a market only for bulk goods (v1007 N=2s).

Sharing of food is always common, occurring within the local community or within the ethnic group (v1718 N=3s), though the kin groups rarely exists outside of the local community (v1755 N=2s; v1755 N=4w).

Average pathogen stress is the combined intensity of seven different diseases (leishmaniasis, trypanosomes, malaria, schistosomes, filariae, spirochetes, and leprosy), ranging from 7 (none of the diseases are present) to 21 (all of them not only present, but serious). Foragers have a median stress level of 16 compared to 14 for modern societies (v1260 N=5s, N=8m).

Crime and Violence

By individuals, homicide rates (v1665 N=4w), trespass rates (v1668 N=2w), and suicide rates (v1669 N=2w) are low while assault rates (v1666 N=4w) and theft rates (v1667 N=3w), range from very high to very low (though both favor the lower rates). By groups, homicide (v1675 N=3w) rates remain the same as for individuals. Assault (v1676 N=4s), theft (v1677 N=4s), and trespass (v1678 N=4s) rates by groups are quite variable, with very high rates showing up with notable frequency. Trespass by group increases, homicide by group remains the same, theft by group increases, and assault by group remains the same, compared to crimes by individuals.

Table 3: Crime

Variable		*Variable Number*	*Weak Forager*			*Strict Forager*			*Modern*		
			Mean	*Median*	*N*	*Mean*	*Median*	*N*	*Mean*	*Median*	*N*
Individual	Homicide	1665	1.00	1	4	1.00	1	2	4.25	3.5	4
	Assault	1666	4.00	3	4	7.00	7	2	5.40	5	5
	Theft	1667	3.67	1	3	9.00	9	1	4.60	5	5
	Trespass	1668	1.00	1	2	1.00	1	1	4.00	4	2
	Suicide	1669	1.00	1	2	1.00	1	1	4.00	4	4
Group	Homicide	1675	1.00	1	3	1.00	1	1	—	—	0
	Assault	1676	5.17	6.5	6	7.25	8	4	7.25	8	4
	Theft	1677	5.67	8	6	8.00	8	4	7.75	8	4
	Trespass	1678	5.20	8	5	6.25	8	4	8.00	8	3

1665-1678: 1-low, 9-high; if N is even, median is average of two middle values

When violence occurs, resource acquisition is never a motive for it (v1727 N=3w) while in modern societies, it's a motive for violent conflict (v1727 N=2m). Revenge can be forbidden, prescribed, or neither forbidden nor prescribed, but when it is prescribed, compensation is never seen as an equal substitute (v1774 N=3s). In all societies, the person wronged is the person who punishes the guilty: it is never a third party (v700 N=3s). People will usually change communities if there's a substantial dispute (v785 N=2w).

The data sources disagree about how common warfare is compared to modern societies. While foragers tend to have less conflict between communities of the same ethnic group (internal warfare) compared to modern societies (the one exception to this has only one observation for the modern sample), the frequency of external warfare is ambiguous, though the slightly larger sample size of 891-893 suggests that more weight should be placed on it, shifting in favor of slightly more external warfare (conflict with other societies). The casualty rate in conflicts is always low compared to modern societies (v901 N=3w N=4m), consistently suffering less than 30% casualties. Though they might fight more often compared to modern societies, not as many suffer from death or injury.

Courage in boys is either strongly emphasized or not emphasized (never moderately emphasized) (v1765 N=2s). For modern societies it is moderately emphasized (v1765 N=1m). If a society has warriors, they enjoy either no prestige or a high level of prestige, favoring the latter which is the same story in modern societies (v1773 N=3s N=3m). Ritual warfare is absent in all of the observed groups as it is in modern societies (v573 N=3s N=1m). Societies are either judged as being

unpacified or pacified within the last 25 years of the study, but never partially pacified while modern societies are all unpacified (v1654 N=3s N=7m). In external warfare, the defeated are sometimes driven from their territory though the victors don't use their territory. (v1656 N=2s). Modern societies usually use the conquered territory (v1654 N=3m).

Table 4: Warfare

Variable	*Variable Number*	*Weak Forager*			*Strict Forager*			*Modern*		
		Mean	*Median*	*N*	*Mean*	*Median*	*N*	*Mean*	*Median*	*N*
Frequency (Overall)	679	1.20	1	5	1.33	1	3	1.20	1	5
Frequency (Internal)	773	3.00	3.5	4	2.50	2.5	2	4.00	4	1
Frequency (External)	774	4.00	4	4	4.00	4	2	4.00	4	1
Frequency (Internal)	891	2.40	3	5	2.25	2.5	4	2.63	3	8
Frequency (External, Defense)	892	2.80	3	5	2.75	3	4	2.14	2	7
Frequency (External, Offense)	893	2.67	3	6	2.60	3	5	2.25	2.5	8
Frequency (Overall)	1648	6.00	1	5	9.33	12	3	12.33	17	6
Frequency (Internal)	1649	5.60	1	5	8.67	11	3	10.14	15	7
Frequency (External)	1650	2.00	1	4	3.00	3	2	12.00	17	6
Casualty Rate	901	2.00	2	3	2.00	2	2	1.00	1	4
Prestige in being a warrior	903	2.00	2	4	1.67	1	3	1.75	2	8

679: 1-absent/occasional/periodic, 2-frequent/endemic; 773-774: 1-Frequent (at least yearly), 4-Rare/never; 891-893: 1-low, 3-high; 901: 1-high, 2-low; 903: 1-high 3-none; 1648-1650: 1-absent, 17-constant (for 1648, 18 is the highest, not 17); if N is even, median is average of two middle values

Intra-ethnic violence ranges from being permanent to being rare while it is slightly less common in modern societies (v1776 N=3s N=4m). Violence towards individuals in the same community or ethnic group is either accepted or rejected but never encouraged, similar to modern societies (v1768 N=2s N=3m, v1769 N=2s). Most societies have no intra-ethnic violence and where it occurs has a highly ritualized regimentation; modern societies have either no such violence or no regimentation for such violence (v1775 N=4w N=2m). The intensity of the violence is always low, if

it occurs at all (v1777 N=3s) and its frequency is rare or occasional, never permanent nor often (v1778 N=2s). Modern societies share a similar level of low frequency and low intensity violence in this area (v1777 N=3, v1778 N=3).

Loyalty to the ethnic group is always moderate while modern societies favor low rates of loyalty (v1771 N=3s N=4m). Hostility to other ethnic groups is usually negligible, though in one society it is extremely high; it's moderate in the modern era (v1772 N=3s N=1m). For hunter gatherers, violence to those outside the ethnic group is rejected (no data available for modern societies) (v1770 N=1s).

Politics

In all forager societies, there is no executive (v85 N=5s), judiciary (v89 N=5s), police (v90 N=5s), or administrative hierarchy (v91 N=5s). No leader gains power through wealth distribution (v574 N=2s).

There is no modern political organization—family heads acknowledge no higher authority (v699 N=3s). Oddly, the ethnographer describes full-time bureaucrats who are unrelated to the government head as "always present" (v701 N=3s). People see their leader's power as somewhat or limited (v759 N=2s) and their leaders as either benevolent or neither benevolent nor malevolent (v760 N=2s). Leaders carefully cultivate support before acting (v761 N=2s) and none have a formal leadership position; power disappears when support diminishes (v762 N=2s).

Family

Families are always polygamous though slightly more than half of the societies have mild amounts of polygamy (v67 N=5s; v79 N=5s). Polygamy is almost always socially preferred; in one case polygamy is rare, in two cases polygamy is socially preferred for men with leadership attributes, and in two cases it is socially preferred for all men (v860 N=5s). Co-wives either share a living space with each other (three societies) or one lives with the husband while the rest lives in different communities (two societies); there is not a "middle ground" of the other wives living away from the husband but in homes in the same community (v863 N=5s). The husband never has a room apart from a wife or wives (v865 N=5s). Most societies have no stratified polygamy, meaning the rates of polygamy changed based on the social standing of the husband, though two have higher rates of polygamy in a hereditary higher social class (v866 N=5s). This seems to conflict with our claim of no class stratification (v270 N=5s), but it is not clear from the ethnography if the social class is an explicit

stratification or if it is assumed from the fact that informal leaders tend to have many wives and tend to have sons who grow up to have many wives. Both societies with “stratified polygamy” witness leaders having more wives than “commoners” (along with one other society that didn’t have stratified polygamy) which makes the informal stratification the most likely explanation given the evidence that informal rule appears to be the norm.

Two societies have multiple wives for skilled hunters while the others see no relation between hunting skill and number of wives (v867 N=5s). Most households are made up of a single family though in one group the households are made up of a married pair (v67 N=5s). On average, 35% of men have more than one wife, though the standard deviation is 29.7 (v871 N=5s). On average, 49.4% of women are in a polygamous marriage, and again the standard deviation is high at 36.38 (v872 N=5s). In modern societies, 3% of men have more than one wife and 7% of women are in a polygamous marriage (v871, v872 N=7m). The standard deviation is also high (6.5 and 12.7, respectively), mostly due to the Balinese who have 18% and 35%.

Females are expected to have premarital sex (v165 N=2s). Both males (v165 N=2s) and females (v166 N=3s) have premarital sex save in one group where female premarital sex is uncommon. Extramarital sex generally employs a double standard where it is acceptable for men but not for women save in one group (the Hadza) where it is acceptable for both (v169 N=4). Extramarital sex among men is either universally or moderately practiced (v170 N=2s). Among women, it is universally practiced (v171 N=1s). Wifesharing does not occur except in one society where it is only used for sexual gratification (as opposed to economic benefit) (v172 N=3s). Rape is acceptable or ignored—the code does not distinguish which occurs (v173 N=1s). Again, this is for the Hadza, the one society where extramarital sex is allowed for both sexes. Unsurprisingly, rape occurs frequently among the Hadza, while in another society it is absent (v174 N=2s). No data on this subject is available for modern societies.

Post-partum sex taboo continues to range from just under two years to a month or less, with data slightly favoring the latter (v34 N=3s). Non-maternal relations for infants generally includes the mother as the primary caregiver (but is never exclusive) and in one case, she plays a small (but significant) role (v51 N=5s). In early childhood, her role is almost always the primary role and is never small (v52 N=5s). Infants principally spend time with other adult females, though in one case it is equally shared with both sexes (v56 N=4s). In childhood children spend time with other children, usually from both sexes though in one group the children spend time

with the same sex (v56 N=3s). Neither males nor females need any grounds for divorce (v745 N=4w; v746 N=3w). Wife-beating is always present (v754 N=2s).

Children Rearing and Values

Trust is strongly encouraged in children, more so than in modern societies (v1761 N=1s N=1m, v335 N=2s N=8m), and sharing is more encouraged than in modern societies, though the Aranda rarely encourages sharing (v1762 N=3s N=2m, v334 N=2s N=8m). Data on honesty is mixed, but the larger dataset suggests that hunter-gatherers encourage more honesty in their children compared to modern societies (v1763 N=1s N=2m, v336 N=2s N=8m). Caretakers have the highest measure of affection for their children while modern societies possess a slightly lower value (v492 N=3w N=7m). Children are never punished physically while in modern societies they are physically punished in half the observations (v1766 N=3s N=4m).

Table 5: Honesty, Trust, Generosity, and Love

Variable	*Variable Number*	*Weak Forager*			*Strict Forager*			*Modern*		
		Mean	*Median*	*N*	*Mean*	*Median*	*N*	*Mean*	*Median*	*N*
Generosity	334	7.33	8	3	7.00	7	2	4.43	5	8
Trust	335	7.33	9	3	6.50	6.5	2	2.88	3	8
Honesty	336	7.33	8	3	6.00	6	2	2.88	3	8
Trust	1761	3.00	3	2	3.00	3	1	1.00	1	1
Sharing	1762	2.50	2.5	4	2.67	3	3	2.00	2	2
Honesty	1763	3.00	3	2	2.00	2	1	2.50	2.5	2
Love for Children	492	8.00	8	3	8.00	8	1	6.71	7	7

334-336: 0-no inclination, 10-extremely strong inclination; 1761-1762: 1-rarely encouraged, 3-strongly encouraged; 1763:1-not encouraged, 4-strongly encouraged; 492: 1-never, 8-almost always; if N is even, median is average of two middle values

Infants sleep with either the mother and the father together or with the entire family and never with just one of the family members (v1710 N=3w). Adolescents sleep in a different dwelling entirely (v1711 N=2s).

All societies have an equal preference for boys and girls (v616 N=3s). There is no evidence of infanticide which “favors” one sex or the other (v617 N=3w). Most societies have no belief that women are inferior to men (v626 N=3s) and women always have a moderate degree of control over property (v628 N=3s) and usually control products of their own making (v660 N=3s). Similar to modern societies,

hunter-gatherers put a medium to high value on a woman's life (v630 N=3s N=4m) and a high to higher-medium value on her labor (v631 N=3s N=4m).[2] Women have a high to a medium-high level of authority on domestic matters in both eras (v632 N=3s N=4m). The sex ratio is usually equal though one hunter-gatherer society has more males than females (v714 N=3s N=4m).

Attitudes concerning talking about sex are generally open: adults will talk about it openly with children or restrict such talk to a certain group of people (v159 N=2w). In modern societies, this is much more restrained with more than half (three out of five) of the sample never talking about sex, ever (v159 N=5m).

Just 20% of hunter-gatherer societies believe in the evil eye, compared to 37.5% in modern societies (v1189 N=5s N=8m).

Other

Gossip ranges from being moderately to very important (v1805 N=3s). When present, it averages 3.60 for hunter-gatherers (from one to five, five being very important). For modern societies, it averages 3.86 (v1805 N=7m).

It is common for an adult to travel between communities during his/her lifetime while it is occasional in modern societies (v786 N=2s N=1m).

Change across all variables (agricultural, religious, family, education, behavior, health, technological, trade, transportation) averaged 18.00, compared to 14.38 for the modern sample (v1849 N=3s N=8m). This is an important reminder that despite our best efforts to identify exemplars of authentic hunter-gatherer societies, our data are far from ideal.

Conclusion

Using data compiled in the Standard Cross-Cultural Codes, we've compiled some wide-ranging best guesses about the lives of our nomadic forager distant ancestors.

Such foragers have neither formal class stratification nor slavery. While private property is usually present, most forager societies have no rich, and none have any poor or dispossessed. Food sharing is always common.

Compared to the most "modern" societies in the larger sample (which are different from us today), disease stress is similar, suicide and murder are rare,

[2] Unfortunately the SCCC does not have a variable about the value of a man's life and labor. However, given the other variables, especially the lack of belief that men are inherently superior to women, it is likely that these values on a woman's life and labor would be on par to a man's.

conflict casualty rates are lower, and fewer believe in an evil eye. Violence is never over resources, and when enemies are driven from a territory no one uses that territory.

A person wronged always directly punishes the guilty; they never use a third party. If there is a substantial dispute, one side will likely leave the community. Leaders carefully cultivate support before acting, and none have a formal leadership position.

Polygamy is always allowed and usually socially preferred. Co-wives either live together or one lives with a husband while the rest live in entirely different bands. On average, about 35% of men have more than one wife, and 50% of women are in a polygamous marriage (vs. 3% and 7% in modern societies).

People are expected to have premarital sex, which is usually common. Extramarital sex is also usually common, though it is usually not acceptable for women. Adults talk about sex openly. While wife-beating exists, divorce is easy. Boys and girls are equally preferred, and women are considered equals of men.

Mothers are usually the main, but not only caregiver of kids. Relative to modern societies, kids are taught more to be generous, trusting, and honest. Parents place greater emphasis on loving their children, and children are never punished physically. Adolescents sleep away from their parents.

Broadly understanding the forager mindset suggests questions about the interaction between their world and ours. The forager life was complex; how did that influence brain development compared to more modern history? How has the forager life left lingering desires in our modern brains? For example, why do wealthier societies tend to act more like foragers (they are more accepting of divorce, more open about sex, and less comfortable with inequality)? How does the strength of these tendencies differ across socioeconomic levels within wealthier societies? The very different culture of foragers underscores how seismic of a shift the transition to farming was for our ancestors; how do these lingering psychological preferences of foragers versus farmers influence modern political disputes? Even though society has culturally left behind the hunter-gatherer lifestyle, we can’t shake its psychological shadow and we would be wise to understand that lifestyle as fully as possible.

Gardener Comments

Note: the authors have responded to comments in the subsequent section.

Anonymous1:
I would be interested to know a bit more about sleep habits in nomadic populations. Do you have any further facts on that, such as how many hours they slept, do they practice naps and whether they sleep less when moving from place to place?

Pierre R. Mercuriali:
To better understand the evolution of psychology, the authors study similar social environments. Human psychology seems to have evolved from hunter-gatherers societies. The anthropological features of ancient hunter-gatherer societies are not all known, e.g., first-hand observational data. Amongst all features some are known and some are unknown. How, then, to infer unknown features? If I have understood correctly, the authors set out to determine unknown ancient features by using shared known features of contemporary societies. They compute, for each known contemporary society, the deviation from an unknown "ideal" hunter-gatherer society, thereby giving an order on all societies.They make the assumption that societies that are closest share similar features, and thus infer ancient, unknown features, from the (observed) societies that are the closest according to this deviation.

I think this is a swell article, with the data collection clearly explained. The question and methods are interesting and could be extended to answer other questions. It also functions as a reference, because the variables and data points used are clear and explicitly mentioned.

Questions/remarks on content:

C1. I would have liked a discussion on the assumption I explained above (to know if I have understood the process right)! In the same vein, I would have liked a conclusion on the evolution of psychology. What can be inferred from the anthropological reconstitution of these hunter-gatherer societies?

C2. I could imagine generalizing the idea of "deviation" into a "distance" (in the mathematical sense) between societies. That way one could answer fun questions

such as: "what societies are the closest?" Also, could this deviation distance process be performed with any other kind of society (not just hunter-gatherer societies)?

C3. Could this distance be generalized to include explicit weights? For example, societies with more than one modern trait were excluded: one could argue that the "weight", when computing the deviation between societies, would be +infinity, thus giving an infinite deviation.

C4. Are all the missing anthropological variables that were inferred for the Ideal Sample described in the paper? If not, what motivated the choice of the ones that were described? Where to find the others?

C5. I really liked the contextual information about the authors' first field of interest (economy). I think the connections between economy (frameworks? tools? positions? points of view?) and evolutionary psychology could be further explored.

Because Seeds of Science has freer guidelines regarding submission format and content than the journals I know, I feel this could be an opportunity to add interesting meta-contextual information.

Questions/remarks on form:

F1. The question mark in the Deviation from Ideal Sample table could be replaced with a range: [i to i+n] with n being the number of question marks in the line and i the number of X in the line. This makes the uncertainness explicit.

F2. On the same table, the "society" labels on the first line are difficult to read. I suggest writing them in a slanted manner (45°).

F3. Pages could be numbered (to reference them more easily). Table 0 (deviation) could be numbered. The font used for the titles of the various tables could be harmonized (Table 1 uses a sans-serif font, Table 2, 3... use a serif font).

F4. Page 9, section "Politics", paragraph 2, sentence 2: I can't quite parse the sentence; is there a missing word? If not, disregard my comment.

F5. Page 5, paragraph 5, sentence 2: I think there is a word missing. "Ethnologists divide them into two main groups, based _on_ their form of hunting"

Joe:
Oddly, the summary mentions only neutral or positive comments about the lifestyle of the foragers, while the body of the article has some negatives. It seems odd to say that slavery does not occur and that the sexes are equal while also suggesting that a Tiwi husband might "rent out" his wife. Even if this was in defiance of custom, it being an option at all is suggestive of considerable inequality and a slavery-like system of marriage.

Informal class stratification is still class stratification. I would argue that most stratification is some level of informal. I'm not even sure what would count as "formal" stratification. Caste systems, I guess?

While I encountered some notes of discrepancy, I may be misinterpreting the claims here and I think that overall the conclusions seem clear and accurate given the data. It seems to be a worthwhile addition to the community.

Anonymous2:
It is a good work. However, to me it fits in a conventional journal of sociology or anthropology rather than to SoS. I miss further elaboration in the discussion pointing to what nowadays society could learn from those ancestors or more controversial or novel ideas.

Phil Filippak:
In my opinion, one of the most important things to highlight is that the distinction is primarily between societies of wildly different sizes, not only of different lifestyles. While it may be true that forager societies exhibit more of the beneficial social traits, that may be coming from the fact that there are usually <100 people in that society.

Ted D. Wade (PhD in psychobiology):
There is a lack of comparison to similar research here. As important as the question is, and given how long the cross-cultural databases (their SCCC is not the only such database) have existed, I would expect there to be quite a rich literature on the subject. If the literature exists, then I think the author(s) of this paper would benefit

from at least mentioning it. Perhaps they intend to discuss/contextualize their findings in a separate publication?

Ben Lockwood (Ph.D., Geography; Postdoctoral Researcher):
This research appears to be a summary of a dataset that was published over half a century ago (Murdock and White, 1969). The authors claim that they could find no systematic summaries of the early foraging societies that this dataset characterizes, however many such summaries exist. There is an abundant collection of literature across multiple disciplines that the authors have not examined, and this literature contains a long history of meta-analyses of early foraging societies (Segall et al., 1990; Jankowiak and Fischer, 1992; Gangestad and Simpson, 2000; Wood and Eagly, 2002; Mesoudi et al., 2006; Van Ijzendoorn and Sagi-Schwartz, 2008; Balliet et al., 2011; Minkov, 2012; Kelly, 2013; Alesina et al., 2013; Jaeggi and Gurven, 2013; Curry et al., 2019; Glowacki and Lew-Levy, 2022). The authors have not provided any reasoning for their lack of acknowledgement of the many previous studies which have produced summaries of greater detail and rigor than is present here.

The manuscript, unfortunately, does not provide an adequate justification for how this analysis could advance scientific knowledge. The authors make a variety of wide-sweeping, generalized, and potentially dubious claims about early foraging societies based on a half-century old dataset, of which many studies have already explored. They do not address what gaps in the literature or innovative approaches this study provides. Thus, it is unclear what novel, or even speculative, ideas this paper contributes to the wider scientific community.

As such, I cannot recommend it for publication in its current form. I would suggest that the authors return to the literature around these topics to determine what previous investigations may lack in order to produce an analysis of value in an area of study that has already been so thoroughly explored.

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Patrick (Master's in anthropology/sociology):
It's an interesting attempt to systematise and compare a range of extant hunter-gatherer societies using various indicators. More stamp-collecting than physics, but useful insights that may help break down noble savage stereotypes, or may reinforce them.

Partha Ghosh:
It's an interesting summary. However, not sure there are many new ideas or promising leads to advance the topic here. I think it could be interesting to look at the larger data, before removing the 18 outlier criteria, for further qualitative insights.

Dr. Payal B. Joshi:
The article is fairly good and some sections that I particularly enjoyed reading were the description on strict foragers and data on warfare. Though there are too many claims made by the authors, it is backed by relatively less cited references. Also, there have been many new papers that are not cited by the authors which reflects that the paper was written a while ago. Thus, with some refreshing literature needs to be cited prior to publishing and avoiding redundancy.

Authors' Response to Gardener Comments

We appreciate the time and effort that you and the gardeners have dedicated to providing thoughtful feedback, and we are grateful to the gardeners for their valuable comments.

- To address clarity concerns with methodology, we added additional information concerning our reasoning for focusing on the groups we did.
- We sympathize with the comments concerning recent work on this issue, and included a brief note justifying the value of our "bird's eye" view of forager life (in contrast to the more focused and in depth approach that's favored in existing cross-culture analyses).
- It was also suggested we describe possible extensions from the paper as well as make our motivation as economists clearer; we agreed and incorporate additional information to reflect that.
- We are also grateful for the gardeners who pointed out some clarity issues in the body of the paper, and presentation deficiencies in the tables, and we made the appropriate changes.
- There were some suggestions that we weren't able to incorporate, such as including information sleep patterns (while we're also curious about how long foragers slept and similar information, variables of that nature weren't available) and a more detailed exploration of the "deviation" to expand to measure how "close" different societies are (an intriguing idea,

but we felt it was beyond the scope of the paper). But it encouraged us to think more deeply about the paper in a way we hadn't before and we appreciate the ideas.

Again, we wish to thank all the gardeners who took valuable time out of their day to provide comments.

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