Supplementary material
Appealing to the minds of gods: A cultural evolutionary account of religious beliefs using ethnographic data from eight diverse societies

Theiss Bendixen[a,*], Coren Apicella[b], Quentin Atkinson[c], Emma Cohen[d,e], Joseph Henrich[f], Rita A. McNamara[g], Ara Norenzayan[h], Aiyana K. Willard[i], Dimitris Xygalatas[j], Benjamin Grant Purzycki[a,*]

[a]*Department of the Study of Religion, Aarhus University, DK*
[b]*Department of Psychology, University of Pennsylvania, USA*
[c]*Department of Psychology, University of Auckland, NZ*
[d]*Institute of Cognitive and Evolutionary Anthropology, University of Oxford, UK*
[e]*Wadham College, University of Oxford, UK*
[f]*Harvard University, USA*
[g]*School of Psychology, Victoria University of Wellington, NZ*
[h]*University of British Columbia, CA*
[i]*Department of Psychology, The University of Texas at Austin, USA*
[j]*Department of Anthropology, University of Connecticut, USA*

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*Corresponding authors
Email addresses: tb@cas.au.dk (Theiss Bendixen), bgpurzycki@cas.au.dk (Benjamin Grant Purzycki)

S1. Introduction

In this Supplementary Document, we present details on: our data processing (Section S2); calculating salience (Section S5); additional ethnographic context of the free-list results for each site (Section S6); and a supplementary plot and tables (Section S7).

S2. Notes on Data Processing

We processed our data according to the steps illustrated in Figure S1. After free-list data were collected, translated and entered into spreadsheets, all data were compiled and checked for general errors by B.G.P.[1] After this, two research assistants who were not privy to the theoretical motivations of the greater study or the current data independently coded all of the free-list data according to the general rubric detailed in the main text (Purzycki and McNamara, 2016). As some items were culturally specific (e.g., "Sang Salyr" or "nuhunu") or ambiguous (e.g., "flowers" or "milk"), we consulted with the relevant field researchers to clarify the context of listed items (e.g., when foodstuffs refer to ritual offerings instead of food taboos).

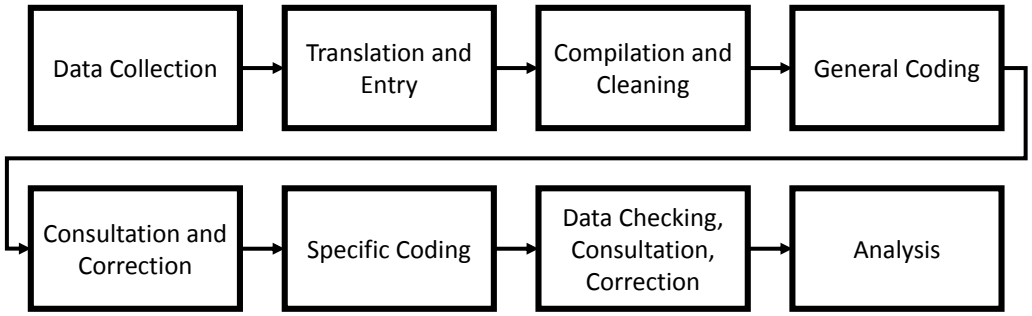

Figure S1: **Main steps in free-list data processing.**

[1]Note that any of the ID numbers in the `CERCID` column with the "BGP" prefix are individuals who have no corresponding data from the main study.

After these consultations, our assistants updated their codes. Upon completion, we compared general codes in order to obtain reliability estimates for the coding scheme. Table S1 details the proportion of agreements across each domain for the general codes; inter-coder reliability across domains was quite high ranging between 69 and 99% agreement between the original two coders. To resolve disagreements, B.G.P. subsequently selected which of the two seemed closer to the coding scheme. In the cases of items coded as Specific, he subsequently recoded them after consulting with field researchers or the ethnographic record, which meant occasionally over-ruling the coders; Table S2 tabulates these instances. At this point, our assistants were familiar enough with the data and software and could then focus their efforts on systematically coding the data according in whichever manner they saw fit. We refer to these as our "specific codes".

Field Site	BGL	BGD	LGL	LGD	POL	POD
Coastal Tanna	0.98	0.98	0.96	0.96	0.69	0.89
Hadza	0.98	1.00	1.00	0.99	0.94	0.96
Inland Tanna	0.99	0.95	0.98	0.85	0.93	0.91
Lovu Fiji	**0.73**	**0.65**	–	–	0.83	0.78
Marajo	0.93	0.98	0.93	0.93	0.80	0.85
Mauritius	0.93	0.89	0.79	0.89	0.70	0.81
Tyva Republic	0.96	0.99	0.91	0.94	0.78	0.80
Yasawa Fiji	0.96	0.97	0.94	0.96	0.77	0.73

Table S1: **Proportion of agreement between coders.** Note that the Lovu values for BGL and BGD include data from an external third coder. NAs excluded.

Field Site	BGL	BGD	LGL	LGD	POL	POD
Coastal Tanna	0/92	0/128	0/51	0/48	0/105	0/150
Hadza	1/91	0/98	0/63	0/76	0/81	0/89
Inland Tanna	2/119	1/129	0/128	0/98	1/95	0/146
Lovu Fiji	0/219	0/220	–	–	0/243	0/254
Marajo	0/186	0/198	0/105	0/91	0/141	0/155
Mauritius	11/273	0/169	1/123	1/76	0/255	0/286
Tyva Republic	1/190	0/196	19/175	1/162	0/295	0/271
Yasawa Fiji	0/329	0/317	9/231	26/226	0/525	0/520
Total	15/1514	1/1455	29/876	28/777	1/1740	0/1871

Table S2: **Disagreements between BGP and coders.** Counts of disagreements against total number of codes per domain. NAs excluded.

A few years after data underwent this process of cleaning and processing, T.B. and B.G.P.

found that some of the BGL and BGD data from Lovu were erroneously pasted from other free-list domains, so that the original assistants coded the same items for different domains (bold in Table S1). B.G.P. tracked down the correct data from the originally submitted data sheets and contacted the original coders in hopes of correction. In the meantime, an external individual coded this missing data (reported in Table S1). Both of the original assistants eventually recoded the data but agreement was notably much lower for these items than the others in the set (BGL: 0.42 and BGD: 0.63). This is likely due to a combination of time and timing. We therefore opted for the data that includes the external coder's data for Lovu to select where there was higher agreement. In this case, all other coded data is from one original coder, but it has the third coder's data for BGL and BGD for Lovu[2].

As specific codes were left up to the individual coders, we report the specific codes from one (NC) who developed the most specific coding scheme. During data preparation and analysis, T.B. and B.G.P. noticed that specific codings were missing for Lovu and parts of the Mauritius sample. T.B. coded these missing data points using the existing code categories of one (NC) of the original coders' specific codes. These are stored in columns named `[domain]_SPEC_TB`, which are otherwise duplicates of NC's specific codes. Further, since the specific codes were by definition coder-specific, there were also some intra-coder inconsistencies, such as coding or spelling semantically-similar items differently. T.B. first cleaned (i.e., corrected typos, removed blank spaces, etc.) the specific codings (stored in `[domain]_SPEC_TB_c` columns) and, subsequently, lumped semantically-similar items (stored in `[domain]_SPEC_TB_cl` columns), erring on the side of preserving the original codes in borderline cases (e.g., codes for "No stealing" were drawn from variously coded items such as "No stealing – Burglers", "No stealing – Robbery", "No Stealing – Thieves").

S3. Notes on Hadza Data

Among the Hadza, there was some ambiguity as to whether our two focal deities—Haine and Ishoko—are actually distinct entities. In the analysis reported in the main paper, in cases where participants said that Haine and Ishoko are the same, the free-list data from Haine was duplicated to Ishoko, a decision made by the local field research team. Our coders nevertheless coded this data as though they were different. To assess how this decision impacts the results, Figures S3 and S4 plot the salience of the general codes separately for those Hadza participants who said that Ishoko and Haine are "different" or the "same" (according to the variable `GDSMDIFF`; see Table S3). (A few participants responded "Don't know" to this question, and we exclude these participants here since they also exclusively responded "Don't know" to the relevant free-list prompts.) While the saliences are not identical across these participants, the results reported in the main paper stand largely unaltered: For Haine, the five most salient codes (BGL: People. Virtue, D/K, Ritual, Morality; BGD: Morality, D/K, Drugs, Ritual, Virtue) are the same across the two groups, and for Ishoko, the two most salient items (LGL: D/K, People) and the five most salient

[2]These data variables are `BGL_AB` and `BGD_AB` in the data set.

items (LGD: Morality, D/K, Ritual, Virtue, Drugs) are also the same. With that said, future research should assess the conceptual relationship between Haine and Ishoko in more detail. For future use of the present dataset, we strongly recommend using the free-list data stored on the main project repository[3], which differs from the dataset used in the present paper[4] only in that the duplicated Hadza data are turned to NAs (as were their subsequent codes).

S4. Data Codebook

Table S3 details the variables in the data set, their definitions, and the kind of data they are. BG refers to "moralistic gods", LG refers to "local gods", and PO refers to police. L or D added to these acronyms refer to "likes" and "dislikes" respectively. NC and TL refer to original coders, AB refers to third external coder of the Lovu BGL and BGD data.

Table S3: **Codebook for Free-List data**.

Variable	Definition	Data
Culture	Name of population	factor
CERCID	ID # linked to other CERC data	factor
FLID	ID # specifically for FL data	factor
POSTRA	Data added/processed after primary RA work?	1 = yes
Order	order in which items were listed	numeric
CULTURE_NC	Name of population (NC data)	factor
CULTURE_TL	Name of population (TL data)	factor
ID_NC	ID (NC data)	factor
ID_TL	ID (TL data)	factor
ORDER_NC	order in which items were listed (NC)	numeric
ORDER_TL	order in which items were listed (TL)	numeric
BGL_ORIG_NC	original moralistic gods' likes data (NC)	factor
BGL_ORIG_TL	original moralistic gods' likes data (TL)	factor
BGL_GEN_NC	NC's general codes (BGL)	factor
BGL_GEN_TL	TL's general codes (BGL)	factor
DIS_BGL_TL	disagreement between NC and TL (BGL)	1 = disagreement
DIS_BGL_AB	disagreement between NC and AB (BGL)	1 = disagreement
BGL	final codes for BGL	factor
DIS_BGL_BGP	BGP disagrees with NC and TL (BGL)	1 = disagreement
BGL_AB	TL's general codes with AB's for Lovu (BGL)	factor
BGL_SPEC_NC	NC's specific codes (BGL)	factor
BGL_SPEC_TL	TL's specific codes (BGL)	factor

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[3] https://github.com/bgpurzycki/Evolution-of-Religion-and-Morality
[4] https://github.com/tbendixen/cross-cultural-free-list-project

Table S3 – *Continued from previous page*

Variable	Definition	Data Type
BGL_SPEC_TB	TB's updates to NC	factor
BGL_SPEC_TB_c	TB's cleaned data	factor
BGL_SPEC_TB_cl	TB's lumped	factor
BGD_ORIG_NC	original moralistic gods' dislikes data (NC)	factor
BGD_ORIG_TL	original moralistic gods' dislikes data (TL)	factor
BGD_GEN_NC	NC's general codes (BGD)	factor
BGD_GEN_TL	TL's general codes (BGD)	factor
DIS_BGD_TL	disagreement between NC and TL (BGD)	1 = disagreement
DIS_BGD_AB	disagreement between NC and AB (BGD)	1 = disagreement
BGD	final codes for BGD	factor
DIS_BGD_BGP	BGP disagrees with NC and TL (BGD)	1 = disagreement
BGD_AB	TL's general codes with AB's for Lovu (BGD)	factor
BGD_SPEC_NC	NC's specific codes (BGD)	factor
BGD_SPEC_TL	TL's specific codes (BGD)	factor
BGD_SPEC_TB	TB's updates to NC	factor
BGD_SPEC_TB_c	TB's cleaned data	factor
BGD_SPEC_TB_cl	TB's lumped	factor
LGL_ORIG_NC	original local gods' likes data (NC)	factor
LGL_ORIG_TL	original local gods' likes data (TL)	factor
LGL_GEN_NC	NC's general codes (LGL)	factor
LGL_GEN_TL	TL's general codes (LGL)	factor
DIS_LGL	disagreement between NC and TL (LGL)	1 = disagreement
LGL	final codes for LGL	factor
LGL2	final codes for LGL with don't knows –> NA	factor
DIS_LGL_BGP	BGP disagrees with NC and TL (LGL)	1 = disagreement
LGL_SPEC_NC	NC's specific codes (LGL)	factor
LGL_SPEC_TL	TL's specific codes (LGL)	factor
LGL_SPEC_TB	TB's updates to NC	factor
LGL_SPEC_TB_c	TB's cleaned data	factor
LGL_SPEC_TB_cl	TB's lumped	factor
LGD_ORIG__NC	original local gods' dislikes data (NC)	factor
LGD_ORIG_TL	original local gods' dislikes data (TL)	factor
LGD_GEN_NC	NC's general codes (LGD)	factor
LGD_GEN_TL	TL's general codes (LGD)	factor
DIS_LGD	disagreement between NC and TL (BGD)	1 = disagreement
LGD	final codes for LGD	factor
LGD2	final codes for LGD with don't knows –> NA	factor
DIS_LGD_BGP	BGP disagrees with NC and TL (LGD)	1 = disagreement
LGD_SPEC_NC	NC's specific codes (LGD)	factor
LGD_SPEC_TL	TL's specific codes (LGD)	factor

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Table S3 – *Continued from previous page*

Variable	Definition	Data Type
POL_ORIG_NC	original police likes data (NC)	factor
POL_ORIG_TL	original police likes data (TL)	factor
POL_GEN_NC	NC's general codes (POL)	factor
POL_GEN_TL	TL's general codes (POL)	factor
DIS_POL	disagreement between NC and TL (POL)	1 = disagreement
POL	final codes for POL	factor
DIS_POL_BGP	BGP disagrees with NC and TL (POL)	1 = disagreement
POL_SPEC_NC	NC's specific codes (POL)	factor
POL_SPEC_TL	TL's specific codes (POL)	factor
POL_SPEC_TB	TB's updates to NC	factor
POL_SPEC_TB_c	TB's cleaned data	factor
POL_SPEC_TB_cl	TB's lumped	factor
POD_ORIG_NC	original police dislikes data (NC)	factor
POD_ORIG_TL	original police dislikes data (TL)	factor
POD_GEN_NC	NC's general codes (POD)	factor
POD_GEN_TL	TL's general codes (POD)	factor
DIS_POD	disagreement between NC and TL (POD)	1 = disagreement
POD	final codes for POD	factor
DIS_POD_BGP	BGP disagrees with NC and TL (POD)	1 = disagreement
POD_SPEC_NC	NC's specific codes (POD)	factor
POD_SPEC_TL	TL's specific codes (POD)	factor
POD_SPEC_TB	TB's updates to NC	factor
POD_SPEC_TB_c	TB's cleaned data	factor
POD_SPEC_TB_cl	TB's lumped	factor
GOOD_ORIG_NC	original good data (NC)	factor
GOOD_ORIG_TL	original good data (TL)	factor
MATCH_GOOD	quality check (GOOD)	corrected = corrected
GOOD_SPEC_NC	NC's specific codes (GOOD)	factor
GOOD_SPEC_TL	TL's specific codes (GOOD)	factor
GOOD_SPEC_BP	BP's specific codes (GOOD)	factor
BAD_ORIG_NC	original bad data (NC)	factor
BAD_ORIG_TL	original bad data (TL)	factor
MATCH_BAD	quality check (BAD)	corrected = corrected
BAD_SPEC_NC	NC's specific codes (BAD)	factor
BAD_SPEC_TL	TL's specific codes (BAD)	factor
BAD_SPEC_BP	BP's specific codes (BAD)	factor
HAINE	Believe in Haine? (Hadza)	Yes/No/Don't know/NA
ISHOKO	Believe in Ishoko? (Hadza)	Yes/No/Don't know/NA
GDSMDIFF	Conception in both? (Hadza) Haine and Ishoko to be identical	Different/Same/Don't Know/NA

S5. Salience Calculations

Each item an individual lists gets its own item salience score according to the order of mention. To calculate the salience score, simply subtract an item's order number, k, from 1 plus the total number of items a participant listed. This number is then divided by the total number of items listed, $\frac{n+1-k}{n}$. All items listed first thus get an item salience of 1. Items listed earlier are typically easier to access or recall, and thus constitute a form of *cognitive* salience (Chaves et al., 2019). These values are thus *item-* or *individual-level* data.

Calculating the *cultural* salience, Smith's S (Smith, 1993; Smith et al., 1995; Smith and Borgatti, 1997), requires taking the sum of all item saliences and dividing that by the total number of participants, N: $S = \frac{\Sigma \frac{(n+1-k)}{n}}{N}$. This simple metric therefore encapsulates cognitive salience by capturing a facet of salience *within* minds, but also cultural salience insofar as it incorporates the salience of items *across* minds. Indeed, S increases as a function of item ubiquity and placement; the earlier individuals list specific items, the more prevelent they typically are in the sample. As such, S is a group-level trait that retains its individual-level components[5]. To calculate salience of items across groups, we used the "MAX" function in the `AnthroTools` package (Purzycki and Jamieson-Lane, 2016) for `R`. In this way Smith's S was only calculated for the earliest-listed instances of an item. This is particularly useful for the general codes, where participants could list multiple items that were coded in the same fashion (e.g., "theft", "murder", and "deceit" might all be coded as Morality).

S6. Local God Beliefs across Sites

In this section, we provide further ethnographic detail and context to the specific codes for the local deities. See Tables S12 and S13.

S6.1. Tyvan spirit-masters

Tyvans of our sample free-list that the selected local deities, *spirit-masters*, are pleased by "No Pollution", "Sang Salyr" (i.e., sanctification), "Bowing", "Sprinkling Milk", "Splashing Food", "Offerings (of) Food" and "Sanctification", and displeased with "Pollution", "Littering", "Pollution (of) Water" as well as "Destruction (of) Nature".

Tyvans, then, perceive *spirit-masters* to be particularly concerned with pollution and littering as well as sanctification and ritual acts, including bowing and various food offerings (see also Purzycki, 2011, 2013, 2016). We argue in the main text that these appeals orient people toward problems with natural resource management (Section 2.3) and territoriality (Section 3.3.2). (For further details of the Tyvan case, see Purzycki and Sosis, 2022, ch. 10).

[5]This section was adopted and modified from Purzycki and Bendixen (2020).

S6.2. Tanna and the garden spirit, Tupunus

In the free-list data across our two sites on Tanna, the garden spirit *Tupunus* was the selected local deity. The coastal Tannese sample free-lists *Tupunus* as primarily pleased by "Food", "Yam" and "Gardening", and displeased with "Disobedience (of) Garden Rules", "Disobedience" and "Stealing". Similarly, the inland Tannese sample free-lists that *Tupunus* is pleased by "Food", such as "Taro", "Yam", "Banana", "Kava", as well as "Gardening" and "Nakamal" (i.e., place for meetings and ceremonies), and is angered by "Death", "Stealing", "Bad Behavior", "Illness" as well as "Disobedience (of) Garden Rules"[6].

Across both sites, then, *Tupunus* is associated with a ritual garden system involving food crops and garden taboos (Bonnemaison, 1991; Flexner et al., 2018; Kouha, 2015). The garden taboos are enforced by *Tupunus*, who gets upset and punishes perpetrators with sickness and bad luck if garden taboos are violated (Atkinson, 2018; Nehrbass, 2011). Central to the garden taboos are magicians (also known as *naotupunus* or "stone masters"), who are responsible for managing the local crops and livestock. Taken together, in line with the conjectures on god-problems outlined in the main text, these observations hint that Tannese garden rules and taboos, or aspects thereof, correspond to salient and potentially costly social dilemmas[7]. There are indications in the ethnographic literature that this indeed is the case.

For instance, Bonnemaison (1991, p. 75) writes: "When the vines flower, the magician takes the first yams from the sacred garden and distributes them among the members of his residence group." The magician, observed Bonnemaison (1991, p. 75), works in the "sacred garden, where only he and his closest relatives may work". He is regarded as "a veritable guide to traditional gardening. [...] a sort of master of agricultural technology", and "[e]ach of the tasks carried out by the magician in the sacred garden is then repeated by all the other members of the community in their own gardens". Magical garden taboos are not restricted to crops, however, and includes proscriptions on "pig raising, for the disease of pigs, their proper growth, and the safe return in case of loss" (p. 76), perhaps explaining why *Tupunus* is listed as disliking "Death", "Illness" and "Stealing" (since livestock is a form of property). Bonnemaison (1991, p. 86) concludes that, for the traditional Tannese, "[g]ardening is a ritual act" and that by adhering to these ritual practices, "they obtain high yields from a small area, preserve ecological balance, and have a production surplus available for exchange

[6]Interestingly, the moralistic deity of the inland Tannese field site, the indigenous creator deity *Kalpapen*, is also primarily listed as pleased with "Gardening" and food crops, such as "Taro" and "Yam" (all coded generally as Ecology, see Table S4), suggesting some conceptual overlap between the traditional deities at this site.

[7]On Tanna, certain forest areas are also largely off-limits because they are inhabited by evil spirits. These sacred areas appear to coincide with strategic and ecological significance. Bonnemaison (1984, p. 126) writes: "Only by day and with precaution does one venture into these fringe areas, hunting or gathering reserves where from time to time men may make a few temporary gardens to cultivate food crops. [...]. Roads leading into it are under the surveillance of leaders of groups settled along them and traditionally no one went beyond a certain safety limit without first obtaining their agreement–otherwise the result would be war and frequently the risk of death for offenders".

with their allies, thus fulfilling their social obligations."

In the same vein, Flexner et al. (2018) report:

> Some stone masters can and do enact temporary taboos on resource extraction. No family in some communities, for example, can harvest new yam gardens in March/April until the yam stone master offers up first yam fruits to [...] significant local spirits. Access to most other edible cultivars including fruit and nut trees is also controlled by the relevant stone masters. This also acts as a resource management strategy to ensure that fruits and nuts fully mature before people may harvest them. (258)

In sum, the intricate garden ritual system on Tanna seems to revolve around potential problems with cooperation and coordination, such as settling property disputes (e.g., construed as a Hawk-Dove game, see Hare et al., 2016), forging social alliances, preventing over-consumption, trespassing and stealing, ensuring that crops are harvested at the right time (for a simple game-theoretic model of this dilemma, see Rogers, 2020), nourished properly and distributed fairly, that local biodiversity is safeguarded, etc. All such problems sensibly constitute "god-problems" in that they are social dilemmas (a) that are costly (b) and/or salient (c) with relatively inscrutable cost/benefit ratios (f) where defection is difficult (or impossible, due to a lack of dedicated secular institutions) to monitor secularly (d) and/or more efficiently sanctioned with beliefs about monitoring spiritual forces (e).

S6.3. Yasawa and ancestor spirits, kalou-vu

Yasawans first and foremost free-list that the ancestor spirits, *kalou-vu*, like "Kava", "Worship (of) Ancestral Spirit", "Smoking – Cigarette", "Swearing" and "Quiet", and they dislike "Faith", the "Word (of) God", "Disturbances – Noise", "Civil", "Truth", "Disturbances – Noise Inside Koro", "Clean" as well as "Grace (of) God".

Across Fiji, the concept of *kalou-vu* refer to deified ancestors (Hocart, 1912; Thomson, 1895; McNamara et al., 2016, 2021). That the ancestor spirits like "Worship" of themselves as well as "Swearing" and that they dislike "Faith", the "Word" and "Grace" of God, and "Truth" may express a form of cultural antagonism between Christianity and traditional ancestor beliefs, with the latter being viewed as problematic in parts of Fiji (e.g., McNamara and Henrich, 2018; Shaver, 2015; Shaver and Sosis, 2014; Tomlinson, 2004). Essential to local ancestor worship is the preparation and drinking of kava (Turner, 2012), the top most salient thing that the *kalou-vu* likes according to our sample.

Kava is a pepper plant with sedative properties that can be prepared into a mildly narcotic substance and, according to Tomlinson (2007, p. 1066), "kava stands metaphorically at the center of Fijian public life". Across Fiji and the rest of Polynesia, kava-drinking plays a role in many aspects of daily activities, including at formal ritual performances (e.g. weddings and funerals) as well as more informal nightly drinking sessions (Shaver, 2015; Shaver and Sosis, 2014; Tomlinson, 2004; Turner, 2012). These nightly ceremonies, where often only men participate, "appear in the ethnographic record over many generations of anthropological fieldwork and across many islands" (Shaver and Sosis, 2014, p. 141), and it is therefore likely that they play integral social roles in the local community.

Generally, the men are seated and served according to social rank, with the highest-ranking men (depending on age, inherited privileges, social position, marital status, etc.) seated in one end and served first. Seating and serving order then descends according to status. As such, the social hierarchy is made manifest (Tomlinson, 2004) and some ethnographers have therefore suggested that there is a competitive element to the nightly kava sessions, where males forge social alliances and compete for status, for instance by engaging in drinking games (Shaver, 2015; Shaver and Sosis, 2014; Tomlinson, 2004, 2007; Turner, 2012).

Kava ceremonies are also forums for sharing information (possibly an additional pathway to prestige and social status) and coordinating collective behavior. For instance, Tomlinson (2004) writes about kava ceremonies that:

> Many topics are covered. People tell stories from recent trips they have taken, veterans tell war stories, and other individuals comment on the movement of boats and ships around the island. People gossip. They discuss the market price of kava – because it is sold as a cash crop as well as consumed locally [...] and chat about the communal work projects that are underway. (659)

As a result, kava ceremonies may contribute to aligning common interests and settling personal disputes (Tomlinson, 2007).

Across Fiji, the ancestors who became deified for worship were sometimes chiefs or other individuals wielding social and political authority (Thomson, 1895). Dávid-Barrett and Carney (2016) formally model the deification process of historical figures and finds that, depending on the size of a community, deification of powerful forebearers may help groups solve collective action problems, in that a shared belief in a powerful ancestor serves as a common point of cultural reference and hence may improve behavioral coordination (see also e.g., Rossano, 2007).

In sum, then, there are several indications in the literature – in line with the proposed criteria for "god-problems" – that beliefs about *kalou-vu* and their likes and dislikes point to potential problems with coordination and cooperation, including competition for status, forging social bonds, dissolving disagreements, aligning economic interests, coordinating communal projects, as well as the likely conflicts of interest between different coexisting religious belief systems.

S6.4. Mauritius and nam spirits

The local deities of Mauritius are *nam* spirits. They are free-listed as liking "Bad Behavior", "Prayer", "Fear", "Revenge", and "Loving", and disliking "Prayer", "Disturbances", "People", "Good People" and "God".

Nam spirits are similar to the Western concept of the soul (Kundtóva Klocová et al., 2022; Xygalatas et al., 2018), and when a person dies, the *nam* leaves the body of the deceased. As we explain in the main text, depending on the circumstances of the death, *nam* will either transition peacefully to the spirit world or transform into *jab*, an evil spirit associated with black magic (Colwell-Chanthaphonh and de Salle-Essoo, 2014; Sussman, 1981;

Kundtóva Klocová et al., 2022; Xygalatas et al., 2018), resulting in ambivalent responses (e.g., why *nam* are perceived as pleased with predominantly *immoral* things, such as "Bad Behavior", "Fear" and "Revenge"). Here, we provide a little more detail about the behaviors associated with nam worship in order to assess whether the free-listed likes and dislikes of *nam* conceivably point to social dilemmas, problems of cooperation and coordination, or conflicts of interest, as predicted by our cultural evolutionary account.

Ritual performances for placating *nam* spirits are "frequently found in graveyards, crossroads, forests and near temples of Kali" (Kundtóva Klocová et al., 2022). Of particular interest are roadside shrines that mark the place of fatal accidents or places of special importance (Colwell-Chanthaphonh and de Salle-Essoo, 2014). As these shrines are often "located next to and visible from public routes" and thus "are meant to be seen" (ibid., p. 271), it is likely that they form part of a socially manipulative signal system. Some shrines may be thought of as representing boundary markers "to indicate the limit between the human, domesticated world, and the natural, wild world inhabited by evil forces and spirits of nature" (Colwell-Chanthaphonh and de Salle-Essoo, 2014, p. 271). As roadside shrines are often built to mark the site of fatal deaths, they may thus signal hazards and danger in the landscape, and hence contribute to coordinating people's safe travel. Indeed, sacralized patches of land are often found in areas of particular danger or significance[8] (Barrett et al., 2019; Berkes, 2017; Purzycki, 2011, 2016). Further, as shrines are viewed as contact points between the worlds of the living and the spirits, and since spirits are perceived to "greatly influence the paths of people's life" (Colwell-Chanthaphonh and de Salle-Essoo, 2014, p. 261), rituals are sometimes performed to either cause harm or save someone from illness and misfortune. The belief complex involving *nam* worship and ritual offerings at shrines may thus help explain, coordinate and influence salient and costly events and features in the personal and social lives of local Mauritians (Sussman, 1981), thus potentially satisfying several of the criteria for "god-problems" outlined in the main text.

However, it is worth stressing that these inferences are speculative at the moment. If we take our cultural evolutionary account at face value, an alternative argument could be made that we should, in fact, not expect *nam* to be associated with costly social dilemmas, on the following grounds: Since *nam* is a product of relatively recent syncretic mixing of various religious traditions, the concept of *nam* only ever existed in a context where secular institutions were in place as objects of manipulative appeals and enforcers of salient and costly cooperative norms. As such, and contrary to traditional deities at other sites, appeals to *nam* would not include behaviors that point to communal problems.

S6.5. Hadza

Among our Hadza sample, *Ishoko*, represented as the Sun, was selected as the local deity. Ishoko is free-listed as liking "Peace", "Loving", "Prayer", "Good Heart", "Singing" and

[8]There is an active literature on how sacred groves may generally contribute to ecological conservation and management (e.g., Angsongna et al., 2016; Colding and Folke, 2001; Smith and Wishnie, 2000).

"Sharing", and as disliking "Violence", "Murder", "Stealing", and "Insults".

As we note in the main text, *Ishoko* is primarily concerned with moral deeds and virtuous qualities as well as ritual and religious acts. In this way, then, *Ishoko* resembles a moralistic deity. Indeed, in terms of Smith's S, the difference between *Ishoko* and the selected moralistic deity for the Hadza, *Haine*, is quite small (see Tables S5 and S7), lending support to the speculation that the Hadza think similarly of these two deities (Purzycki et al., 2022). See Section S7 and main text for further discussion.

S6.6. Marajó and St. Mary

At our field site on the island of Marajó, Brazil, St. Mary (Our Lady of Nazareth – *Nossa Senhora de Nazaré*) served as the local deity. In the free-lists, St. Mary is listed as pleased with "Prayer", "Loving" and "Church Worship", and displeased with "Bad Behavior", "Violence", "No Praying", "No Faith", "Sin" and "Murder".

As such, St. Mary resembles a moralistic deity, and the god-problem criteria are satisfied in this case in that (im)moral behaviors by definition involve costs or benefits that can often be construed in game theoretic terms. We refer to the main text for further discussion.

S7. Supplementary Plots and Tables

In the main text, we present a panel of histograms illustrating the general codes that *angers* the moralistic deity, the local deity and the police for each site. Figure S2 is a corresponding panel of histograms illustrating the general codes that *pleases* the agents.

In the main text, we also present salience (Smith's S) tables for the most salient general codes globally (Smith's $S \geq .10$) and for each site (top-most salient code), respectively. Tables S4–S9 list the most salient (Smith's $S \geq .05$) general codes for each site and agent, whereas Tables S10–S15 list the most salient (Smith's $S \geq .05$) specific codes for each site and agent. We exclude responses of "I don't know" as these items always have a salience of 1 and necessarily decrease Smith's S.

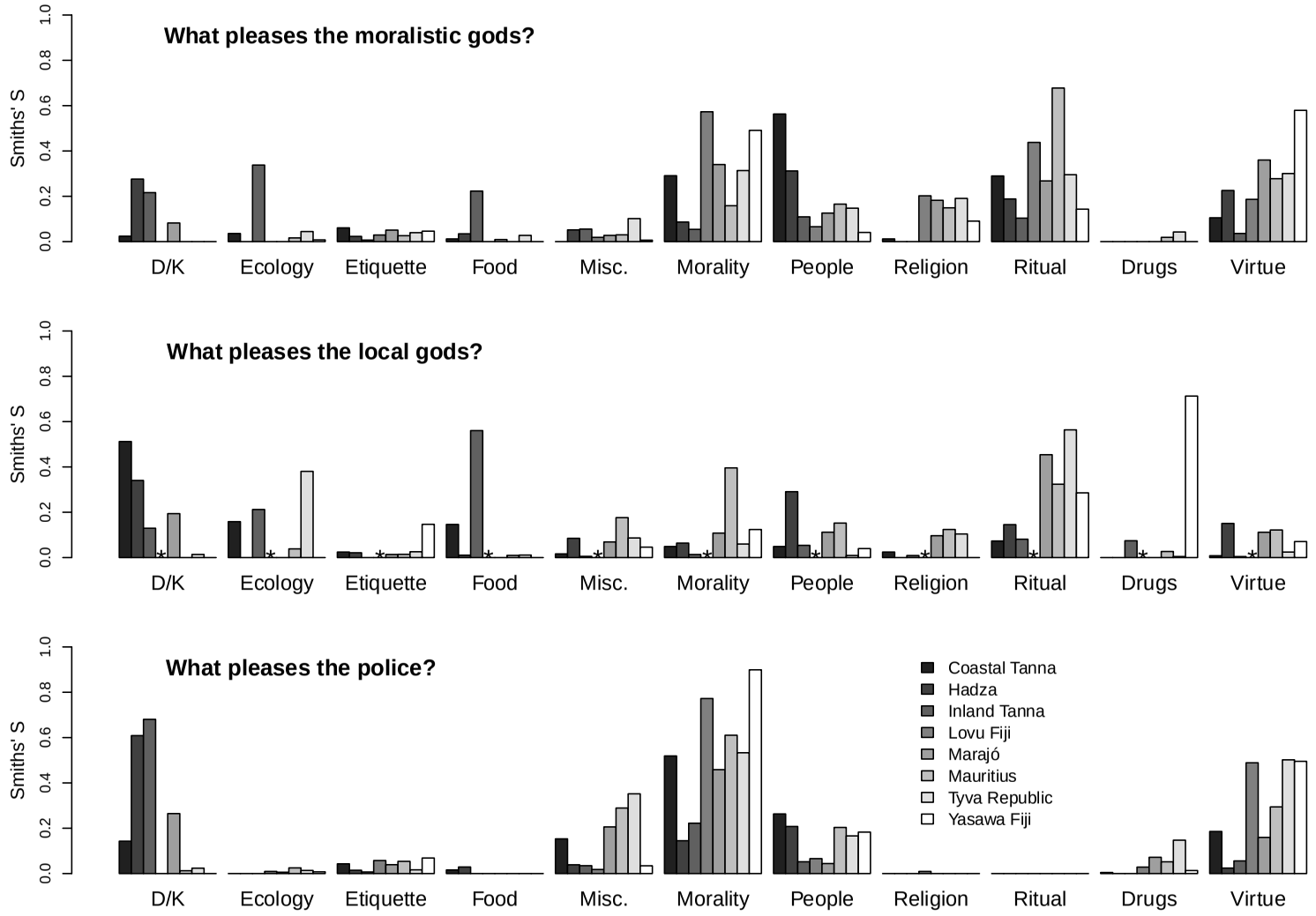

Figure S2: **Smith's *S* of general codings for what *pleases* the moralistic gods, the local gods and the police**. Note that no local deities were identified for Lovu Fiji, hence the asterisks. D/K = Don't know; Misc. = Miscellaneous; Drugs = Substance Use/Abuse.

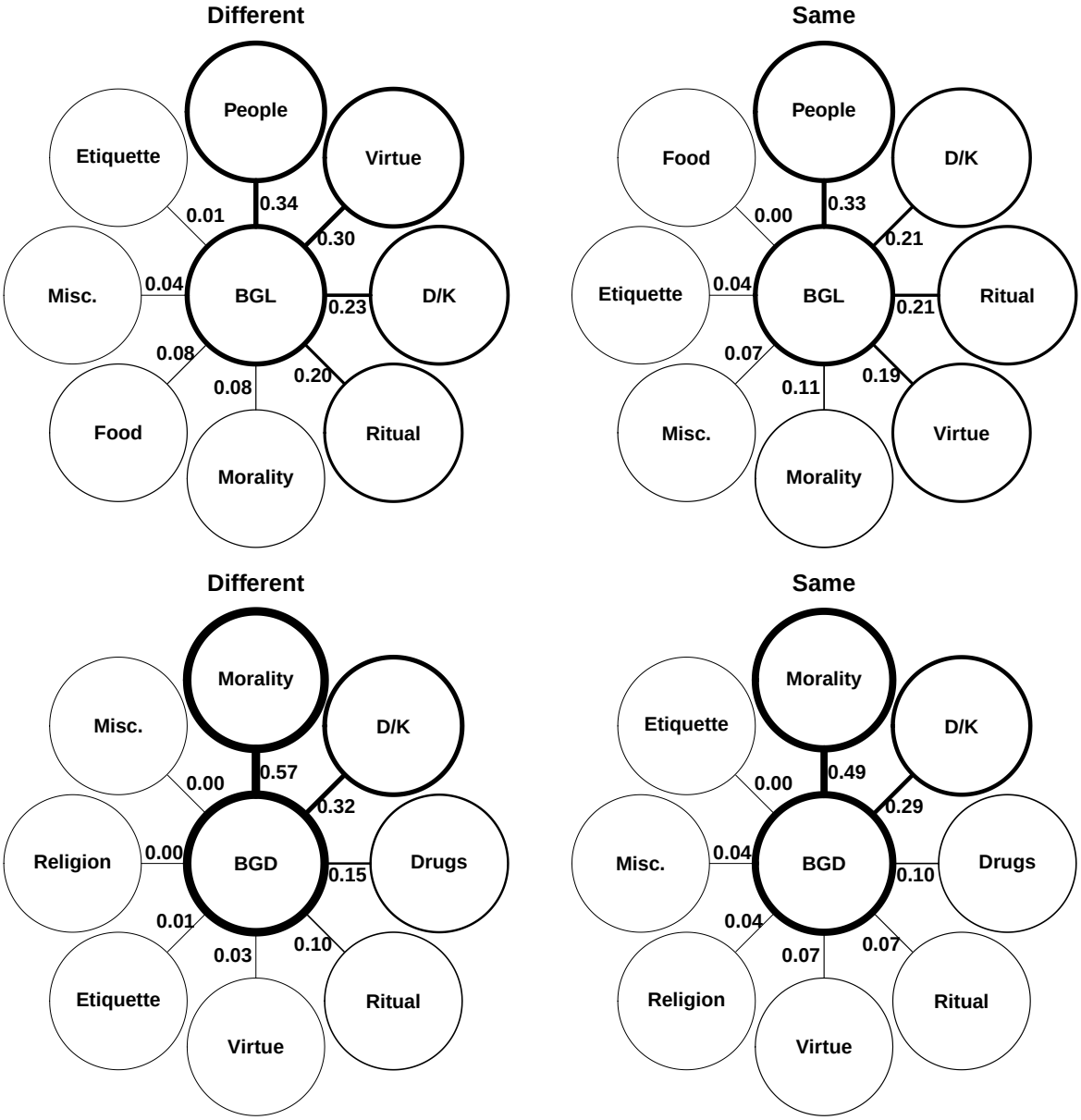

Figure S3: **Flower plots of Smith's *S* of general codings for what *pleases* (BGL) and *angers* (BGD) Haine among the Hadza**. "Different" and "Same" refer to participants who, respectively, said that Haine and Ishoko are distinct entities or not. "Drugs" = "Substance Use/Abuse"; "Misc." = "Miscellaneous".

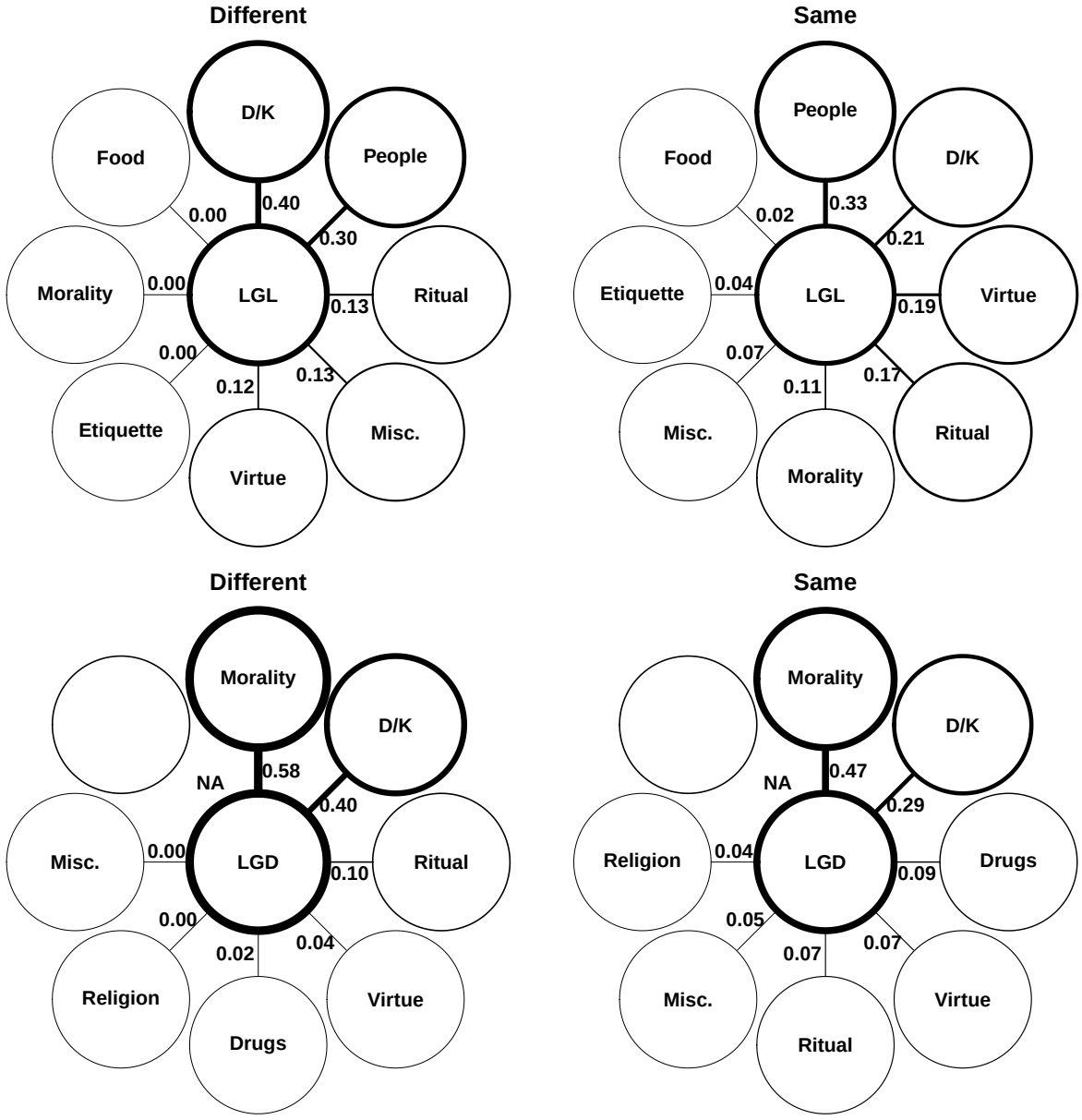

Figure S4: **Flower plots of Smith's *S* of general codings for what *pleases* (LGL) and *angers* (LGD) Ishoko among the Hadza**. "Different" and "Same" refer to participants who, respectively, said that Haine and Ishoko are distinct entities or not. "Drugs" = "Substance Use/Abuse"; "Misc." = "Miscellaneous".

S7.1. General codes

Table S4: **Cross-cultural models for what pleases the moralistic gods – general codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	n	N
Coastal Tanna	People	0.95	23.65	0.56	25	42
Coastal Tanna	Morality	0.76	12.22	0.29	16	42
Coastal Tanna	Ritual	0.81	12.17	0.29	15	42
Coastal Tanna	Virtue	0.55	4.42	0.11	8	42
Coastal Tanna	Etiquette	0.85	2.55	0.06	3	42
Hadza	People	0.82	18.08	0.31	22	58
Hadza	Virtue	0.77	13.08	0.23	17	58
Hadza	Ritual	0.78	10.92	0.19	14	58
Hadza	Morality	1.00	5.00	0.09	5	58
Hadza	Miscellaneous	1.00	3.00	0.05	3	58
Inland Tanna	Ecology	0.96	25.00	0.34	26	74
Inland Tanna	Food	0.97	16.50	0.22	17	74
Inland Tanna	People	0.62	8.08	0.11	13	74
Inland Tanna	Ritual	0.85	7.67	0.10	9	74
Inland Tanna	Miscellaneous	0.82	4.08	0.06	5	74
Inland Tanna	Morality	0.80	4.00	0.05	5	74
Lovu Fiji	Morality	0.86	45.83	0.57	53	80
Lovu Fiji	Ritual	0.78	35.02	0.44	45	80
Lovu Fiji	Religion	0.67	16.17	0.20	24	80
Lovu Fiji	Virtue	0.62	14.92	0.19	24	80
Lovu Fiji	People	0.88	5.25	0.07	6	80
Marajo	Virtue	0.82	26.28	0.36	32	73
Marajo	Morality	0.75	24.83	0.34	33	73
Marajo	Ritual	0.89	19.55	0.27	22	73
Marajo	Religion	0.78	13.30	0.18	17	73
Marajo	People	0.66	9.19	0.13	14	73
Marajo	Etiquette	0.62	3.70	0.05	6	73
Mauritius	Ritual	0.87	54.22	0.68	62	80
Mauritius	Virtue	0.79	22.22	0.28	28	80
Mauritius	People	0.63	13.23	0.17	21	80
Mauritius	Morality	0.70	12.67	0.16	18	80
Mauritius	Religion	0.66	11.93	0.15	18	80
Tyva Republic	Morality	0.79	22.88	0.31	29	73

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Table S4 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Tyva Republic	Virtue	0.73	21.93	0.30	30	73
Tyva Republic	Ritual	0.83	21.55	0.30	26	73
Tyva Republic	Religion	0.77	13.92	0.19	18	73
Tyva Republic	People	0.83	10.77	0.15	13	73
Tyva Republic	Miscellaneous	0.74	7.42	0.10	10	73
Yasawa Fiji	Virtue	0.80	60.82	0.58	76	105
Yasawa Fiji	Morality	0.85	51.55	0.49	61	105
Yasawa Fiji	Ritual	0.79	15.03	0.14	19	105
Yasawa Fiji	Religion	0.68	9.50	0.09	14	105

Table S5: **Cross-cultural models for what angers the moralistic gods – general codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	Morality	0.92	37.88	0.90	41	42
Coastal Tanna	Etiquette	0.81	15.47	0.37	19	42
Coastal Tanna	Virtue	0.52	4.18	0.10	8	42
Hadza	Morality	0.93	28.00	0.49	30	57
Hadza	Substance Use/Abuse	0.74	6.67	0.12	9	57
Hadza	Ritual	0.90	4.50	0.08	5	57
Inland Tanna	Morality	0.89	25.83	0.35	29	74
Inland Tanna	People	1.00	14.00	0.19	14	74
Inland Tanna	Etiquette	0.66	9.27	0.13	14	74
Inland Tanna	Ritual	1.00	7.00	0.09	7	74
Inland Tanna	Miscellaneous	0.64	4.50	0.06	7	74
Lovu Fiji	Morality	0.94	63.67	0.80	68	80
Lovu Fiji	Virtue	0.71	18.55	0.23	26	80
Lovu Fiji	Ritual	0.66	9.83	0.12	15	80
Lovu Fiji	Etiquette	0.59	5.92	0.07	10	80
Lovu Fiji	Substance Use/Abuse	0.74	5.17	0.06	7	80
Marajo	Morality	0.86	47.97	0.63	56	76
Marajo	Virtue	0.74	21.48	0.28	29	76
Marajo	People	0.64	6.42	0.08	10	76
Marajo	Religion	0.69	6.20	0.08	9	76
Marajo	Ritual	0.61	6.12	0.08	10	76
Marajo	Miscellaneous	0.72	5.77	0.08	8	76
Marajo	Etiquette	0.74	4.47	0.06	6	76

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Table S5 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Marajo	Substance Use/Abuse	0.88	4.40	0.06	5	76
Mauritius	Morality	0.95	48.43	0.70	51	69
Mauritius	Virtue	0.73	19.08	0.28	26	69
Mauritius	Ritual	0.64	10.28	0.15	16	69
Mauritius	Religion	0.64	8.33	0.12	13	69
Mauritius	Miscellaneous	0.68	6.08	0.09	9	69
Mauritius	People	0.74	4.47	0.06	6	69
Tyva Republic	Morality	0.87	44.35	0.61	51	73
Tyva Republic	Virtue	0.73	23.93	0.33	33	73
Tyva Republic	Substance Use/Abuse	0.72	11.58	0.16	16	73
Tyva Republic	Miscellaneous	0.78	7.78	0.11	10	73
Tyva Republic	Ecology	0.61	6.12	0.08	10	73
Tyva Republic	Religion	0.95	3.80	0.05	4	73
Yasawa Fiji	Morality	0.83	71.83	0.68	87	105
Yasawa Fiji	Virtue	0.81	57.53	0.55	71	105
Yasawa Fiji	Etiquette	0.64	11.48	0.11	18	105

Table S6: **Cross-cultural models for what pleases the local gods – general codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	Ecology	0.93	6.50	0.16	7	41
Coastal Tanna	Food	1.00	6.00	0.15	6	41
Coastal Tanna	Ritual	1.00	3.00	0.07	3	41
Hadza	People	0.91	13.67	0.29	15	47
Hadza	Virtue	0.71	7.08	0.15	10	47
Hadza	Ritual	0.85	6.83	0.15	8	47
Hadza	Miscellaneous	1.00	4.00	0.09	4	47
Hadza	Morality	1.00	3.00	0.06	3	47
Inland Tanna	Food	0.96	41.47	0.56	43	74
Inland Tanna	Ecology	0.92	15.70	0.21	17	74
Inland Tanna	Ritual	0.86	6.00	0.08	7	74
Inland Tanna	Substance Use/Abuse	0.69	5.50	0.07	8	74
Inland Tanna	People	0.67	4.00	0.05	6	74
Marajo	Ritual	0.98	26.33	0.45	27	58
Marajo	People	0.93	6.50	0.11	7	58
Marajo	Virtue	0.81	6.48	0.11	8	58

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Table S6 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Marajo	Morality	0.63	6.27	0.11	10	58
Marajo	Religion	0.93	5.60	0.10	6	58
Marajo	Miscellaneous	0.80	4.00	0.07	5	58
Mauritius	Morality	0.82	20.58	0.40	25	52
Mauritius	Ritual	0.84	16.83	0.32	20	52
Mauritius	Miscellaneous	0.83	9.17	0.18	11	52
Mauritius	People	0.79	7.92	0.15	10	52
Mauritius	Religion	0.64	6.45	0.12	10	52
Mauritius	Virtue	0.79	6.33	0.12	8	52
Tyva Republic	Ritual	0.88	40.58	0.56	46	72
Tyva Republic	Ecology	0.88	27.40	0.38	31	72
Tyva Republic	Religion	0.83	7.50	0.10	9	72
Tyva Republic	Miscellaneous	0.62	6.23	0.09	10	72
Tyva Republic	Morality	0.72	4.30	0.06	6	72
Yasawa Fiji	Substance Use/Abuse	0.95	74.83	0.71	79	105
Yasawa Fiji	Ritual	0.73	30.00	0.29	41	105
Yasawa Fiji	Etiquette	0.67	15.42	0.15	23	105
Yasawa Fiji	Morality	0.59	13.00	0.12	22	105
Yasawa Fiji	Virtue	0.53	7.42	0.07	14	105

Table S7: **Cross-cultural models for what angers the local gods – general codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	Ritual	1.00	8.00	0.22	8	37
Coastal Tanna	Morality	0.91	7.25	0.20	8	37
Coastal Tanna	Ecology	1.00	3.00	0.08	3	37
Coastal Tanna	People	1.00	2.00	0.05	2	37
Hadza	Morality	0.95	21.83	0.46	23	47
Hadza	Ritual	0.88	3.50	0.07	4	47
Hadza	Substance Use/Abuse	0.69	2.75	0.06	4	47
Hadza	Virtue	0.89	2.67	0.06	3	47
Inland Tanna	People	0.96	16.33	0.22	17	74
Inland Tanna	Morality	0.91	15.50	0.21	17	74
Inland Tanna	Ecology	0.93	13.00	0.18	14	74
Inland Tanna	Ritual	0.96	11.50	0.16	12	74
Inland Tanna	Miscellaneous	1.00	5.00	0.07	5	74

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Table S7 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Inland Tanna	Etiquette	0.69	4.83	0.07	7	74
Marajo	Morality	0.93	23.30	0.39	25	60
Marajo	Ritual	0.81	11.38	0.19	14	60
Marajo	Religion	0.86	6.00	0.10	7	60
Marajo	Miscellaneous	1.00	5.00	0.08	5	60
Marajo	Etiquette	0.86	4.30	0.07	5	60
Marajo	Virtue	0.90	3.60	0.06	4	60
Mauritius	Ritual	0.91	19.10	0.40	21	48
Mauritius	Religion	0.92	9.15	0.19	10	48
Mauritius	Morality	1.00	8.00	0.17	8	48
Mauritius	Miscellaneous	0.97	7.75	0.16	8	48
Mauritius	People	0.90	4.50	0.09	5	48
Mauritius	Virtue	0.83	2.50	0.05	3	48
Tyva Republic	Ecology	0.94	50.00	0.69	53	72
Tyva Republic	Ritual	0.66	13.83	0.19	21	72
Tyva Republic	Morality	0.72	7.92	0.11	11	72
Tyva Republic	Religion	0.76	6.08	0.08	8	72
Tyva Republic	Substance Use/Abuse	0.79	4.75	0.07	6	72
Tyva Republic	Virtue	0.55	3.83	0.05	7	72
Yasawa Fiji	Religion	0.91	76.67	0.73	84	105
Yasawa Fiji	Etiquette	0.79	25.17	0.24	32	105
Yasawa Fiji	Virtue	0.60	19.67	0.19	33	105
Yasawa Fiji	Ritual	0.80	16.83	0.16	21	105

Table S8: **Cross-cultural models for what pleases the police – general codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	Morality	0.87	21.80	0.52	25	42
Coastal Tanna	People	0.85	11.05	0.26	13	42
Coastal Tanna	Virtue	0.87	7.80	0.19	9	42
Coastal Tanna	Miscellaneous	0.71	6.43	0.15	9	42
Hadza	People	0.96	14.33	0.21	15	69
Hadza	Morality	0.91	10.00	0.14	11	69
Inland Tanna	Morality	0.94	16.00	0.22	17	72
Inland Tanna	Virtue	0.67	4.02	0.06	6	72
Inland Tanna	People	0.94	3.75	0.05	4	72

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Table S8 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	n	N
Lovu Fiji	Morality	0.84	61.02	0.77	73	79
Lovu Fiji	Virtue	0.88	38.62	0.49	44	79
Lovu Fiji	People	0.47	5.20	0.07	11	79
Lovu Fiji	Etiquette	0.45	4.53	0.06	10	79
Marajo	Morality	0.89	31.18	0.46	35	68
Marajo	Miscellaneous	0.88	14.00	0.21	16	68
Marajo	Virtue	0.83	10.85	0.16	13	68
Marajo	Substance Use/Abuse	0.54	4.88	0.07	9	68
Mauritius	Morality	0.84	48.83	0.61	58	80
Mauritius	Virtue	0.74	23.53	0.29	32	80
Mauritius	Miscellaneous	0.80	23.13	0.29	29	80
Mauritius	People	0.71	16.28	0.20	23	80
Mauritius	Etiquette	0.48	4.30	0.05	9	80
Mauritius	Substance Use/Abuse	0.52	4.15	0.05	8	80
Tyva Republic	Morality	0.78	38.92	0.53	50	73
Tyva Republic	Virtue	0.78	36.63	0.50	47	73
Tyva Republic	Miscellaneous	0.73	25.68	0.35	35	73
Tyva Republic	People	0.67	12.13	0.17	18	73
Tyva Republic	Substance Use/Abuse	0.63	10.75	0.15	17	73
Yasawa Fiji	Morality	0.92	94.40	0.90	103	105
Yasawa Fiji	Virtue	0.61	52.00	0.50	85	105
Yasawa Fiji	People	0.46	19.20	0.18	42	105
Yasawa Fiji	Etiquette	0.55	7.20	0.07	13	105

Table S9: **Cross-cultural models for what angers the police – general codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	n	N
Coastal Tanna	Morality	0.95	39.02	0.95	41	41
Coastal Tanna	Substance Use/Abuse	0.60	10.28	0.25	17	41
Coastal Tanna	Etiquette	0.41	3.27	0.08	8	41
Coastal Tanna	Miscellaneous	0.42	2.53	0.06	6	41
Hadza	Morality	1.00	24.00	0.35	24	69
Inland Tanna	Morality	0.97	43.58	0.64	45	68
Inland Tanna	Substance Use/Abuse	0.51	6.08	0.09	12	68
Inland Tanna	Etiquette	0.68	3.40	0.05	5	68
Lovu Fiji	Morality	0.97	73.72	0.96	76	77

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Table S9 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Lovu Fiji	Substance Use/Abuse	0.67	10.00	0.13	15	77
Marajo	Morality	0.96	49.72	0.76	52	65
Marajo	Substance Use/Abuse	0.70	12.63	0.19	18	65
Marajo	Virtue	0.83	4.17	0.06	5	65
Marajo	People	0.58	4.03	0.06	7	65
Marajo	Miscellaneous	0.67	4.00	0.06	6	65
Mauritius	Morality	0.91	68.28	0.82	75	83
Mauritius	Substance Use/Abuse	0.77	23.95	0.29	31	83
Mauritius	Miscellaneous	0.59	14.77	0.18	25	83
Mauritius	Etiquette	0.61	6.75	0.08	11	83
Mauritius	Ecology	0.63	5.70	0.07	9	83
Tyva Republic	Morality	0.82	54.98	0.77	67	71
Tyva Republic	Substance Use/Abuse	0.75	25.52	0.36	34	71
Tyva Republic	Virtue	0.77	16.93	0.24	22	71
Tyva Republic	Miscellaneous	0.58	13.42	0.19	23	71
Tyva Republic	People	0.63	8.18	0.12	13	71
Tyva Republic	Etiquette	0.51	3.60	0.05	7	71
Yasawa Fiji	Morality	0.97	100.80	0.96	104	105
Yasawa Fiji	Virtue	0.57	35.63	0.34	62	105
Yasawa Fiji	Etiquette	0.54	13.00	0.12	24	105
Yasawa Fiji	People	0.38	12.20	0.12	32	105

S7.2. Specific codes

Table S10: **Cross-cultural models for what pleases the moralistic gods – specific codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site. *Denotes clustered items such as good conscience, good behavior, good nature, good heart etc.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	People	1.00	19.00	0.45	19	42
Coastal Tanna	Prayer	0.79	6.33	0.15	8	42
Coastal Tanna	Caring - People	1.00	4.00	0.10	4	42
Coastal Tanna	Sharing	0.69	3.43	0.08	5	42
Coastal Tanna	Loving - People	0.64	2.57	0.06	4	42
Coastal Tanna	Worship	0.60	2.42	0.06	4	42
Coastal Tanna	Behaviour - Good	0.60	2.42	0.06	4	42
Hadza	Peace	0.74	8.92	0.15	12	58

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Table S10 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Hadza	Prayer	0.70	6.33	0.11	9	58
Hadza	Sharing	1.00	5.00	0.09	5	58
Hadza	Loving - People	0.80	4.00	0.07	5	58
Hadza	Heart - Good	1.00	4.00	0.07	4	58
Hadza	Singing	0.88	3.50	0.06	4	58
Hadza	Peace - People	0.88	3.50	0.06	4	58
Inland Tanna	Gardening	1.00	17.00	0.23	17	74
Inland Tanna	Food - Taro	0.85	14.50	0.20	17	74
Inland Tanna	Food - Yam	0.65	9.17	0.12	14	74
Lovu Fiji	Honesty	0.77	20.72	0.26	27	80
Lovu Fiji	Prayer	0.80	20.68	0.26	26	80
Lovu Fiji	Worship	0.67	12.75	0.16	19	80
Lovu Fiji	Faith	0.75	10.50	0.13	14	80
Lovu Fiji	Behaviour - Good	0.79	10.33	0.13	13	80
Lovu Fiji	Helpful	0.66	7.92	0.10	12	80
Lovu Fiji	Offerings - Pooja	1.00	4.00	0.05	4	80
Marajo	Prayer	0.79	11.88	0.16	15	73
Marajo	Behaviour - Good	0.72	9.32	0.13	13	73
Marajo	Loving - People	0.65	8.45	0.12	13	73
Marajo	Worship - Church	0.90	5.42	0.07	6	73
Marajo	Loving	0.79	4.73	0.06	6	73
Marajo	Helpful - People	0.58	4.63	0.06	8	73
Marajo	Good	0.85	4.25	0.06	5	73
Marajo	Loving - God	0.67	4.00	0.05	6	73
Marajo	Obedient	0.77	3.87	0.05	5	73
Mauritius	Prayer	0.72	19.44	0.24	27	80
Mauritius	Food - Milk	0.73	14.50	0.18	20	80
Mauritius	People - Good	0.81	7.32	0.09	9	80
Mauritius	Devotion - Devotees	0.81	7.32	0.09	9	80
Mauritius	Bel'Leaf	0.89	5.33	0.07	6	80
Mauritius	Worship	0.63	5.08	0.06	8	80
Mauritius	Flowers	0.55	4.42	0.06	8	80
Mauritius	Water	0.62	4.34	0.05	7	80
Mauritius	Purity	0.68	4.10	0.05	6	80
Tyva Republic	Faith	0.78	10.12	0.14	13	73
Tyva Republic	Behaviour - Good	0.88	7.92	0.11	9	73
Tyva Republic	Good	0.83	5.83	0.08	7	73
Tyva Republic	Prayer	0.97	5.80	0.08	6	73
Tyva Republic	Helpful - People	0.77	5.42	0.07	7	73
Tyva Republic	Reading - Tarinas	0.65	5.23	0.07	8	73

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Table S10 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Tyva Republic	Purity	0.77	3.83	0.05	5	73
Tyva Republic	Helpful	0.75	3.75	0.05	5	73
Tyva Republic	Bowing	0.73	3.65	0.05	5	73
Yasawa Fiji	Obedient	0.77	33.88	0.32	44	105
Yasawa Fiji	Truth	0.76	20.58	0.20	27	105
Yasawa Fiji	Listening	0.74	20.10	0.19	27	105
Yasawa Fiji	Work - Hard	0.67	15.42	0.15	23	105
Yasawa Fiji	Kindness	0.61	12.18	0.12	20	105
Yasawa Fiji	Loving	0.52	10.42	0.10	20	105
Yasawa Fiji	Reading - Bible	0.86	9.50	0.09	11	105
Yasawa Fiji	Prayer	0.71	7.83	0.07	11	105
Yasawa Fiji	Patience	0.47	7.45	0.07	16	105
Yasawa Fiji	People - Good	0.79	7.08	0.07	9	105
Yasawa Fiji	Caring	0.56	6.75	0.06	12	105
Yasawa Fiji	Purity	0.70	6.33	0.06	9	105
Yasawa Fiji	Faith	0.74	5.17	0.05	7	105

Table S11: **Cross-cultural models for what angers the moralistic gods – specific codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	Stealing	0.75	20.28	0.48	27	42
Coastal Tanna	Violence	0.76	15.10	0.36	20	42
Coastal Tanna	Swearing	0.80	14.47	0.34	18	42
Coastal Tanna	Behaviour - Bad	0.88	5.30	0.13	6	42
Coastal Tanna	Disobedient	0.63	4.42	0.11	7	42
Coastal Tanna	Gossip	0.52	4.15	0.10	8	42
Coastal Tanna	Murder	0.74	2.95	0.07	4	42
Hadza	Violence	0.90	15.33	0.27	17	57
Hadza	Murder	0.80	8.75	0.15	11	57
Hadza	Stealing	0.57	5.17	0.09	9	57
Hadza	Alcohol - Drunks	0.67	3.33	0.06	5	57
Inland Tanna	Stealing	0.77	13.05	0.18	17	74
Inland Tanna	Behaviour - Bad	0.94	7.50	0.10	8	74
Inland Tanna	Death	1.00	6.00	0.08	6	74
Inland Tanna	Swearing	0.70	5.58	0.08	8	74

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Table S11 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Inland Tanna	Illness	1.00	4.00	0.05	4	74
Inland Tanna	Lies	0.62	3.75	0.05	6	74
Lovu Fiji	Lies	0.83	33.93	0.42	41	80
Lovu Fiji	Stealing	0.73	24.82	0.31	34	80
Lovu Fiji	Jealousy	0.69	13.88	0.17	20	80
Lovu Fiji	Violence	0.65	8.50	0.11	13	80
Lovu Fiji	Behaviour - Bad	0.58	4.67	0.06	8	80
Lovu Fiji	Gossip	0.62	4.33	0.05	7	80
Marajo	Lies	0.76	12.88	0.17	17	76
Marajo	Sin	0.80	11.93	0.16	15	76
Marajo	Stealing	0.73	9.55	0.13	13	76
Marajo	Violence	0.80	7.97	0.10	10	76
Marajo	Evil	0.90	7.20	0.09	8	76
Marajo	Murder	0.67	6.72	0.09	10	76
Marajo	Not Faithful	0.64	4.45	0.06	7	76
Mauritius	Behaviour - Bad	0.90	12.67	0.18	14	69
Mauritius	People - Bad	0.89	10.67	0.15	12	69
Mauritius	Dominating - Others	0.91	10.05	0.15	11	69
Mauritius	Violence	0.80	6.38	0.09	8	69
Mauritius	Lies	0.94	5.67	0.08	6	69
Mauritius	Demons	0.67	4.67	0.07	7	69
Tyva Republic	Lies	0.82	18.80	0.26	23	73
Tyva Republic	Stealing	0.68	12.25	0.17	18	73
Tyva Republic	Alcohol - Drinking	0.80	8.83	0.12	11	73
Tyva Republic	Murder	0.61	7.97	0.11	13	73
Tyva Republic	Not Pure	0.74	7.43	0.10	10	73
Tyva Republic	Smoking	0.72	4.30	0.06	6	73
Tyva Republic	Gossip	0.63	3.77	0.05	6	73
Yasawa Fiji	Disobedient	0.74	32.50	0.31	44	105
Yasawa Fiji	Sin	0.79	22.15	0.21	28	105
Yasawa Fiji	Lazy	0.68	18.33	0.17	27	105
Yasawa Fiji	Selfish	0.81	16.30	0.16	20	105
Yasawa Fiji	Lies	0.80	15.17	0.14	19	105
Yasawa Fiji	Stealing	0.69	13.72	0.13	20	105
Yasawa Fiji	Pretentious	0.58	9.22	0.09	16	105
Yasawa Fiji	Swearing	0.66	8.62	0.08	13	105
Yasawa Fiji	Jealousy	0.64	7.73	0.07	12	105
Yasawa Fiji	Coward	0.57	6.25	0.06	11	105
Yasawa Fiji	Violence	0.42	5.45	0.05	13	105

Table S12: **Cross-cultural models for what pleases the local gods – specific codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	n	N
Coastal Tanna	Food	1.00	4.00	0.10	4	41
Coastal Tanna	Food - Yam	1.00	3.00	0.07	3	41
Coastal Tanna	Gardening	0.83	2.50	0.06	3	41
Hadza	Peace	0.95	9.50	0.20	10	47
Hadza	Loving	0.62	3.75	0.08	6	47
Hadza	Prayer	0.70	3.50	0.07	5	47
Hadza	Heart - Good	1.00	3.00	0.06	3	47
Hadza	Singing	1.00	3.00	0.06	3	47
Hadza	Sharing	1.00	3.00	0.06	3	47
Inland Tanna	Food - Taro	0.84	25.12	0.34	30	74
Inland Tanna	Food - Yam	0.76	16.77	0.23	22	74
Inland Tanna	Gardening	1.00	9.00	0.12	9	74
Inland Tanna	Food - Banana	0.71	8.50	0.11	12	74
Inland Tanna	Alcohol - Kava	0.69	5.50	0.07	8	74
Inland Tanna	Nakamal	0.90	4.50	0.06	5	74
Marajo	Prayer	0.92	18.42	0.32	20	58
Marajo	Loving	0.72	3.58	0.06	5	58
Marajo	Worship - Church	0.70	3.50	0.06	5	58
Mauritius	Behaviour - Bad	0.79	6.33	0.12	8	53
Mauritius	Prayer	0.69	6.25	0.12	9	53
Mauritius	Fear	0.56	3.33	0.06	6	53
Mauritius	Revenge	0.83	3.33	0.06	4	53
Mauritius	Loving	0.89	2.67	0.05	3	53
Tyva Republic	No Pollution	0.89	11.58	0.16	13	72
Tyva Republic	Sang Salyr	0.82	9.05	0.13	11	72
Tyva Republic	Bowing	0.77	6.17	0.09	8	72
Tyva Republic	Sprinkling Milk	0.60	5.38	0.07	9	72
Tyva Republic	Splashing Food	0.74	5.17	0.07	7	72
Tyva Republic	Offerings - Food	0.85	5.08	0.07	6	72
Tyva Republic	Sanctification	0.90	4.50	0.06	5	72
Yasawa Fiji	Alcohol - Kava	0.94	75.33	0.72	80	105
Yasawa Fiji	Worship - Ancestral Spirit	0.62	15.50	0.15	25	105
Yasawa Fiji	Smoking - Cigarette	0.53	9.00	0.09	17	105
Yasawa Fiji	Swearing	0.69	6.25	0.06	9	105

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Table S12 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Yasawa Fiji	Quiet	0.79	5.50	0.05	7	105

Table S13: **Cross-cultural models for what angers the local gods – specific codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	Disobedience - Garden Rules	1.00	3.00	0.08	3	37
Coastal Tanna	Disobedience	1.00	3.00	0.08	3	37
Coastal Tanna	Stealing	0.60	2.42	0.07	4	37
Hadza	Violence	0.79	9.50	0.20	12	47
Hadza	Murder	0.77	8.50	0.18	11	47
Hadza	Stealing	0.69	4.83	0.10	7	47
Hadza	Insults	0.58	2.33	0.05	4	47
Inland Tanna	Death	1.00	7.00	0.09	7	74
Inland Tanna	Stealing	0.93	5.60	0.08	6	74
Inland Tanna	Behaviour - Bad	0.92	5.50	0.07	6	74
Inland Tanna	Illness	1.00	5.00	0.07	5	74
Inland Tanna	Disobedience - Garden Rules	0.90	4.50	0.06	5	74
Marajo	Behaviour - Bad	0.88	6.17	0.10	7	60
Marajo	Violence	1.00	5.00	0.08	5	60
Marajo	No Praying	1.00	4.00	0.07	4	60
Marajo	No Faith	0.88	3.50	0.06	4	60
Marajo	Sin	0.88	3.50	0.06	4	60
Marajo	Murder	0.87	3.47	0.06	4	60
Mauritius	Prayer	0.88	7.00	0.14	8	49
Mauritius	Disturbances	1.00	4.00	0.08	4	49
Mauritius	People	0.80	4.00	0.08	5	49
Mauritius	People - Good	1.00	3.00	0.06	3	49
Mauritius	God	0.92	2.75	0.06	3	49
Tyva Republic	Pollution	0.78	14.75	0.20	19	72
Tyva Republic	Pollution - Littering	0.91	13.67	0.19	15	72
Tyva Republic	Pollution - Water	0.93	9.33	0.13	10	72
Tyva Republic	Destruction - Nature	0.74	4.42	0.06	6	72
Yasawa Fiji	Faith	0.91	57.33	0.55	63	105
Yasawa Fiji	God - Word	0.65	27.33	0.26	42	105
Yasawa Fiji	Disturbances - Noise	0.77	12.33	0.12	16	105
Yasawa Fiji	Civil	0.59	8.83	0.08	15	105

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Table S13 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Yasawa Fiji	Truth	0.64	6.42	0.06	10	105
Yasawa Fiji	Disturbances - Noise Inside Koro	0.75	6.00	0.06	8	105
Yasawa Fiji	Clean	0.71	5.67	0.05	8	105
Yasawa Fiji	God - Grace	0.61	5.50	0.05	9	105

Table S14: **Cross-cultural models for what pleases the police – specific codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Coastal Tanna	No Stealing	0.87	7.87	0.19	9	42
Coastal Tanna	Arresting - People	0.83	5.80	0.14	7	42
Coastal Tanna	Peace	0.88	5.25	0.12	6	42
Coastal Tanna	No Violence	0.59	4.10	0.10	7	42
Coastal Tanna	Obedience	0.82	4.10	0.10	5	42
Coastal Tanna	Respect	0.65	3.27	0.08	5	42
Hadza	Peace	1.00	7.00	0.10	7	69
Hadza	Arresting - Criminals	1.00	5.00	0.07	5	69
Hadza	Peace - People	1.00	4.00	0.06	4	69
Inland Tanna	No Stealing	0.71	5.67	0.08	8	72
Inland Tanna	Behaviour - Good	0.74	3.70	0.05	5	72
Lovu Fiji	Honesty	0.85	33.03	0.42	39	79
Lovu Fiji	No Stealing	0.83	29.72	0.38	36	79
Lovu Fiji	Law Abiding	0.61	11.52	0.15	19	79
Lovu Fiji	No Violence	0.58	11.08	0.14	19	79
Lovu Fiji	Behaviour - Good	0.83	6.67	0.08	8	79
Lovu Fiji	People - Good	0.86	6.00	0.08	7	79
Lovu Fiji	No Lies	0.66	5.92	0.07	9	79
Lovu Fiji	Truth	1.00	4.00	0.05	4	79
Lovu Fiji	No Murder	0.56	3.92	0.05	7	79
Marajo	No Stealing	0.80	5.60	0.08	7	69
Marajo	No Crime	0.94	3.75	0.05	4	69
Marajo	Behaviour - Good	0.92	3.67	0.05	4	69
Marajo	Respect	0.69	3.43	0.05	5	69
Mauritius	Work	0.87	7.83	0.10	9	80
Mauritius	Law Abiding	0.58	6.95	0.09	12	80
Mauritius	Bribes	1.00	6.00	0.07	6	80
Mauritius	No Violence	0.67	5.35	0.07	8	80

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Table S14 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Mauritius	No Stealing	0.65	5.22	0.07	8	80
Mauritius	Behaviour - Good	0.63	5.02	0.06	8	80
Mauritius	Peace - Calmness	0.83	5.00	0.06	6	80
Mauritius	People - Good	0.95	4.75	0.06	5	80
Mauritius	Peace	0.91	4.55	0.06	5	80
Mauritius	Discipline	0.62	4.33	0.05	7	80
Tyva Republic	Discipline	0.86	19.87	0.27	23	73
Tyva Republic	Money - Salary	0.71	8.52	0.12	12	73
Tyva Republic	Law Abiding	0.69	8.33	0.11	12	73
Tyva Republic	Helpful	0.71	7.80	0.11	11	73
Tyva Republic	Work	0.74	6.63	0.09	9	73
Tyva Republic	No Alcohol - Drinking	0.69	5.50	0.08	8	73
Tyva Republic	Money	0.52	4.70	0.06	9	73
Tyva Republic	Work - Hard	0.72	4.35	0.06	6	73
Tyva Republic	No Stealing	0.62	4.33	0.06	7	73
Tyva Republic	Truth	0.63	3.78	0.05	6	73
Tyva Republic	No Crime	0.73	3.65	0.05	5	73
Tyva Republic	Helpful - Others	0.72	3.60	0.05	5	73
Yasawa Fiji	Law Abiding	0.70	54.80	0.52	78	105
Yasawa Fiji	Obedience	0.82	32.60	0.31	40	105
Yasawa Fiji	Listening	0.74	23.00	0.22	31	105
Yasawa Fiji	Helpful - Others	0.55	20.20	0.19	37	105
Yasawa Fiji	Truth	0.76	19.00	0.18	25	105
Yasawa Fiji	Caring	0.53	17.00	0.16	32	105
Yasawa Fiji	Loving	0.43	15.60	0.15	36	105
Yasawa Fiji	No Stealing	0.65	14.20	0.14	22	105
Yasawa Fiji	Discipline	0.48	8.60	0.08	18	105
Yasawa Fiji	Socialising	0.40	8.40	0.08	21	105
Yasawa Fiji	Information - Correct	0.68	8.20	0.08	12	105
Yasawa Fiji	Work - Together	0.52	6.80	0.06	13	105
Yasawa Fiji	Cleanliness	0.60	6.00	0.06	10	105
Yasawa Fiji	No Rape	0.51	5.60	0.05	11	105

Table S15: **Cross-cultural models for what angers the police – specific codes**. Only Smith's $S \geq .05$ is reported. n is the number of individuals mentioning each code per culture and is given by dividing sum (S) salience by mean (M) salience. N is the total number of free-list participants per domain and site.

Culture	Code	M Salience	S Salience	Smiths' S	n	N
Coastal Tanna	Stealing	0.83	34.05	0.83	41	41
Coastal Tanna	Violence	0.73	23.33	0.57	32	41
Coastal Tanna	Murder	0.52	7.85	0.19	15	41
Coastal Tanna	Smoking - Marijuana	0.62	5.58	0.14	9	41
Coastal Tanna	Swearing	0.43	3.02	0.07	7	41
Coastal Tanna	Rape	0.43	2.15	0.05	5	41
Hadza	Stealing	0.86	11.17	0.16	13	69
Hadza	Violence	0.83	7.50	0.11	9	69
Hadza	Murder	0.74	5.17	0.07	7	69
Inland Tanna	Stealing	0.84	34.55	0.51	41	68
Inland Tanna	Violence	0.77	13.83	0.20	18	68
Inland Tanna	Murder	0.60	9.63	0.14	16	68
Inland Tanna	Smoking - Marijuana	0.51	6.08	0.09	12	68
Inland Tanna	Behaviour - Trouble	0.94	3.75	0.06	4	68
Inland Tanna	Swearing	0.68	3.40	0.05	5	68
Lovu Fiji	Stealing	0.88	53.47	0.69	61	77
Lovu Fiji	Lies	0.62	19.77	0.26	32	77
Lovu Fiji	Violence	0.68	17.62	0.23	26	77
Lovu Fiji	Murder	0.56	10.08	0.13	18	77
Lovu Fiji	Disobedience - Law	0.62	7.38	0.10	12	77
Lovu Fiji	Rape	0.55	4.92	0.06	9	77
Lovu Fiji	Dishonest	0.54	3.78	0.05	7	77
Marajo	Stealing	0.87	24.23	0.37	28	65
Marajo	Violence	0.74	14.78	0.23	20	65
Marajo	Murder	0.68	11.53	0.18	17	65
Marajo	Drugs - Trafficking	0.75	3.75	0.06	5	65
Marajo	Drugs	0.57	3.45	0.05	6	65
Mauritius	Stealing	0.82	34.23	0.41	42	83
Mauritius	Violence	0.68	24.47	0.29	36	83
Mauritius	Crime	0.73	16.68	0.20	23	83
Mauritius	Rape	0.58	10.50	0.13	18	83
Mauritius	Drugs - Consumption	0.88	9.67	0.12	11	83
Mauritius	Alcohol - Drunks	0.71	7.15	0.09	10	83
Mauritius	Accidents	0.46	5.48	0.07	12	83

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Table S15 – *Continued from previous page*

Culture	Code	M Salience	S Salience	Smiths' S	*n*	*N*
Mauritius	Drugs	0.68	5.47	0.07	8	83
Mauritius	Criminals	0.61	5.45	0.07	9	83
Mauritius	Disrespect - Law	0.72	4.33	0.05	6	83
Mauritius	Mess	0.68	4.10	0.05	6	83
Tyva Republic	Stealing	0.73	18.28	0.26	25	71
Tyva Republic	Alcohol - Drunks	0.68	14.27	0.20	21	71
Tyva Republic	Alcohol - Drinking	0.86	8.60	0.12	10	71
Tyva Republic	Disobedience - Law	0.81	7.33	0.10	9	71
Tyva Republic	Lies	0.52	7.30	0.10	14	71
Tyva Republic	Murder	0.60	6.60	0.09	11	71
Tyva Republic	Crime	0.87	6.10	0.09	7	71
Tyva Republic	No Peace	0.77	4.60	0.06	6	71
Tyva Republic	Cruel	0.69	4.17	0.06	6	71
Tyva Republic	Violence	0.58	4.03	0.06	7	71
Tyva Republic	No Discipline	1.00	4.00	0.06	4	71
Yasawa Fiji	Disobedience - Law	0.69	54.07	0.51	78	105
Yasawa Fiji	Stealing	0.71	45.42	0.43	64	105
Yasawa Fiji	Lies	0.69	29.80	0.28	43	105
Yasawa Fiji	Disobedience	0.82	28.00	0.27	34	105
Yasawa Fiji	Violence	0.54	19.60	0.19	36	105
Yasawa Fiji	Jealousy	0.55	14.40	0.14	26	105
Yasawa Fiji	Rape	0.52	10.93	0.10	21	105
Yasawa Fiji	Swearing	0.56	10.60	0.10	19	105
Yasawa Fiji	Relationship - Bad	0.35	9.80	0.09	28	105
Yasawa Fiji	Intentions - Bad	0.48	9.53	0.09	20	105

Data Availability

All data is available at: https://github.com/bgpurzycki/Evolution-of-Religion-and-Morality.

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