Authors for correspondence:
Zachary H. Garfield
e-mail: zachary.garfield@iast.fr
Shane J. Macfarlan
e-mail: shane.macfarlan@anthro.utah.edu

THE ROYAL SOCIETY PUBLISHING

The content and structure of reputation domains across human societies: a view from the evolutionary social sciences

Zachary H. Garfield[1], Ryan Schacht[2], Emily R. Post[3], Dominique Ingram[3], Andrea Uehling[3] and Shane J. Macfarlan[3]

[1]Institute for Advanced Study in Toulouse, Université de Toulouse 1 Capitole, Toulouse, France
[2]Department of Anthropology, East Carolina University, Greenville, NC, USA
[3]Department of Anthropology, University of Utah, Salt Lake City, UT, USA

ZHG, 0000-0002-1547-1492; RS, 0000-0002-4606-7345; SJM, 0000-0002-6332-9829

Reputations are an essential feature of human sociality and the evolution of cooperation and group living. Much scholarship has focused on reputations, yet typically on a narrow range of domains (e.g. prosociality and aggressiveness), usually in isolation. Humans can develop reputations, however, from any collective information. We conducted exploratory analyses on the content, distribution and structure of reputation domain diversity across cultures, using the Human Relations Area Files ethnographic database. After coding ethnographic texts on reputations from 153 cultures, we used hierarchical modelling, cluster analysis and text analysis to provide an empirical view of reputation domains across societies. Findings suggest: (i) reputational domains vary cross-culturally, yet reputations for cultural conformity, prosociality, social status and neural capital are widespread; (ii) reputation domains are more variable for males than females; and (iii) particular reputation domains are interrelated, demonstrating a structure consistent with dimensions of human uniqueness. We label these features: *cultural group unity*, *dominance*, *neural capital*, *sexuality*, *social and material success* and *supernatural healing*. We highlight the need for future research on the evolution of cooperation and human sociality to consider a wider range of reputation domains, as well as their social, ecological and gender-specific variability.

This article is part of the theme issue 'The language of cooperation: reputation and honest signalling'.

1. Introduction

Reputations are essential for human sociality. Whether used to punish norm violators in small communities or orient behaviour in anonymous online markets, reputations matter [1]. Reputations represent collective beliefs and evaluations a community forms about an individual's behavioural or emotional tendencies [2,3]. They function as currencies in a social marketplace with individuals signalling qualities relative to peers [4,5]. Such signals can reduce transaction costs in the formation, maintenance and termination of relationships by providing information about others without direct experience [6]. Because reputations can facilitate prosocial behaviour and punish deviancy [7], they provide some cognitive scaffolding supporting human sociality, including, the formation of status hierarchies [8,9], social institutions [10] and prosociality [11,12]. Many species rely on reputation-information exchange [13]. Among humans, however, language and gossip create a selective environment whereby reputations have significant social consequences [14–17].

Individual reputations can develop for any domain in which collective information exists on people's behavioural or emotional tendencies [18]. As new formats of social interaction emerge, the human behavioural repertoire becomes unbounded [19], suggesting an unlimited number of potential

reputation domains. Nevertheless, evolutionary scholars have typically focused on a narrow range of reputation domains, such as prosociality [15,20–23], competency [3,24,25], aggressiveness [26–28] and sexuality [29,30]. This research has produced valuable insights on the influence of particular reputation domains on facets of social interaction [4], gendered relationships [30] and the evolution of social systems [31].

Research on reputations has remained agnostic, however, about the scope of reputation domains within societies, their frequency across cultures and potential gender biases [32]. Furthermore, research has often occurred in a piece-meal fashion focusing on a single domain, obfuscating the degree to which domains interact and shape behavioural responses as a suite of integrated parts (however, see [3]). Current scholarship lacks a clear understanding of the content, structure and diversity of reputation domains across societies.

We seek to build a foundation for comparative approaches to reputation domain diversity through exploratory analyses of the ethnographic record. We first derive a list of *a priori* reputation domains (discussed in the electronic supplementary material). We then assess the cross-cultural frequency of evidence for reputation domains and how evidence for gender-specific reputations varies. Lastly, we identify features of reputation domain co-occurrence and the semantic content of ethnography describing reputations. The following aims guide our study:

— aim 1: to assess the distribution of ethnographic evidence for reputation domains;
— aim 2: to identify if reputation domains exhibit systematic gender biases and if these domains vary within gender;
— aim 3: to identify the structure and interrelationships of reputation domains; and
— aim 4: to reveal the semantic content of reputation domains in the ethnographic record.

Existing work provides a strong rationale for both putative universalities in human reputation domains, as well as variation by social, ecological or gender-specific pressures. Using the ethnographic record in a systematic framework, despite limitations and potential biases (see Materials and Methods, Discussion), is a first step in uncovering patterns across human societies.

2. Material and methods

(a) Ethnographic sample and coding

To accomplish our aims we relied on the electronic Human Relations Area Files (eHRAF)—an online database of primary ethnographic documents. It should be noted, the ethnographic record is male-biased given the majority of ethnographers have been men and their writings and observations have generally prioritized (deliberately or not) the behaviour and social lives of men [33,34].

The eHRAF includes thousands of documents from over 300 cultures indexed by subject at the paragraph-level [35]. Users can generate a sample of ethnographic texts (i.e. paragraphs) using Boolean searches of subject codes and/or keywords. Our dataset was compiled using a keyword *and* eHRAF's indexing system, the outline of cultural materials (OCM), which associates each paragraph with any of over 700 subject codes covering a range of topics relevant for the human sciences. We conducted an 'Advanced Search' of the keyword 'reputation' with any of the

OCM subjects: *social personality, personality traits,* or *status, role and prestige.* This search aimed to strike a balance between retrieving a generalizable yet manageable sample of the ethnography of reputations. A limitation is that our search may have omitted particular domains of reputations. See the electronic supplementary material for additional details.

We read the resulting 1383 paragraphs for content, excluding those referencing reputations for groups, non-human entities or ethnographers. We applied these inclusion criteria because our goal is to understand individual reputations within a particular culture. We then aggregated paragraphs from the same document. This resulted in a dataset containing 319 documents from 153 diverse cultures with broad geographical coverage (see the electronic supplementary material, figure S1 and table S1). These documents had a mean word count of 140 (s.d. of 160 and range of 14 to 1957). We refer to this as our *document dataset,* which is publicly available in the *reputation diversity database* R package [36], including bibliographic information, culture sample and all data.

We derived, *a priori,* 20 reputation domains from the scientific literature on human sociality. These include *aggressiveness, bravery, coercive ability, cooperation, cultural conformity, honesty, industriousness, material capital, medicine, neural capital, oration, parental care, prosociality, sexual fidelity, social capital, social status, sociosexuality, somatic capital, supernatural ability* and *teaching* (see the electronic supplementary material for discussion on operationalization and inclusion). Each domain is operationalized as having both a positive and negative valence. For example, evidence for the reputation domain *neural capital*—which includes reputations for generalized or specialized intelligence, special knowledge or cognitive abilities—could be based on evidence that a given society values expertise, as well as evidence indicating that a group actively detests mental ineptitude (or vice versa). Using these operationalized reputation domains, we coded the 319 documents in the *document dataset* for supporting evidence across the 20 reputation domains. Authors decomposed into groups of two were allocated a subset of documents (approximately 106 per pair) to read and code, indicating supporting evidence for each domain and whether the evidence was gendered: male-specific, female-specific or gender neutral. We did not compute inter-coder reliability measures given coders varied in experience reading and coding ethnographic texts and common inter-rater reliability statistics can produce misleadingly low-reliability metrics despite relatively high levels of simple agreement for sparse matrices, such as our data [37,38]. Author-pairs compared coded data to resolve disagreements. For divergent codings, the text and operational definitions were reviewed and consensus reached on the appropriate coding. The aggregated resolved codings constitute our data. See the electronic supplementary material for example text and coding.

(b) Data analysis

The current study is primarily exploratory. We rely on descriptive and exploratory statistical approaches to accomplish our aims. We assess the cross-cultural support for each reputation domain by estimating the proportion of documents providing supporting evidence, including across our gender coding (represented as a percentage estimate). Because our *document dataset* is a sample of the ethnographic record and because multiple documents often described the same culture, we incorporated uncertainty accounting for this non-independence and hierarchical structure with generalized linear mixed-effects regression models (GLMM) with random effects for culture using the lme4 package [39]. Some analyses are agnostic to gender-specific codings and any coding (female-specific, male-specific or gender neutral) counts as supporting evidence, while others account for gender-specific codings.

estimated support for reputation domains
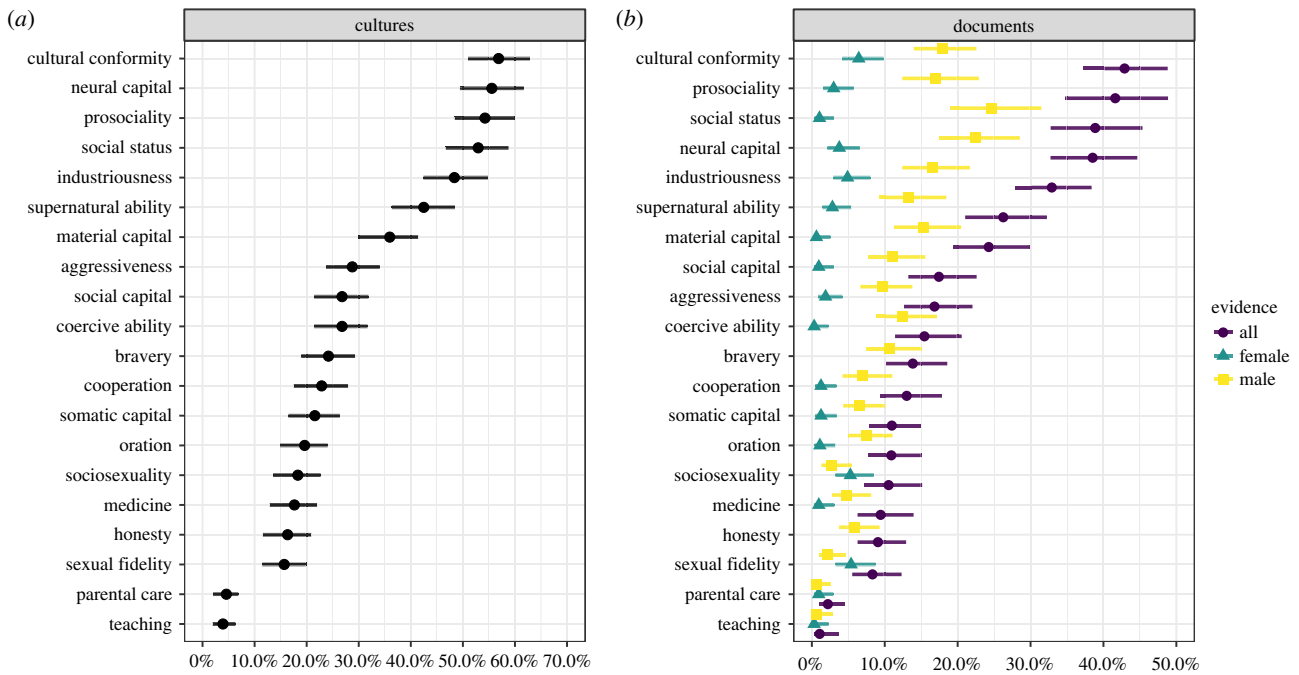
Figure 1. Evidence for reputation domains. (*a*) Percentage of cultures providing at least one supporting document (95% CI estimated using a cluster bootstrap). (*b*) Percentage of documents providing supporting evidence (95% CI computed with intercept-only mixed-effects models). Purple circles: estimates from all data independent of gender coding. Green triangles: estimates from female-specific evidence. Yellow squares: estimates from male-specific evidence.

To estimate the frequency of supporting evidence for each reputation domain, we fit intercept-only GLMMs with random intercepts for culture, with each binary-coded reputation domain as outcomes, for all coded data (i.e. evidence for each reputation domain independent of gender-specific codings). We also fitted identical models for female-specific and male-specific evidence. These GLMMs estimate the proportion of documents providing evidence for the reputation domains (i.e. the fixed effect with 95% confidence interval (CI)) adjusting for the non-independence of documents from the same culture (aims 1 and 2). We also compute the percentage of cultures with at least one document providing supporting evidence for each reputation domain (independent of gender coding), with 95% CI estimated using a cluster bootstrap and 1000 samples with replacement (aim 1).

Using all data, where each row represents the gender-specific evidence for each document, we assess gender-biased evidence for each reputation domain by comparing (via information criterion model selection) an intercept-only GLMM (with random intercepts for documents nested within culture and for culture language family) to similar models which include a gender-term covariate (aim 2).

We rely on hierarchical cluster analysis to identify structure (i.e. features) among reputation domains (aim 3). We then use text-analytic methods and a document-term matrix (DTM) of our corpus of ethnography with penalized regression to identify semantic content predictive of evidence for reputation features (aim 4).

We also investigated sources of bias in our coded data owing to features of the ethnographic record. We used the presence of a female coauthor, document publication year and total pages of ethnography per culture in the eHRAF as predictors of our reputation domains (accounting for the hierarchical document-culture structure and culture language family).

All analyses were conducted with R v. 4.0.2 (22 June 2020).

3. Results

Evidence for reputation domains varied across subsistence types with horticulturalists and agriculturalists over-represented relative to pastoralists and hunter–gatherers (electronic supplementary material, table S1). Evidence was also male-biased. Of the 1252 counts of supporting evidence across domains, 695 (56%) were coded as male-specific, 418 (33%) were coded as gender neutral and 139 (11%) were coded as female-specific (electronic supplementary material, table S2).

Bias assessment analyses did not identify strong evidence of bias owing to our meta-ethnographic measures. Consequently, we did not incorporate such measures in analyses. See the electronic supplementary material for results.

(a) Evidence for reputation domains

For all 20 reputation domains, we report the percentage of cultures that provided at least one count of supporting evidence, independent of gender coding. At the culture-level, the most strongly supported domains, documented in over 50% of cultures included *cultural conformity*, *neural capital*, *prosociality* and *social status* (figure 1*a*).

We report the proportion of documents that provided supporting evidence including gender-specific evidence (figure 1*b*). At the document-level, the most strongly supported domains, represented in over 30% of documents, included *cultural conformity*, *prosociality*, *social status*, *neural capital* and *industriousness*. Evidence for these reputation domains was strongly male-biased, in particular *social status* and *neural capital* which were the most supported male-specific domains. The most strongly supported female-specific reputation domains (although male-biased overall) were *cultural conformity* and *industriousness*. The between-domain variation among female-specific evidence was minimal compared to the male-specific evidence which was more variable. We emphasize the relatively low levels of female-specific evidence could be a feature of systemic male-bias in the ethnographic record, more so than gendered patterns of social or cultural diversity (see Discussion).

To assess gender biases in the supporting evidence for reputation domains, we fitted two binomial GLMMs of each reputation domain using the entire dataset, where each row represents the gender-specific evidence for each document (i.e. female-specific, male-specific, gender neutral; three rows per document). The first model was an intercept-only GLMM with the binary-coded reputation domains as outcomes and random intercepts for document nested within a culture (to account for the repeated measures of evidence type per document and multiple documents per culture) and a random intercept for culture language family (to partially account for shared ancestry). These intercept-only models were compared to similar models which included gender-evidence type as a covariate. We compared the intercept-only models to their respective gender-term models using Akaike information criterion (AIC) [40]. Gender was deemed to be a predictor of reputation domain evidence when AICΔ < −2 [41]. Results are reported in the electronic supplementary material, table S3 and support patterns in figure 1b. Evidence for all domains was male-biased with the following exceptions: *sociosexuality*, *parental care* and *teaching* did not demonstrate gender biases and *sexual fidelity* was female-biased. Two reputation domains (*bravery* and *honesty*) did not produce female-specific evidence and were not included.

(b) Structural features of reputation domains

Evidence for different reputation domains may co-occur within documents, putatively suggesting domain interrelatedness and structure. To identify features (i.e. clusters) of domains we used agglomerative hierarchical cluster analysis. See the electronic supplementary material for details.

Figure 2 displays a dendrogram from cluster analysis of the 20 reputation domains, which includes two estimates of significance for how strongly each cluster is supported by the data. We rely on the approximately unbiased (AU) *p*-values (represented in red at each cluster's 'edge'), which are computed by multiscale bootstrap resampling and represented as percentages (clusters with AU values greater than 95 are strongly supported; top-level clusters are automatically outlined by red rectangles). This revealed five strongly supported clusters we *post hoc* identify as *sexuality*, *dominance*, *supernatural healing*, *social and material success*, and *cultural group unity*. We used these clusters to compute new variables, henceforth reputation domain *features*. Although the cluster capturing *neural capital* and *oration* was only moderately supported (AU = 76), given *neural capital* was among the most frequent domains and oratory abilities are a type of neural capital we computed a *neural capital* feature from this cluster. For each document, these six reputation domain features are coded as 1, when any of the associated domains provided supporting evidence.

We estimated the percentage of cultures providing support for each reputation domain feature using the same cluster bootstrap methods used to estimate the culture-level support for domains. Supporting evidence for the *cultural group unity* and *social and material success* features was common across cultures, documented in 82% and 64% of cultures, respectively. Evidence for the *neural capital* feature was documented in 59% of cultures, the *dominance* feature in 53% of cultures, the *supernatural healing* feature in 44% of cultures and the *sexuality* feature in 23% of cultures (figure 3).

(c) The ethnography of reputation domains

We used text analysis to explore the ethnography of reputation domains in reference to our six features. We created a DTM of all 'informative' words in our corpus of texts which captures the frequency of each unique term within each document. We fitted an elastic net logistic regression model (with the lasso penalty, $\alpha = 1$) of each of the six features as a function of the frequencies of all 8770 unique words (using the glmnet package [43]). Words that were strong positive predictors epitomized the semantic content of documents which provided evidence for that feature. Figure 4 displays non-zero coefficients from elastic net lasso regression models of each reputation domain feature.

Evidence for the *cultural group unity* feature was positively predicted by terms related to social relationships and community (e.g. *family, person* and *wife*) and negatively predicted by terms related to the supernatural (e.g. *spirit* and *shaman*). Evidence for the *social and material success* feature was positively predicted by *wealth, prestige* and terms for leadership and status. Evidence for the *neural capital* feature was positively predicted by *skill, leader* and *village*. Evidence for the *dominance* feature was positively predicted by *war, strong, kill* and *physical* implicating reputations for dominance with conflict, physical formidability and aggression. Negative predictors of the *dominance* feature included *status* and *wealth*, suggesting a distinction between dominance and prestige. Evidence for the *supernatural healing* feature was positively predicted by the terms, *shaman, cure, power* and *medicine*; *woman* was a weak negative predictor. Evidence for the *sexuality* feature was predicted by *girl, woman* and *sexual*.

4. Discussion

The content, structure and diversity of reputation domains across societies are understudied from a holistic perspective. The current study was motivated by a lack of cross-cultural research, despite widespread theorizing in biology, psychology and anthropology regarding the role of reputations for sociality and evolutionary dynamics. Using the eHRAF database, we extracted ethnographic accounts of individual-level reputation domains. Results suggest: (i) there is considerable cross-cultural variability in evidence for reputation domains—some domains are common in the ethnographic record (e.g. *cultural conformity, prosociality*) while others are relatively rare (e.g. *teaching* and *honesty*); (ii) evidence for most reputations are male-biased with male-specific reputation domains more variable than female-specific domains; and (iii) reputation domains cluster within six features: *cultural group unity, dominance, neural capital, sexuality, social and material success*, and *supernatural healing*. Below we interpret results from an evolutionary social science perspective.

(a) Diversity in reputation domains

Most reputation domains (16 of 20) were documented in less than half of sampled cultures (figures 1a and 3). Despite variability, some were more common than others, including reputations for *cultural conformity, prosociality, social status, neural capital* and *industriousness*. These results are notable because of what is missing: 'cooperation'. Evolutionary-oriented scholars have implicated cooperative reputations for explaining human ultrasociality [5,14,15], yet reputations for
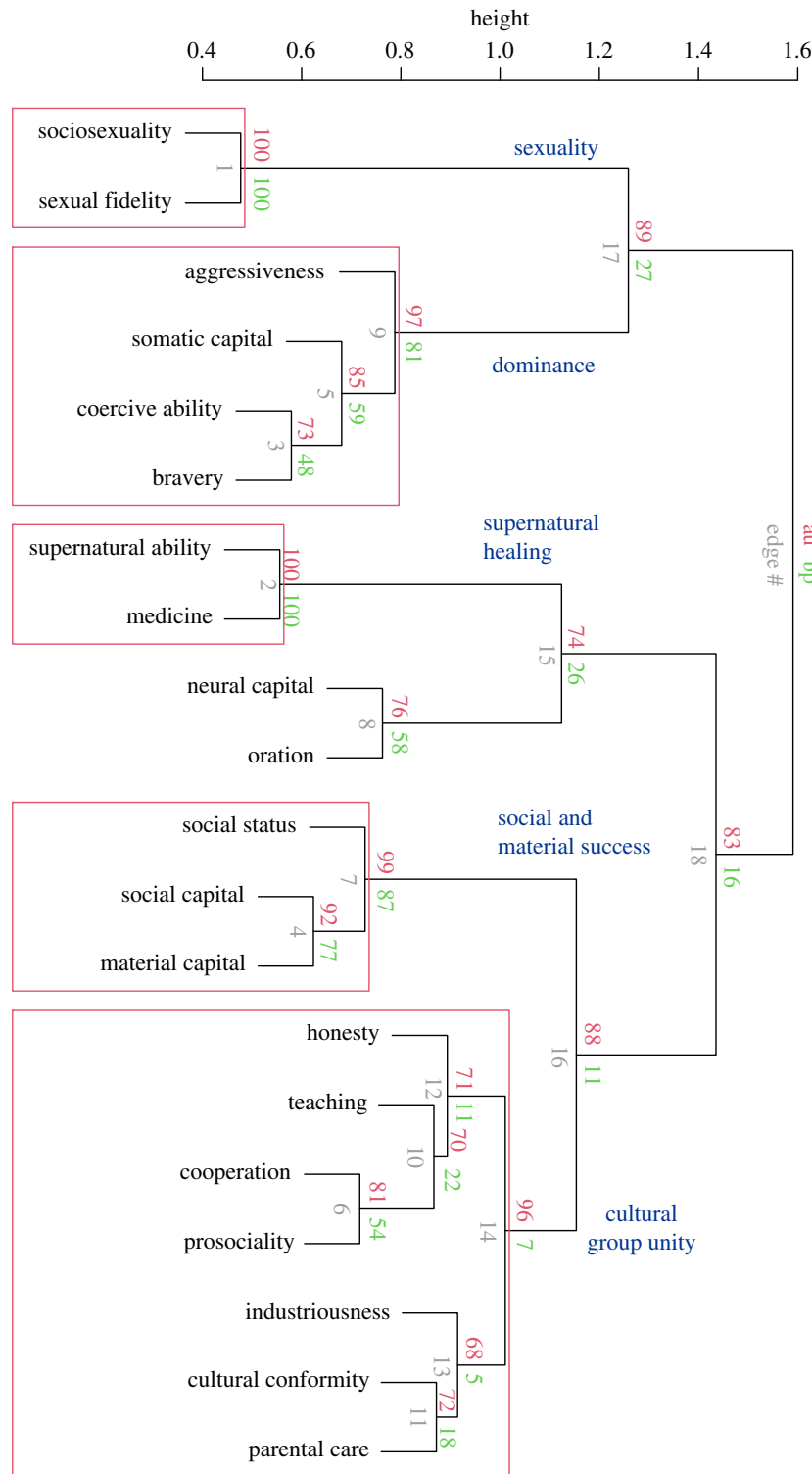
Figure 2. Cluster analysis of reputation domains. Distances were 1 − cor. Ward agglomeration method. AU *p*-values (red) computed with 10 000 bootstrap samples using the pvclust package [42]. Edge number in grey.

'cooperativeness' were documented in only 23% of cultures. Reputations indirectly related to cooperation (e.g. *conformity, honesty, social relationships* and *industriousness*), however, were common across societies. Reputations for cooperation were also captured by the most common feature: *cultural group unity* (figure 3). The limited evidence of reputations for cooperativeness could be owing in part to the nature of the ethnographic record (see Limitations) or a product of our operational definition. We follow developmental and neuro-psychologists [25,44,45] by differentiating cooperation—defined as the likelihood an individual intentionally assists

another in order to achieve a joint goal—from prosociality—defined as the likelihood one will invest in group welfare or act in group-altruistic ways (see the electronic supplementary material for discussion).

While we wish to avoid sweeping claims and emphasize the exploratory nature of our study, these results signal a need to expand research on reputations beyond cooperativeness, incorporating a variety of domains and examining their effect on sociality, particularly in experimental settings (*sensu*, [3]). Across cultures, distinct reputations capturing inter-individual variation in personality, experiences, capacities
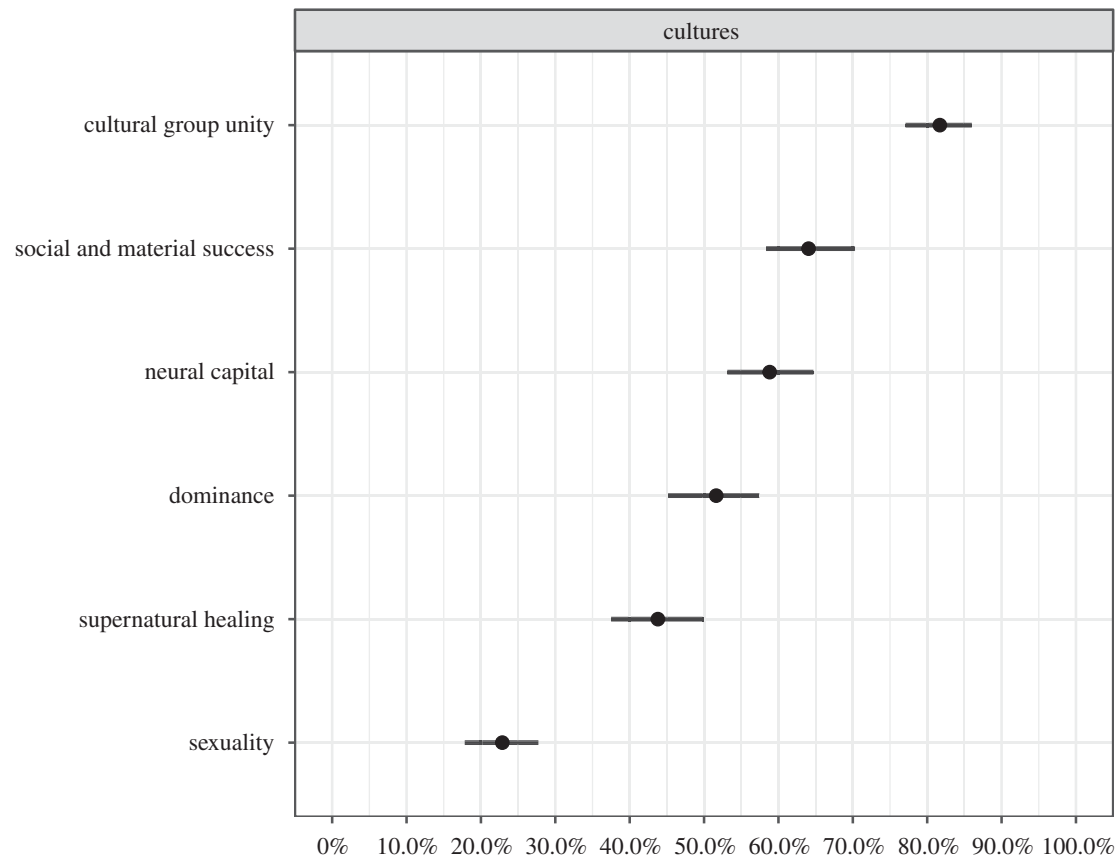
Figure 3. Percentage of cultures providing evidence for reputation features (95% CI estimated via cluster bootstrap).

and reliability, probably underpin much of human sociality, including cooperativeness.

(b) Gender differences in reputation domains

Evidence for most reputation domains was male-biased, and there was greater variance among male than female reputation domains (figure 1b). While this finding is consistent with research demonstrating that, across cultures, male social life is typically more public than female social life [46–48] we cannot disentangle male bias in ethnography from putative male biases in more overt sociality and reputation diversity. This male-biased pattern is consistent, however, with perspectives suggesting societies disproportionately channel opportunities to men to differentiate themselves, at the detriment of women who have fewer avenues to develop social capital [32,47,49,50]. As Rosaldo [48, pp. 393–394] suggests reviewing much ethnography, 'the vast majority of opportunities for public influence and prestige, the ability to forge relationships, determine enmities, speak up in public, use or forswear the use of force are all recognized as men's privilege and right'.

Competition among women, however, has been suggested to be more indirect and reputation-based, compared to men [27,51], which would predict at least some female-specific reputation domains or limited variance between reputation domains of women and men [52]. Some empirical studies of gender differences in social influence among relatively egalitarian societies have found similarity in the weights of particular status-determining attributes between genders, despite male biases in overall influence [50,53]. Future comparative studies should more comprehensively define female-specific

reputation domains and design targeted methods to document supporting evidence [54,55].

The only reputation domain more strongly associated with women than men was *sexual fidelity*; reputations for sociosexuality did not demonstrate gender bias (see [56] for similar results). These findings support evolutionary psychology models drawing on sexual selection theory which predict gender-specific evaluations related to reproductive strategies [29,51] and widespread male reproductive skew specific to influential men [38,57–59]. Overall, reputations related to sexuality were rare in our data. Sexuality may have been a taboo topic in some ethnographic contexts, but the ethnographic record includes rich descriptions of human sexuality [60,61]. It is possible that our search strategy did not capture much of the ethnography of reputations related to sexuality. Nonetheless, findings *do not* provide support for a universal psychology dedicated to evaluating female sexuality vis-à-vis males and *do* support perspectives emphasizing flexibility in reputations, strategies and norms related to sexuality [62].

(c) Reputation domain structure and evolutionary theories

We find reputation domains are structured along six features which we termed *cultural group unity, social and material success, neural capital, dominance, supernatural healing* and *sexuality*. This data-driven, exploratory analysis comports well with theory from evolutionary psychology and the framework of human uniqueness in evolutionary anthropology.

Evolutionary psychologists examining the content of competitor derogation [29] have predicted men will often be evaluated for abilities to control resources necessary for status achievement, attracting mates and reproductive success. We
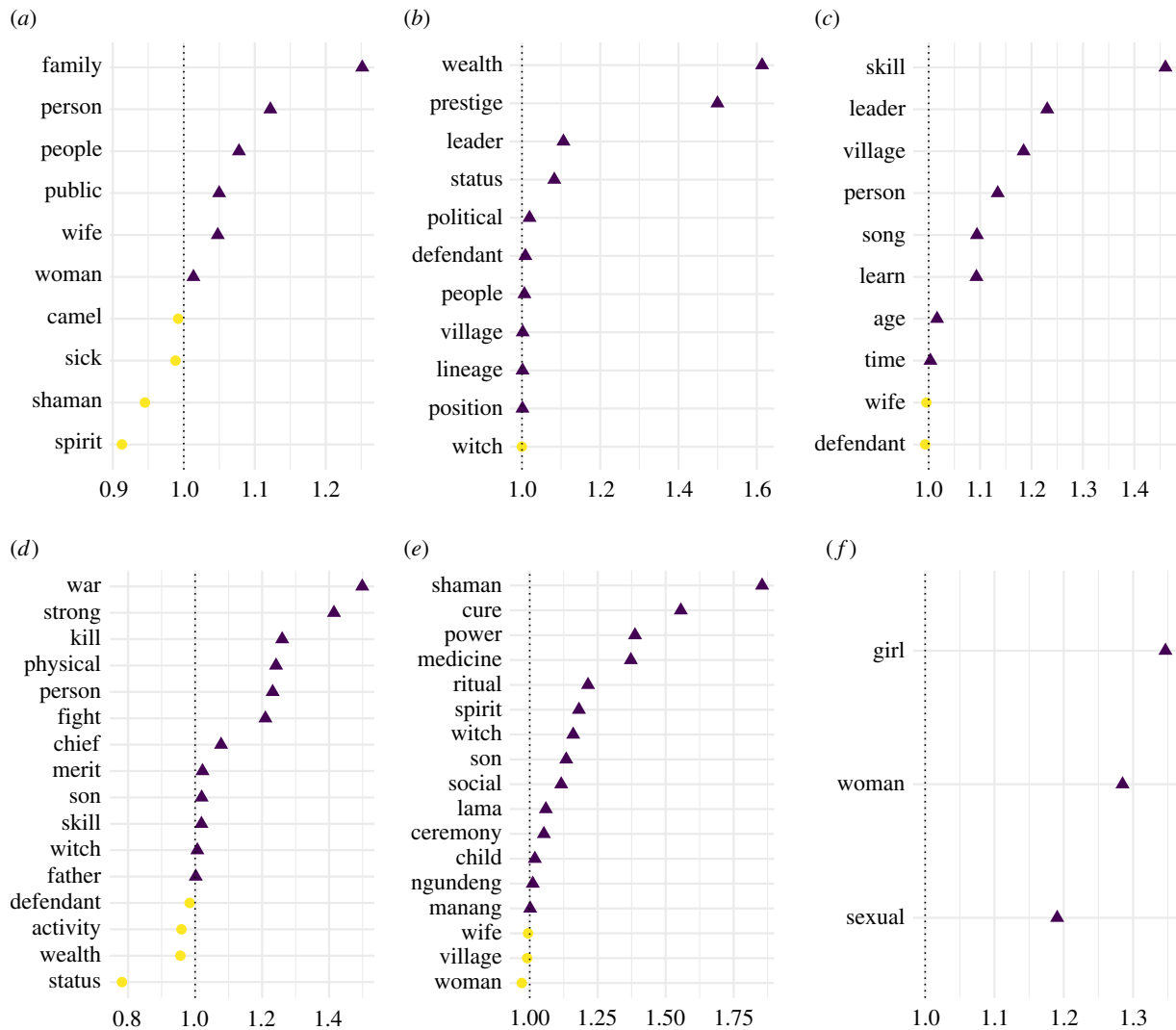
Figure 4. Non-zero coefficients from text analysis elastic net regression models of evidence for reputation features. Coefficients indicate the words in each document which best predicted evidence for the feature. Positive coefficients as purple triangles. Negative coefficients as yellow circles. (a) *Cultural group unity*, (b) *social and material success*, (c) *neural capital*, (d) *dominance*, (e) *supernatural healing* and (f) *sexuality*.

find some support for this claim given the reputation features of *dominance* and *social and material success*. Additionally, evidence for the reputation domains *social status*, *material capital* and *coercive ability* were among the most male-biased domains (figure 1b). Status hierarchies shape the priority of access to resources and scholars have suggested they can be navigated through two distinct (though non-mutually exclusive) pathways: dominance and prestige [8,63,64]. These results support a distinction between dominance and social status or prestige [65,66], indicated by the cluster and text analyses (figures 3 and 4c,d).

Reputations for prestige (our *social and material success* feature) are associated with social networks as well as material resources, more so than reputations for dominance (figures 2 and 4b). These results are consistent with analyses among the Tsimane illustrating inter-relationships between status, social networks and social and material gains from cooperation with high-status individuals [67]. Results also support associations between reputations for dominance and coercion, physical aggression and conflict (figure 4d) [68]. Reputations for bravery were also captured by the *dominance* feature and cross-cultural research identified bravery as a universal feature of prosocial moral values [69]. Taken together, these results

suggest reputations for social status and prestige are often associated with capacities for resource control while reputations for dominance may, in some contexts, be associated with prosocial investments [66,70–72].

The clustering of reputations for *cooperation*, *prosociality*, *conformity*, *honesty*, *teaching* and *industriousness* fits conceptions of the distinct nature of human social cognition, as well as fundamental structures of human groups. For example, scholars suggest human uniqueness relies on an evolved psychology dedicated to reasoning about others having cooperative *and* prosocial motivations [44,45,73]. These models suggest cultural conformity and learning biases lead to the evolution of well-structured groups and better equip groups to compete with others groups [11,74,75]. Such between-group competitive dynamics can occur through altruistic provisioning of group members or through intergroup violence [76,77] and can in turn, further support within-group cooperation [78,79].

Lastly, the *supernatural healing* feature is associated with unique features of the human niche (i.e. religion) and fits long-standing anthropological notions about the important role of religious practitioners (e.g. shamans) who manipulate the supernatural to provide benefits for and impose costs on group members [71,80–82].

5. Limitations

Our study has several limitations. First, our data are limited to the content ethnographers recorded and published. Information on reputations that the ethnographer was unaware of, not interested in, nor permitted to research, constrains available data. Therefore, while we can conclude the widespread ethnographic evidence of some reputation domains probably indicates their cross-cultural importance, we cannot conclude reputation domains lacking substantial evidence are indeed rare across cultures. Additionally, the terms an ethnographer uses for reputation domains may reflect their worldview (etic), rather than the worldview of the focus population (emic). We attempted to assess potential biases in our data owing to meta-ethnographic measures (see the electronic supplementary material); however, it is possible other features of ethnography or ethnographers influenced results.

Ethnographic materials related to the social, economic and cultural lives of women are systematically underreported, especially in the early history of the field [32,33,83]. Thus, the extent to which women have fewer avenues for gaining reputations cross-culturally remains unclear and cannot be evaluated via these methods. However, the evidence of gender biases we discovered comport with the common notion that patriarchy is pervasive globally and negatively impacts women's ability to achieve recognition, political power, economic capital and autonomy (see [84]).

We identified the 20 reputation domains a priori, drawing on the literature on human uniqueness and sexual selection theory, which itself is likely to be biased by authors and general biases across the human sciences. While a useful starting point for exploring reputational diversity, we imagine that other domains could exist. Lastly, we constrained our eHRAF search using the keyword 'reputation', which could have missed other content on reputations that used adjacent language (e.g. personality, gossip). Recognizing these limitations, these results provide greater cross-cultural validity to existing theories of reputation and can spark future empirical and theoretical work better incorporating the cultural diversity, structure and gendered dimensions of reputation domains.

6. Conclusion

Reputations are a critical component of human social life and have fundamental implications for human evolution. From a socio-structural perspective, reputations are the pathways by which societies evaluate individuals and are the mechanisms through which individuals can distinguish themselves. Despite their centrality to much of human sociality, little systematic cross-cultural research exists on the content and structure of reputation domains. We find that ethnographic evidence for reputations is variable across societies, tends to focus on cultural conformity and prosociality, displays large gender biases with greater variance among males and is structured around themes related to human uniqueness.

Drawing on Chapais' [85] distinction between context-independent versus context-dependent human universals, we hypothesize reputations for cultural group unity will be a *context-independent* universal, likely to manifest in all human societies, whereas reputations for social and material success, neural capital, and dominance are more likely to be *context-dependent* universals, promoted or suppressed by socio-ecological or cultural evolutionary processes [86].

References

1. Alexander RD. 1987 *The biology of moral systems*. New York, NY: De Gruyter.

2. Barclay P. 2015 Reputation. In *The handbook of evolutionary psychology* (ed. D Buss), pp. 810–828. Hoboken, NJ: John Wiley & Sons.

3. Macfarlan SJ, Lyle HF. 2015 Multiple reputation domains and cooperative behaviour in two Latin American communities. *Phil. Trans. R. Soc. B* 370, 20150009. (doi:10.1098/rstb.2015.0009)

4. Barclay P. 2013 Strategies for cooperation in biological markets, especially for humans. *Evol. Hum. Behav.* 34, 164–175. (doi:10.1016/j.evolhumbehav.2013.02.002)

5. Milinski M. 2016 Reputation, a universal currency for human social interactions. *Phil. Trans. R. Soc. B* 371, 20150100. (doi:10.1098/rstb.2015.0100)

6. Sugden R. 2005 *The economics of rights, Co-operation and welfare*. Basingstoke, UK: Palgrave Macmillan.

7. Molho C, Wu J. 2021 Direct punishment and indirect reputation-based tactics to intervene against offences. *Phil. Trans. R. Soc. B* 376, 20200289. (doi:10.1098/rstb.2020.0289)

8. Henrich J, Gil-White FJ. 2001 The evolution of prestige: freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evol. Hum. Behav.* 22, 165–196. (doi:10.1016/S1090-5138(00)00071-4)

9. Buss DM, Durkee PK, Shackelford TK, Bowdle BF, Schmitt DP, Brase GL, Choe JC, Trofimova I. 2020 Human status criteria: sex differences and similarities across 14 nations. *J. Pers. Soc. Psychol.* 119, 979–998. (doi:10.1037/pspa0000206)

10. Glowacki L. 2020 The emergence of locally adaptive institutions: insights from traditional social structures of East African pastoralists. *Biosystems* 198, 104257. (doi:10.1016/j.biosystems.2020.104257)

11. Chudek M, Henrich J. 2011 Culture-gene coevolution, norm-psychology and the emergence of human prosociality. *Trends Cogn. Sci.* 15, 218–226. (doi:10.1016/j.tics.2011.03.003)

12. Gintis H. 2000 Strong reciprocity and human sociality. *J. Theor. Biol.* 206, 169–179. (doi:10.1006/jtbi.2000.2111)

13. Subiaul F, Vonk J, Okamoto-Barth S, Barth J. 2008 Do chimpanzees learn reputation by observation? Evidence from direct and indirect experience with generous and selfish strangers. *Anim. Cogn.* 11, 611–623. (doi:10.1007/s10071-008-0151-6)

14. Nowak MA, Sigmund K. 1998 Evolution of indirect reciprocity by image scoring. *Nature* **393**, 573–577. (doi:10.1038/31225)

15. Macfarlan SJ, Remiker M, Quinlan R. 2012 Competitive altruism explains labor exchange variation in a Dominican community. *Curr. Anthropol.* **53**, 118–124. (doi:10.1086/663700)

16. Hess NH, Hagen EH. 2006 Psychological adaptations for assessing gossip veracity. *Hum. Nat.* **17**, 337–354. (doi:10.1007/s12110-006-1013-z)

17. Manrique HM, Zeidler H, Roberts G, Barclay P, Walker M, Samu F, Fariña A, Bshary R, Raihani N. 2021 The psychological foundations of reputation-based cooperation. *Phil. Trans. R. Soc. B* **376**, 20200287. (doi:10.1098/rstb.2020.0287)

18. Giardini F, Wittek R. 2019 *The Oxford handbook of gossip and reputation*. New York, NY: Oxford University Press.

19. Enquist M, Ghirlanda S, Eriksson K. 2011 Modelling the evolution and diversity of cumulative culture. *Phil. Trans. R. Soc. B* **366**, 412–423. (doi:10.1098/rstb.2010.0132)

20. Barclay P. 2004 Trustworthiness and competitive altruism can also solve the 'tragedy of the commons'. *Evol. Hum. Behav.* **25**, 209–220. (doi:10.1016/j.evolhumbehav.2004.04.002)

21. Panchanathan K, Boyd R. 2004 Indirect reciprocity can stabilize cooperation without the second-order free rider problem. *Nature* **432**, 499. (doi:10.1038/nature02978)

22. Macfarlan SJ, Quinlan R, Remiker M. 2013 Cooperative behaviour and prosocial reputation dynamics in a Dominican village. *Proc. R. Soc. B* **280**, 20130557. (doi:10.1098/rspb.2013.0557)

23. Lyle HF, Smith EA. 2014 The reputational and social network benefits of prosociality in an Andean community. *Proc. Natl Acad. Sci. USA* **111**, 4820–4825. (doi:10.1073/pnas.1318372111)

24. Hawkes K, Bird RB. 2002 Showing off, handicap signaling, and the evolution of men's work. *Evol. Anthropol.* **11**, 58–67. (doi:10.1002/evan.20005)

25. Fiske ST, Cuddy AJC, Glick P. 2007 Universal dimensions of social cognition: warmth and competence. *Trends Cogn. Sci.* **11**, 77–83. (doi:10.1016/j.tics.2006.11.005)

26. Benard S. 2013 Reputation systems, aggression, and deterrence in social interaction. *Soc. Sci. Res.* **42**, 230–245. (doi:10.1016/j.ssresearch.2012.09.004)

27. Hess NH, Hagen EH. 2006 Sex differences in indirect aggression psychological evidence from young adults. *Evol. Hum. Behav.* **27**, 231–245. (doi:10.1016/j.evolhumbehav.2005.11.001)

28. Hess NH, Hagen EH. 2019 Gossip, reputation, and friendship in within-group competition: an evolutionary perspective. In *Handbook of gossip and reputation* (eds F Giardini, R Wittek), pp. 275–302. Oxford, UK: Oxford University Press.

29. Buss DM, Dedden LA. 1990 Derogation of competitors. *J. Soc. Pers. Relationships* **7**, 395–422. (doi:10.1177/0265407590073006)

30. Davis A, Vaillancourt T, Arnocky S, Doyel R. 2019 Women's gossip as an intrasexual competition strategy. In *The Oxford handbook of gossip and reputation* (eds F Giardini, R Wittek), pp. 303–321. New York, NY: Oxford University Press.

31. Nowak MA. 2006 Five rules for the evolution of cooperation. *Science* **314**, 1560–1563. (doi:10.1126/science.1133755)

32. Post ER, Macfarlan SJ. 2020 Tracking cross-cultural gender bias in reputations. *Cross-Cultural Res.* **54**, 346–363. (doi:10.1177/1069397120910429)

33. Mukhopadhyay CC, Higgins PJ. 1988 Anthropological studies of women's status revisited: 1977–1987. *Annu. Rev. Anthropol.* **17**, 461–495. (doi:10.1146/annurev.an.17.100188.002333)

34. Abu-Lughod L. 1990 Can there be a feminist ethnography? *Women Perf.* **5**, 7–27. (doi:10.1080/07407709008571138)

35. Ember CR. 2007 Using the HRAF collection of ethnography in conjunction with the standard cross-cultural sample and the ethnographic atlas. *Cross-Cultural Res.* **41**, 396. (doi:10.1177/1069397107306593)

36. Garfield Z, Macfarlan S, Schacht R, Post E, Ingram D, Uehling A. 2021 Zhgarfield/reputationdiversitydata: initial release of the reputationdiversitydata package. Zenodo (doi:10.5281/zenodo.4740791)

37. Syme KL, Garfield ZH, Hagen EH. 2015 Testing the bargaining vs. inclusive fitness models of suicidal behavior against the ethnographic record. *Evol. Hum. Behav.* **37**, 179–192. (doi:10.1016/j.evolhumbehav.2015.10.005)

38. Garfield ZH, Hubbard HR, Hagen EH. 2019 Evolutionary models of leadership: tests and synthesis. *Hum. Nat.* **30**, 23–58. (doi:10.1007/s12110-019-09338-4)

39. Bates D, Mächler M, Bolker B, Walker S. 2015 Fitting linear mixed-effects models using lme4. *J. Stat. Softw.* **67**, 1–48. (doi:10.18637/jss.v067.i01)

40. Burnham KP, Anderson DR, Huyvaert KP. 2011 AIC model selection and multimodel inference in behavioral ecology: some background, observations, and comparisons. *Behav. Ecol. Sociobiol.* **65**, 23–35. (doi:10.1007/s00265-010-1029-6)

41. Burnham KP, Anderson DR. (eds). 2002 *Model selection and multimodel inference: a practical information-theoretic approach*. New York, NY: Springer.

42. Suzuki R, Shimodaira H. 2015 Pvclust: hierarchical clustering with p-values via multiscale bootstrap resampling. See https://CRAN.R-project.org/package=pvclust.

43. Zou H, Hastie T. 2005 Regularization and variable selection via the elastic net. *J. R. Stat. Soc. Ser. B* **67**, 301–320. (doi:10.1111/j.1467-9868.2005.00503.x)

44. Tomasello M, Carpenter M, Call J, Behne T, Moll H. 2005 Understanding and sharing intentions: the origins of cultural cognition. *Behav. Brain Sci.* **28**, 675–691. (doi:10.1017/S0140525X05000129)

45. MacLean EL. 2016 Unraveling the evolution of uniquely human cognition. *Proc. Natl Acad. Sci. USA* **113**, 6348–6354. (doi:10.1073/pnas.1521270113)

46. Hawkes K *et al.* 1993 Why hunter-gatherers work: an ancient version of the problem of public goods [and Comments and Reply]. *Curr. Anthropol.* **34**, 341–361. (doi:10.1086/204182)

47. Smith JE, Ortiz CA, Buhbe MT, van Vugt M. 2020 Obstacles and opportunities for female leadership in mammalian societies: a comparative perspective. *Special Issue Evol. Biol. Leadership* **31**, 101267. (doi:10.1016/j.leaqua.2018.09.005)

48. Rosaldo MZ. 1980 The use and abuse of anthropology: reflections on feminism and cross-cultural understanding. *Signs* **5**, 389–417. (doi:10.1086/493727)

49. Lin N. 2000 Inequality in social capital. *Contem. Sociol.* **29**, 785–795. (doi:10.2307/2654086)

50. von Rueden C, Alami S, Kaplan H, Gurven M. 2018 Sex differences in political leadership in an egalitarian society. *Evol. Hum. Behav.* **39**, 402–411. (doi:10.1016/j.evolhumbehav.2018.03.005)

51. Campbell A. 2002 *A mind of her own: the evolutionary psychology of women*. Oxford, UK: Oxford University Press.

52. Hess NH, Hagen EH. 2021 Competitive gossip: the impact of domain, resource value, resource scarcity and coalitions. *Phil. Trans. R. Soc. B* **376**, 20200305. (doi:10.1098/rstb.2020.0305)

53. Garfield ZH, Hagen EH. 2020 Investigating evolutionary models of leadership among recently settled Ethiopian hunter-gatherers. *Special Issue Evol. Biol. Leadership* **31**, 101290. (doi:10.1016/j.leaqua.2019.03.005)

54. Dahlberg F. 1981 *Woman the gatherer*. New Haven, CT: Yale University Press.

55. Low BS. 2005 Women's lives there, here, then, now: a review of women's ecological and demographic constraints cross-culturally. *Evol. Hum. Behav.* **26**, 64–87. (doi:10.1016/j.evolhumbehav.2004.08.011)

56. Schacht R, Borgerhoff Mulder M. 2015 Sex ratio effects on reproductive strategies in humans. *R. Soc. Open Sci.* **2**, 140402. (doi:10.1098/rsos.140402)

57. von Rueden C, Jaeggi AV. 2016 Men's status and reproductive success in 33 nonindustrial societies: effects of subsistence, marriage system, and reproductive strategy. *Proc. Natl Acad. Sci. USA* **113**, 10 824–10 829. (doi:10.1073/pnas.1606800113)

58. Schacht R, Bell AV. 2016 The evolution of monogamy in response to partner scarcity. *Sci. Rep.* **6**, 32472. (doi:10.1038/srep32472)

59. Schacht R, Rauch KL, Borgerhoff Mulder M. 2014 Too many men: the violence problem? *Trends Ecol. Evol.* **29**, 214–222. (doi:10.1016/j.tree.2014.02.001)

60. Hames R, Garfield ZH, Garfield M. 2017 Is male androphilia a context-dependent cross-cultural universal? *Arch. Sex. Behav.* **46**, 63–71. (doi:10.1007/s10508-016-0855-7)

61. Malinowski B. 1932 *The sexual life of savages*. London, UK: Routledge.

62. Hrdy SB. 2000 The optimal number of fathers. Evolution, demography, and history in the shaping of female mate preferences. *Ann. N Y Acad. Sci.* **907**, 75–96. (doi:10.1111/j.1749-6632.2000.tb06617.x)

63. Van Vugt M, Smith JE. 2019 A dual model of leadership and hierarchy: evolutionary synthesis. *Trends Cogn. Sci.* **23**, 952–967. (doi:10.1016/j.tics.2019.09.004)

64. Cheng JT. 2019 Dominance, prestige, and the role of leveling in human social hierarchy and equality. *Curr. Opin. Psychol.* **33**, 238–244. (doi:10.1016/j.copsyc.2019.10.004)

65. Cheng JT, Tracy JL, Foulsham T, Kingstone A, Henrich J. 2013 Two ways to the top: evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. *J. Pers. Soc. Psychol.* **104**, 103–125. (doi:10.1037/a0030398)

66. von Rueden C. 2014 The roots and fruits of social status in small-scale human societies. In *The psychology of social status* (eds JT Cheng, JL Tracy, C Anderson), pp. 179–200. Berlin, Germany: Springer.

67. von Rueden CR, Redhead D, O'Gorman R, Kaplan H, Gurven M. 2019 The dynamics of men's cooperation and social status in a small-scale society. *Proc. R. Soc. B* **286**, 20191367. (doi:10.1098/rspb.2019.1367)

68. Earle TK. 1997 *How chiefs come to power: the political economy in prehistory*. Stanford, CA: Stanford University Press.

69. Curry OS, Mullins DA, Whitehouse H. 2019 Is it good to cooperate?: testing the theory of morality-as-cooperation in 60 societies. *Curr. Anthropol.* **60**, 47–69. (doi:10.1086/701478)

70. Durkee PK, Lukaszewski AW, Buss DM. 2020 Psychological foundations of human status allocation. *Proc. Natl Acad. Sci. USA* **117**, 21 235–21 241. (doi:10.1073/pnas.2006148117)

71. Garfield ZH, Syme KL, Hagen EH. 2020 Universal and variable leadership dimensions across human societies. *Evol. Hum. Behav.* **41**, 397–414. (doi:10.1016/j.evolhumbehav.2020.07.012)

72. Pietraszewski D. 2020 The evolution of leadership: leadership and followership as a solution to the problem of creating and executing successful coordination and cooperation enterprises. *Special Issue Evol. Biol. Leadership* **31**, 101299. (doi:10.1016/j.leaqua.2019.05.006)

73. Hill K, Barton M, Hurtado AM. 2009 The emergence of human uniqueness: characters underlying behavioral modernity. *Evol. Anthropol.* **18**, 187–200. (doi:10.1002/evan.20224)

74. Boyd R, Richerson P. 1985 *Culture and the evolutionary process*. Chicago, IL: University of Chicago Press.

75. Henrich J, Boyd R. 1998 The evolution of conformist transmission and the emergence of between-group differences. *Evol. Hum. Behav.* **19**, 215–241. (doi:10.1016/S1090-5138(98)00018-X)

76. Bowles S. 2006 Group competition, reproductive leveling, and the evolution of human altruism. *Science* **314**, 1569–1572. (doi:10.1126/science.1134829)

77. Glowacki L, Wilson ML, Wrangham RW. 2020 The evolutionary anthropology of war. *J. Econ. Behav. Org.* **178**, 963–982. (doi:10.1016/j.jebo.2017.09.014)

78. Gavrilets S, Fortunato L. 2014 A solution to the collective action problem in between-group conflict with within-group inequality. *Nat. Commun.* **5**, 3526. (doi:10.1038/ncomms4526)

79. Henrich J, Chudek M, Boyd R. 2015 The big man mechanism: how prestige fosters cooperation and creates prosocial leaders. *Phil. Trans. R. Soc. B* **370**, 20150013. (doi:10.1098/rstb.2015.0013)

80. Singh M, Kaptchuk TJ, Henrich J. 2020 Small gods, rituals, and cooperation: the Mentawai water spirit Sikameinan. *Evol. Hum. Behav.* **42**, 61–72. (doi:10.1016/j.evolhumbehav.2020.07.008)

81. Singh M. 2017 The cultural evolution of shamanism. *Behav. Brain Sci.* **2017**, 1–83.

82. Lightner AD, Heckelsmiller C, Hagen EH. 2021 Ethnoscientific expertise and knowledge specialisation in 55 traditional cultures. *Evol. Hum. Sci.* **3**, 1–52. (doi:10.1017/ehs.2021.31)

83. Rosaldo MZ. 1974 Woman, culture, and society: a theoretical overview. In *Woman, culture and society* (eds MZ Rosaldo, L Lamphere), pp. 17–43. Stanford, CA: Stanford University Press.

84. United Nations Sustainable Development. 2021 Gender equality and women's empowerment. See https://www.un.org/sustainabledevelopment/gender-equality/ (accessed on 27 June 2021).

85. Chapais B. 2014 Complex kinship patterns as evolutionary constructions, and the origins of sociocultural universals. *Curr. Anthropol.* **55**, 751–783. (doi:10.1086/678972)

86. Romano A, Giardini F, Columbus S, de Kwaadsteniet EW, Kisfalusi D, Triki Z, Snijders C, Hagel K. 2021 Reputation and socio-ecology in humans. *Phil. Trans. R. Soc. B* **376**, 20200295. (doi:10.1098/rstb.2020.0295)