



Invariances in the architecture of pride across small-scale societies

Daniel Sznycer^{a,b,1}, Dimitris Xygalatas^c, Sarah Alami^d, Xiao-Fen An^e, Kristina I. Ananyeva^f, Shintaro Fukushima^g, Hidefumi Hitokoto^h, Alexander N. Kharitonov^f, Jeremy M. Koster^{i,j}, Charity N. Onyishi^k, Ike E. Onyishi^l, Pedro P. Romero^m, Kosuke Takemuraⁿ, Jin-Ying Zhuang^e, Leda Cosmides^b, and John Tooby^o

^aDepartment of Psychology, University of Montreal, Montreal, QC, Canada H3C 3J7; ^bCenter for Evolutionary Psychology, Department of Psychological and Brain Sciences, University of California, Santa Barbara, CA 93106-9660; ^cDepartment of Anthropology, University of Connecticut, Storrs, CT 06269; ^dDepartment of Anthropology, University of California, Santa Barbara, CA 93106-3210; ^eSchool of Psychology and Cognitive Science, East China Normal University, Shanghai 200062, China; ^fInstitute of Psychology, Russian Academy of Sciences, 129366 Moscow, Russia; ^gSchool of Cultural and Creative Studies, Aoyama Gakuin University, Tokyo 150-8366, Japan; ^hFaculty of Humanities, Fukuoka University, Fukuoka 814-0180, Japan; ⁱDepartment of Anthropology, University of Cincinnati, Cincinnati, OH 45221-0380; ^jDepartment of Human Behavior, Ecology and Culture, Max Planck Institute of Evolutionary Anthropology, 04103 Leipzig, Germany; ^kDepartment of Sociology and Anthropology, University of Nigeria, 41000 Nsukka, Nigeria; ^lDepartment of Psychology, University of Nigeria, 41000 Nsukka, Nigeria; ^mDepartment of Economics, Universidad San Francisco de Quito, Pichincha 17-0901, Ecuador; ⁿFaculty of Economics, Shiga University, Shiga 522-8522, Japan; and ^oCenter for Evolutionary Psychology, Department of Anthropology, University of California, Santa Barbara, CA 93106-3210

Edited by Steven Pinker, Harvard University, Cambridge, MA, and approved July 6, 2018 (received for review May 16, 2018)

Becoming valuable to fellow group members so that one would attract assistance in times of need is a major adaptive problem. To solve it, the individual needs a predictive map of the degree to which others value different acts so that, in choosing how to act, the payoff arising from others' valuation of a potential action (e.g., showing bandmates that one is a skilled forager by pursuing a hard-to-acquire prey item) can be added to the direct payoff of the action (e.g., gaining the nutrients of the prey captured). The pride system seems to incorporate all of the elements necessary to solve this adaptive problem. Importantly, data from western(-ized), educated, industrialized, rich, and democratic (WEIRD) societies indicate close quantitative correspondences between pride and the valuations of audiences. Do those results generalize beyond industrial mass societies? To find out, we conducted an experiment among 567 participants in 10 small-scale societies scattered across Central and South America, Africa, and Asia: (i) Bosawás Reserve, Nicaragua; (ii) Cotopaxi, Ecuador; (iii) Drâa-Tafilalet, Morocco; (iv) Enugu, Nigeria; (v) Le Morne, Mauritius; (vi) La Gaulette, Mauritius; (vii) Tuva, Russia; (viii) Shaanxi and Henan, China; (ix) farming communities in Japan; and (x) fishing communities in Japan. Despite widely varying languages, cultures, and subsistence modes, pride in each community closely tracked the valuation of audiences locally (mean $r = +0.66$) and even across communities (mean $r = +0.29$). This suggests that the pride system not only develops the same functional architecture everywhere but also operates with a substantial degree of universality in its content.

cognition | emotion | cooperation | morality | culture

Evidence from behavioral ecology, archaeology, and contemporary forager societies suggests that our hominin ancestors evolved in an ecology characterized by high rates of mortality, scarcity and high variance in food acquisition (1), high incidence of disease and injury (2), and attacks by predators and conspecifics (3, 4). Reliance on fellow group members, including non-kin, for the assistance necessary to survive and reproduce is a distinctively human characteristic (5). Indeed, mutual aid has been such a universal and basic feature of forager subsistence that it is believed to be central to the evolutionary biology of our species. In this social ecology, it would have been essential to incentivize mates, cooperative partners, and fellow group members to value one's welfare so that they would be inclined to render assistance in times of hunger, incapacitation, and interpersonal conflict (2). The extent to which fellow group members valued, helped, and refrained from exploiting an individual and the extent to which they deferred to the individual in conflicts of interests would have sensitively impacted whether

that individual reproduced successfully, struggled, or died early (6).

In general, there are two classes of bargaining tactics organisms have available for influencing others' choices. First, they can conditionally inflict costs—aggression; second, they can bestow (or withhold) benefits—altruism. The first causes individuals to be respected (or feared). The second causes individuals to be valued. Thus, it might be advantageous to put weight on another's welfare, (i) because the individual is formidable and could inflict costs if not propitiated or (ii) because the individual's actions or existence make positive fitness contributions to the valuer, which would be diminished or lost if assistance was not given. Here, we call these two components respect (for formidability) and valuation (for positive fitness contributions)—also referred to as dominance and prestige (7). Being respected and being favorably valued by others were resources, and selection on our ancestors would have shaped the human motivational system to cost-effectively promote access to both of those different types of resources.

Because nonhumans are far more limited in the kinds of assistance that they can render each other, almost all nonhuman

Significance

It has been proposed that one key function of pride is to guide behavior in ways that would increase others' valuation of the individual. To incline choice, the pride system must compute for a potential action an anticipated pride intensity that tracks the magnitude of the approval or deference that the action would generate among local audiences. Data from industrial mass societies support this expectation. However, it is presently not known whether those data reflect cultural evolutionary processes or a panhuman adaptation. Experiments conducted in 10 traditional small-scale societies with widely varying cultures and subsistence modes replicate the pattern observed in mass societies. This suggests that pride is a universal system that is part of our species' cooperative biology.

Author contributions: D.S. designed research; D.X., S.A., X.-F.A., K.I.A., S.F., H.H., A.N.K., J.M.K., C.N.O., I.E.O., P.P.R., K.T., and J.-Y.Z. performed research; D.S. analyzed data; and D.S., D.X., L.C., and J.T. wrote the paper.

The authors declare no conflict of interest.

This article is a PNAS Direct Submission.

Published under the PNAS license.

¹To whom correspondence should be addressed. Email: dsznycer2@gmail.com.

This article contains supporting information online at www.pnas.org/lookup/suppl/doi:10.1073/pnas.1808418115/-DCSupplemental.

Published online August 1, 2018.

bargaining is based on aggression. Differences in the ability to inflict costs (formidability or resource holding power) led to adaptations for the advertisement of formidability and adaptations for assessing own and others' formidability (8, 9). In group-living species, dominance hierarchies emerge from patterns of deference to those with more formidability—individuals cede resources or rank to avoid being harmed (10).

Although humans fully retain and exploit phylogenetically ancient adaptations for aggression and dominance [including systems for threat, fighting, display, and assessment (8, 10–12)]—as seen in groups of children, adolescents, and adults (13–16)—human evolution was distinctive in the greatly expanded role that mutual assistance played in daily group living, and hence in the reproductive fortunes of individuals (2, 17). The hominin entry into the cognitive niche (involving the emergence and integration of intelligence, language, tool use, coordination, and culture) greatly amplified the opportunities for mutually advantageous prosocial interactions (18, 19). As our ancestors entered the cognitive niche and became hunter-gatherers, there would have been novel and intense selection for adaptations designed to make the self valuable to others, and hence recruit assistance from others. We hypothesize that the emotion of pride functions as an evolved guidance system that modulates behavior to cost-effectively manage and capitalize on the propensities of others to both respect and value the actor.

Mechanisms favoring the valuation of others evolved through several distinct selection pressures, including kin selection (20), reciprocation (21), reputation (22), risk pooling (1), externality management (23), and (substituting respect for valuation) the asymmetric war of attrition (24). These selection pressures, in turn, crafted an array of specialized choice architectures to promote altruistic (or selfish) decisions given the information available to the actor about a potential recipient [e.g., how to respond to cues of the recipient's relatedness, skills, trustworthiness, or ability to defend her interests (25)]. This implies that humans will have evolved a neurocognitive architecture for computing the social value of others, which governs altruistic behavior (26). We note that formidability—the ability to inflict costs through aggression—commonly incentivizes others (in bargaining contexts) to place more weight on the welfare of the more formidable, even when such aggressive capacity is not deployed in ways that help others. Hence, both the ability to confer benefits (e.g., skills, the emission of positive externalities) and the ability to inflict costs should act as inputs to the systems that compute the social value of others (7, 11, 15).

In short, others' assessments of the acts and characteristics of a focal individual lead them to value (or devalue) her. When others (an audience) detect new information about an individual that is at odds with their current level of valuation, their valuation is recalibrated either upward or downward, with correspondingly positive or negative effects on the individual's fitness (26). This would have selected on the recipient's end for motivational adaptations to cost-effectively manage the flow of information about the self to others (27). Indeed, cross-cultural evidence has recently provided support for the hypothesis that the emotion of shame is a neurocognitive adaptation that evolved to prevent audiences from receiving negative information about the individual and to limit the degree and costs of devaluation [e.g., by signaling submission to avoid aggression from audiences (10, 12)] if negative information does spread (28–32).

Reciprocally, the neurocomputational system that organizes the emotion of pride seems to be an adaptation that evolved to pursue and advertise acts or traits leading to enhanced respect and valuation of the individual in the minds of others. A system designed for this function should orchestrate a suite of cognitive mechanisms that (i) motivate the pursuit of acts or the cultivation of traits that would increase others' respect and valuations of the individual; (ii) motivate the advertisement of acts or characteristics that,

when discovered by others, would lead them to increase their respect and valuations of the individual; and (iii) mobilize the individual to profit from the resulting enhanced social landscape (e.g., by pursuing gainful activities previously beyond reach or pressing for better treatment from others). This “advertisement–recalibration theory of pride” (33; see also refs. 10, 12, 34) deductively emerges from the integration of the dynamics of audience recalibration with evolutionary models of human dominance and valuation, which specify the direction and magnitude of those recalibrations.

Existing findings on pride are strongly consistent with this theory of its functional architecture. Pride-like behavior is taxonomically widespread [including primates (35, 36), cervids (37, 38), canids (39), and invertebrates (40)], and therefore phylogenetically ancient. Pride occurs in every known culture (41) and it appears reliably and early in development—as early as in toddlers (42, 43). Pride is triggered by achievements (42), aggressive formidability (44), and other socially valued characteristics. Pride is a highly pleasant emotion (45); this internal reward can incentivize people to undertake and persevere at costly but socially valued courses of action (46, 47). Pride has a full-body display featuring an erect and expanded posture and gaze directed at the audience (12, 42, 48), and thus it appears to generate common knowledge about the individual's enhanced value (49). This display conveys achievement or dominance (10, 12, 50, 51), is produced by congenitally blind individuals (45), and is recognized by young children (52) and by adults within and across cultures (53). Thus, pride and related indicators of being respected and valued affect second and third parties in lawful fashion: They appeal to potential mates (54, 55) (presumably because they indicate good genes, health, resource holding potential, and other types of embodied, social, and material capital); guide social learning through imitation (56, 57); elicit submissiveness (58); and intimidate rivals (10, 59), which reduces agonistic interactions (24) and stabilizes dominance hierarchies (60).

We note that human pride and its obverse, shame, are evolutionarily derived from physiological and behavioral features undergirding dominance and submission (10, 12, 17, 61, 62)—as articulated by the Dominance Hierarchy Model of pride and shame (10)—and various aspects of those emotions (e.g., the displays) are homologous with those of nonhuman primates (10). For example, receiving a pride display may elicit submission, while receiving a shame display may terminate aggression. Thus, these two complementary systems reduce overt conflict and subsequent attacks (refs. 10 and 63; nonhuman primate examples are in refs. 37, 64, and 65). Pride provides an internal reward for competitive success, whereas shame punishes failure; since much animal competition, including human competition, is ultimately over reproductive opportunities (40, 66–68), this may account for the heightened hubristic pride and, to a lesser extent, shame observed during adolescence and early adulthood (69).

The decision-making architecture of a social organism should evaluate and integrate two kinds of payoffs to regulate behavior adaptively: (i) the direct payoff of the potential action (e.g., the value of foraging for a food item) and (ii) the social valuation payoff [e.g., showing bandmates that one is a skilled forager by pursuing a hard-to-acquire prey item (70)]. According to the advertisement–recalibration theory, the feeling of pride is an internal signal of the estimated social valuation payoff—a payoff that can motivate, for example, status-seeking behavior.

One central prediction of the theory then is that the intensity of the feeling of pride will track the magnitude of audience evaluations incrementally and closely for each kind of information. This calibration is necessary if the intensity of the internal signal (anticipatory pride) is used prospectively to compute whether the benefit of enhanced audience valuation or respect outweighs the cost of engaging in a given act—and to decide whether the likely net payoff of a candidate act will make that act worth pursuing. An internal pride signal that is too weak

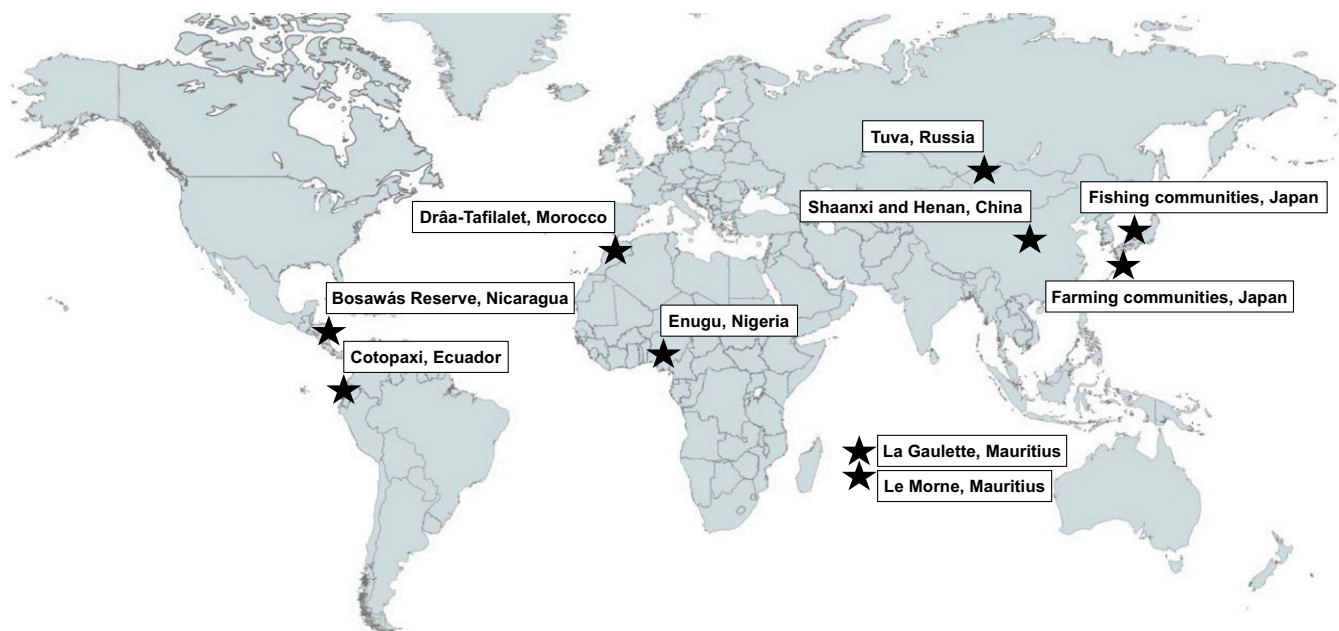


Fig. 1. Map of the 10 field sites.

compared with the prevalent magnitude of audience valuation would lead to maladaptive choices where the relevant act is insufficiently pursued (or if achieved, underadvertised), the increase in valuation in the audience is less than what it would be under more complete knowledge resulting from fuller advertisement, and the individual foregoes valuation that would have been cost-effective to acquire. A pride signal that is too strong yields diminishing or even negative returns, as beneficial courses of action are pursued in excess of their actual return, and moreover, audiences are designed to resist and devalue entitled actions that exceed the individual's actual social value (71, 72). To avoid these errors, the pride system should estimate the magnitude of valuation that a given act would cause among local audiences and calibrate the intensity of its internal signal in proportion to those estimates. This internal signal is expected to be equally well-calibrated for traits (e.g., physical formidability) and other attributes (e.g., sibling of chief) for the individual to know the right degree of advertisement and entitlement afforded by those attributes. Pride is sometimes referred to as a self-conscious (73) or self-focused (74) emotion; however, the preceding analysis suggests that a well-designed pride system must be coupled to the evaluative psychology of others. Importantly,

because the internal pride signal is used by the systems that decide how to act, the intensity of felt pride should track the magnitude of audience valuation even when there is no communication between audiences and the individual who is evaluating alternative courses of action based on anticipated pride. The internal pride signal is useful for promoting audience valuation and respect by choosing certain acts, displays, and modes of conduct over others. The system generating this signal would be handicapped if it needed to observe audience valuation to know its magnitude instead of computing those magnitudes in advance.

These predictions were tested experimentally in 16 countries: the United States, Canada, the United Kingdom, France, Belgium, The Netherlands, Switzerland, Italy, Turkey, Israel, India, Singapore, the Philippines, South Korea, Japan, and Australia (33). Subjects were given a set of scenarios that tapped situations likely to vary in how much valuation the actions or traits that they described might elicit. One group of subjects rated how positively they would evaluate the person described in each scenario. A second independent group of subjects rated how much pride they would feel if they were the person described in the situation. As predicted, the intensity of anticipated pride for a given act or trait closely tracked the corresponding magnitude of audience valuation. This result replicated

Table 1. Demographic information (samples A–J)

Community	Economy	Religion	<i>N</i>	<i>N</i> female	Age, <i>y</i> (SD)
Bosawás Reserve, Nicaragua	Foraging, horticulture	Syncretic Catholicism	46	23	40 (12)
Cotopaxi, Ecuador	Subsistence agriculture, pastoralism	Evangelism	34	25	41 (18)
Drâa-Tafilalet, Morocco	Subsistence agriculture	Sunni Islam	75	43	32 (13)
Enugu, Nigeria	Subsistence agriculture	Catholicism	80	39	34 (8)
Le Morne, Mauritius	Fishing, farming, wage labor	Catholicism	80	33	40 (13)
La Gaulette, Mauritius	Fishing, farming, service sector	Hinduism	80	53	35 (12)
Tuva, Russia	Seminomadic pastoralism	Shamanism, Buddhism	29	22	36 (13)
Shaanxi and Henan, China	Farming	Mostly nonreligious	41	17	41 (12)
Farming communities, Japan*	Farming, wage labor	Buddhism, Shintoism	50	23	68 (11)
Fishing communities, Japan†	Fishing, farming, wage labor	Buddhism, Shintoism	52	18	66 (12)

Means (SDs in parentheses).

*Participants sampled from 13 communities (in three prefectures) where at least 25% of the residents are farmers.

†Participants sampled from 13 communities (in three prefectures) where at least 25% of the residents are fishers.

in each of the 16 countries. Importantly, valuation was tracked specifically by pride. Excitement, amusement, and happiness—three other positively valenced and arousing emotions and states that coactivate with pride—failed to track audience valuation.

Although this 16-nation experiment is suggestive, those populations are all western(-ized), educated, industrialized, rich, and democratic mass societies (75) and importantly, are in close media contact, sharing many norms, values, and attitudes. Hence, the goal of these studies is twofold. (i) The claim being evaluated is that the pride system is a fundamental part of human biology, and therefore, the signature of its operation should be detectable in all human societies, no matter how widely distributed and mutually unfamiliar they are. (ii) By hypothesis, the pride system evolved in small-scale face-to-face social groups where people knew each other, and therefore, it is important to assess the evidence for its operation in small coresidential social ecologies.

Is the tracking of audience valuation by pride limited to industrial mass societies? Or does this tracking occur throughout the range of human societies, potentially reflecting the operation of a panhuman pride system? To answer this question, we conducted an experiment with 567 adult participants from 10 small-scale communities living in widely different physical ecologies and featuring very different languages, cultures, and modes of subsistence: (i) Bosawás Reserve, Nicaragua; (ii) Cotopaxi, Ecuador; (iii) Drâa-Tafilalet, Morocco; (iv) Enugu, Nigeria; (v) Le Morne, Mauritius; (vi) La Gaulette, Mauritius; (vii) Tuva, Russia; (viii) Shaanxi and Henan, China; (ix) farming communities in Japan; and (x) fishing communities in Japan (Fig. 1 and Table 1). We created 10 scenarios in which someone's acts, traits, or circumstances might lead her to be viewed positively. The scenarios were designed to elicit reactions in a variety of evolutionarily relevant domains, such as generosity, social exchange, dominance contests, skills, and health. They were expressed at a level of abstraction that was not culturally particular (e.g., "You have many skills" rather than "You know how to bake and how to pilot airplanes").

The experimental design was adapted from Sznycer et al. (33). Participants were randomly assigned to either an audience condition or a pride condition. Participants in the audience condition were asked to provide their reactions to 10 scenarios involving a third party: a same-sex individual other than themselves (e.g., "He has many skills," "He is generous with others," "He can defend himself, so people never push him around"). These participants were asked, for each scenario, to "indicate how you would view this person if this person was in those situations"; they indicated their reactions using scales ranging from one (I would not view them positively at all) to four (I would view them very positively). These ratings provide situation-specific measures of the degree to which members of a given population would positively evaluate the individual described in the scenarios.

In the pride condition, a different set of participants was asked to "indicate how much pride you would feel if you were in those situations" (i.e., in each of the 10 scenarios; e.g., "You have many skills," "You are generous with others," "You can defend yourself, so people never push you around"), with scales ranging from one (no pride at all) to four (a lot of pride; the exceptions being Bosawás Reserve, Nicaragua and Drâa-Tafilalet, Morocco, where valuation and pride were measured on 1–3 and 1–7 scales, respectively). The stimuli in the audience condition and the pride condition were identical on a scenario-by-scenario basis, the only difference being the perspective from which the events are described.

Results

Within-Community Results. First, we report the valuation and pride results for each community (SI Appendix, SI Text and Tables S1–S2j). There was widespread agreement on how valuation-enhancing these situations are relative to one another: mean intraclass correlation (ICC) across the 10 communities: ICC (2, n) = 0.70 (SI Appendix, Table S3). In other words, participants agreed about

the extent to which they would positively view the individual described in these scenarios. Participants also agreed about the relative degree to which these various situations would elicit pride: mean ICC (2, n) = 0.61 (SI Appendix, Table S3). To test the main prediction that pride tracks audience valuation, we calculated, for each scenario, the mean pride ratings provided by participants in the pride condition and the mean valuation ratings provided by participants in the audience condition. Pride and valuation means were highly correlated with one another within each community, with a mean $r = 0.66$ (SD = 0.24; minimum $r = 0.36$; maximum $r = 0.92$; $N r$ values = 10) and P values = 0.0002–0.31 (Fig. 2 and Table 2, diagonal values). Recall that the pride ratings and the valuation ratings originate from different participants. Consequently, these high correlations cannot be attributed to participants matching their pride ratings and valuation ratings. This is consistent with the primary hypothesis.

Between-Community Results. The pride system evolved for making decisions in—and tracking the values of—one's local group and not people from other cultures. Obviously, there would have been no selection to map the valuations of persons with whom one has never interacted. However, if there is a human-universal system of social valuation, then scenarios that tap this system

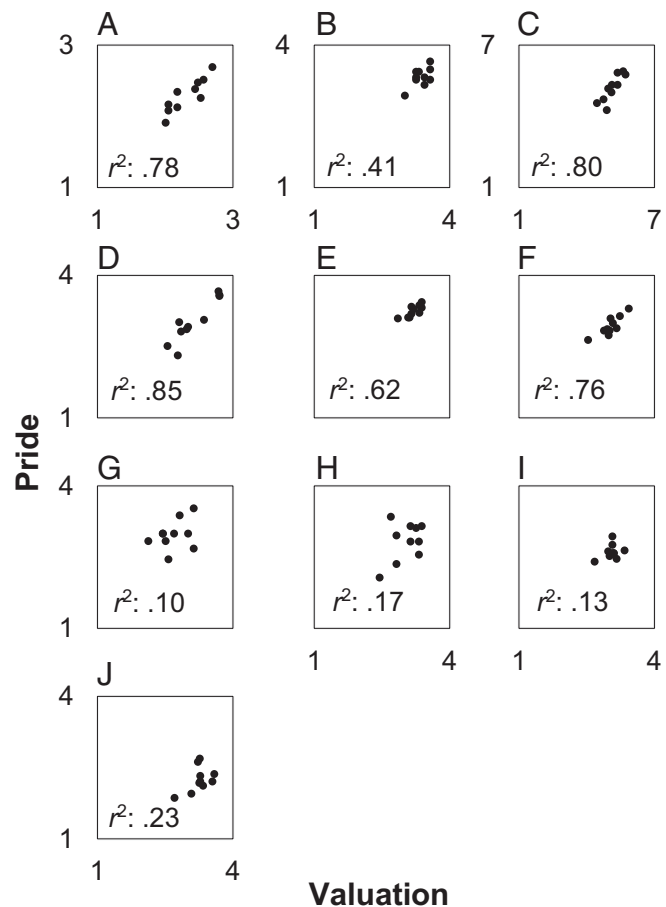


Fig. 2. Scatterplots: pride as a function of valuation (samples A–J). Each point represents the mean pride rating and mean valuation rating of one scenario. Pride ratings and valuation ratings were given by different participants. N on which the correlations are based is the number of scenarios = 10. Effect size: r^2 linear. (A) Bosawás Reserve, Nicaragua; (B) Cotopaxi, Ecuador; (C) Drâa-Tafilalet, Morocco; (D) Enugu, Nigeria; (E) Le Morne, Mauritius; (F) La Gaulette, Mauritius; (G) Tuva, Russia; (H) Shaanxi and Henan, China; (I) farming communities in Japan; and (J) fishing communities in Japan.

Table 2. Correlations between pride and valuation within and between communities (samples A–J)

Pride	Valuation									
	A	B	C	D	E	F	G	H	I	J
(A) Bosawás Reserve, Nicaragua	0.88*	0.07	0.77*	0.60	0.56	0.57	0.87*	0.46	0.16	0.33
(B) Cotopaxi, Ecuador	0.62	0.64*	0.16	−0.01	0.06	0.05	0.24	0.35	0.77*	0.86*
(C) Drâa-Tafilalet, Morocco	0.77*	0.03	0.87*	0.77*	0.63	0.59	0.80*	0.22	0.32	0.31
(D) Enugu, Nigeria	0.11	−0.35	0.76*	0.92*	0.39	0.33	0.68*	−0.16	−0.04	−0.09
(E) Le Morne, Mauritius	0.60	0.11	0.56	0.37	0.79*	0.72*	0.65*	0.47	0.33	0.48
(F) La Gaulette, Mauritius	0.37	0.26	0.43	0.52	0.77*	0.87*	0.64*	0.51	−0.09	0.10
(G) Tuva, Russia	0.51	0.04	0.39	0.39	−0.05	0.45	0.36	0.32	−0.05	0.12
(H) Shaanxi and Henan, China	0.20	0.05	0.39	0.24	0.80*	0.58	0.53	0.42	0.03	0.23
(I) Farming communities, Japan	0.10	0.43	−0.42	−0.62	−0.06	−0.19	−0.29	0.48	0.36	0.36
(J) Fishing communities, Japan	−0.02	0.44	−0.41	−0.52	−0.10	−0.20	−0.30	0.46	0.51	0.48

Coefficients are Pearson’s *r* values. *N* on which the correlations are based is the number of scenarios = 10. Pride ratings and valuation ratings were given by different participants. Grey cells, within-community correlations.
*Correlations meet $P < 0.05$ or less.

may elicit agreement across cultures about what is worthy of valuation and pride, and pride in a given culture may track valuation in other cultures, despite a lack of contact between them. Are there situations that provoke valuation and elicit pride across cultures? To test for between-community agreement in valuation, in pride, and in the pride–valuation link, we computed the extent to which the mean valuation ratings and the mean pride ratings are correlated across communities. There is between-community agreement on average on the extent to which a given situation would elicit valuation: mean $r = 0.37$ ($SD = 0.30$; minimum $r = -0.26$; maximum $r = 0.91$; $N r$ values = 45) and P values = 0.0002–0.96 (*SI Appendix, Table S4*). There is also between-community agreement on the extent to which a given situation would elicit pride: mean $r = 0.20$ ($SD = 0.38$; minimum $r = -0.80$; maximum $r = 0.92$; $N r$ values = 45) and P values = 0.0002–0.99 (*SI Appendix, Table S5*). Furthermore, the pride elicited in each of 10 communities is positively correlated on average with the valuation from the other 9 communities: mean $r = 0.29$ ($SD = 0.34$; minimum $r = -0.62$; maximum $r = 0.87$; $N r$ values = 90) and P values = 0.001–0.98 (Table 2, off-diagonal values)—71 of these 90 correlations (79% of them) have a positive sign. Although there is substantial variation in the extent to which pride tracked valuation across communities, including null and negative correlations, the pride elicited by these scenarios in one community (e.g., Mayangna forager–horticulturalists of the Bosawás Reserve, Nicaragua) tended to track how positively people viewed these scenarios in the other communities (e.g., pastoralists from Tuva, Russia; Amazigh farmers from Drâa-Tafilalet, Morocco; and farmers from Enugu, Nigeria). Of course, some actions, traits, and situations elicit valuation and pride in some cultures but not others (33, 70).

Discussion

A cross-culturally replicable, close quantitative correspondence between anticipated pride and the valuation of local audiences is what one expects of a computational system that is well-designed for furthering the social value of the individual in the minds of others. Features causing this close calibration assist the individual in balancing the competing demands of effectiveness and restraint by steering between an internal pride signal that is too strong (which would lead to, for example, the overpursuit of socially valued acts) and one that is too weak (which would, for example, insufficiently motivate acts that are socially valued). This match is not limited to industrial mass societies but generalizes across populations with widely different cultures, subsistence modes, institutions, and languages. Thus, this feature is more likely to originate in a human-universal adaptation designed by natural selection than in cultural evolutionary processes (76). The

agreement across cultures, and not just within them, on pride, valuation, and their interrelationship is noteworthy. According to some accounts, different cultures are richly and arbitrarily different from each other (77). If this were true, then what cultures value and what members of different cultures are proud about should be radically different. Cultural differences in pride and in the underlying items granted respect and valuation do exist, as shown here and elsewhere (45, 78, 79). However, these cultural differences can be adaptively patterned (33), and therefore cultural variation is not necessarily divorced from the logic of adaptive functionality. Moreover, regularities across vastly disparate cultures can emerge when pride is analyzed from the standpoint of its probable function and target domain. These data contribute to a growing body of findings indicating that theories of adaptive function are a powerful tool for identifying regularities in the structure and content of human emotion.

Methods

The study procedures were approved by the institutional review boards at the University of California, Santa Barbara; East China Normal University; the University of Nigeria, Nsukka; Universidad San Francisco de Quito, and the University of Cincinnati, and the research ethics committee of the Institute of Psychology, Russian Academy of Sciences. All of the participants gave informed consent. The data and study materials are included in *Dataset S1* and *SI Appendix*, respectively.

Participants. We collected data from 567 participants in Bosawás Reserve, Nicaragua (sample A); Cotopaxi, Ecuador (sample B); Drâa-Tafilalet, Morocco (sample C); Enugu, Nigeria (sample D); Le Morne, Mauritius (sample E); La Gaulette, Mauritius (sample F); Tuva, Russia (sample G); Shaanxi and Henan, China (sample H); farming communities in Japan (sample I); and fishing communities in Japan (sample J). Sample sizes and demographic information are described in Table 1.

Procedure. The 10 scenarios are shown in *SI Appendix, Tables S2a–S2j*. Participants were randomly assigned to either the audience condition or the pride condition. The language in the scenarios was gendered according to participants’ stated gender, except for at the two Japan sites. At both Japan sites, data collection was through self-administered questionnaires sent by mail; here, we used gender-neutral pronouns and instructed respondents in the audience condition to imagine the target individual was someone of their same sex and age. Sample size, order in which the scenarios were administered, method of stimuli administration, and language of stimuli are listed in *SI Appendix, Table S1*.

ACKNOWLEDGMENTS. We thank two anonymous reviewers. This research was supported by funding from Federal Agency for Scientific Organizations, Russian Federation Grant 0159-2016-0001 (to K.I.A. and A.N.K.), Japan Society for the Promotion of Science KAKENHI Grant 26780343 (to K.T.), and John Templeton Foundation (JTF) Grant 29468 (to L.C. and J.T.). The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the JTF or the other funding agencies.

1. Kaplan H, Hill K (1985) Food sharing among ache foragers: Tests of explanatory hypotheses. *Curr Anthropol* 26:223–239.
2. Sugiyama LS (2004) Illness, injury, and disability among Shiwiar forager-horticulturalists: Implications of health-risk buffering for the evolution of human life history. *Am J Phys Anthropol* 123:371–389.
3. Keeley LH (1997) *War Before Civilization* (Oxford Univ Press, New York).
4. Treves A, Naughton-Treves L (1999) Risk and opportunity for humans coexisting with large carnivores. *J Hum Evol* 36:275–282.
5. Clutton-Brock T (2009) Cooperation between non-kin in animal societies. *Nature* 462: 51–57.
6. von Rueden CR, Jaeggi AV (2016) Men's status and reproductive success in 33 non-industrial societies: Effects of subsistence, marriage system, and reproductive strategy. *Proc Natl Acad Sci USA* 113:10824–10829.
7. 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.
8. Sell A, et al. (2009) Human adaptations for the visual assessment of strength and fighting ability from the body and face. *Proc Biol Sci* 276:575–584.
9. Sell A, et al. (2010) Adaptations in humans for assessing physical strength from the voice. *Proc Biol Sci* 277:3509–3518.
10. Weisfeld GE, Dillon LM (2012) Applying the dominance hierarchy model to pride and shame, and related behaviors. *J Evol Psychol* 10:15–41.
11. Sell A, Tooby J, Cosmides L (2009) Formidability and the logic of human anger. *Proc Natl Acad Sci USA* 106:15073–15078.
12. Fessler DMT (1999) *Toward an Understanding of the Universality of Second Order Emotions*, ed Hinton AL (Cambridge Univ Press, New York), pp 75–116.
13. Hawley PH (2007) Social dominance in childhood and adolescence: Why social competence and aggression may go hand in hand. *Aggression and Adaptation: The Bright Side to Bad Behavior*, eds Hawley PH, Little TD, Rodkin P (Erlbaum, Hillsdale, NJ), pp 1–29.
14. De Bruyn EH, Cillessen AH (2006) Popularity in early adolescence: Prosocial and antisocial subtypes. *J Adolesc Res* 21:607–627.
15. 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.
16. Hold BC (1980) Attention-structure and behavior in G/wi San children. *Evol Hum Behav* 1:275–290.
17. Gilbert P (1997) The evolution of social attractiveness and its role in shame, humiliation, guilt and therapy. *Br J Med Psychol* 70:113–147.
18. Tooby J, DeVore I (1987) *The Reconstruction of Hominid Behavioral Evolution Through Strategic Modeling*, ed Kinzey WG (State Univ New York Press, Albany, NY), pp 187–237.
19. Pinker S (2010) Colloquium paper: The cognitive niche: Coevolution of intelligence, sociality, and language. *Proc Natl Acad Sci USA* 107:8993–8999.
20. Hamilton WD (1964) The genetical evolution of social behaviour. I. *J Theor Biol* 7: 1–16.
21. Trivers R (1971) The evolution of reciprocal altruism. *Q Rev Biol* 46:35–57.
22. Nowak MA, Sigmund K (1998) Evolution of indirect reciprocity by image scoring. *Nature* 393:573–577.
23. Tooby J, Cosmides L (1996) Friendship and the Banker's Paradox: Other pathways to the evolution of adaptations for altruism. *Evolution of Social Behaviour Patterns in Primates and Man*, Proceedings of the British Academy, eds Runciman WG, Maynard Smith J, Dunbar RIM (The British Academy, London), pp 119–143.
24. Hammerstein P, Parker GA (1982) The asymmetric war of attrition. *J Theor Biol* 96: 647–682.
25. Lieberman D, Tooby J, Cosmides L (2007) The architecture of human kin detection. *Nature* 445:727–731.
26. Tooby J, Cosmides L, Sell A, Lieberman D, Szyner D (2008) *Internal Regulatory Variables and the Design of Human Motivation: A Computational and Evolutionary Approach*, ed Elliot AJ (Lawrence Erlbaum Associates, Mahwah, NJ), pp 251–271.
27. Leary MR, Kowalski RM (1990) Impression management: A literature review and two-component model. *Psychol Bull* 107:34–47.
28. Szyner D, et al. (2016) Shame closely tracks the threat of devaluation by others, even across cultures. *Proc Natl Acad Sci USA* 113:2625–2630.
29. Szyner D (2010) Cognitive adaptations for calibrating welfare tradeoff motivations, with special reference to the emotion of shame. Doctoral dissertation (University of California, Santa Barbara, CA).
30. Szyner D, Schniter E, Tooby J, Cosmides L (2015) Regulatory adaptations for delivering information: The case of confession. *Evol Hum Behav* 36:44–51.
31. Szyner D, et al. (2012) Cross-cultural differences and similarities in proneness to shame: An adaptationist and ecological approach. *Evol Psychol* 10:352–370.
32. Robertson TE, Szyner D, Delton AW, Tooby J, Cosmides L (2018) The true trigger of shame: Social devaluation is sufficient, wrongdoing is unnecessary. *Evol Hum Behav* 39:566–573.
33. Szyner D, et al. (2017) Cross-cultural regularities in the cognitive architecture of pride. *Proc Natl Acad Sci USA* 114:1874–1879.
34. Tracy JL, Shariff AF, Cheng JT (2010) A naturalist's view of pride. *Emot Rev* 2:163–177.
35. Weisfeld GE, Beresford JM (1982) Erectness of posture as an indicator of dominance or success in humans. *Motiv Emot* 6:113–131.
36. Smuts BB, Cheney DL, Seyfarth RM, Wrangham RW (2008) *Primate Societies* (Univ Chicago Press, Chicago).
37. Barrette C (1977) Fighting behavior of muntjac and the evolution of antlers. *Evolution* 31:169–176.
38. Clutton-Brock TH, Albon SD (1979) The roaring of red deer and the evolution of honest advertisement. *Behaviour* 69:145–170.
39. Fox MW (1969) The anatomy of aggression and its ritualization in Canidae: A developmental and comparative study. *Behaviour* 35:242–258.
40. Huntingford F, Turner A (1987) *Animal Conflict* (Chapman and Hall, London).
41. Brown DE (1991) *Human Universals* (Temple Univ Press, Philadelphia).
42. Lewis M, Alessandri SM, Sullivan MW (1992) Differences in shame and pride as a function of children's gender and task difficulty. *Child Dev* 63:630–638.
43. Stipek D (1995) The development of pride and shame in toddlers. *Self-Conscious Emotions: The Psychology of Shame, Guilt, Embarrassment, and Pride*, eds Tangney JP, Fischer KW (Guilford, New York), pp 237–252.
44. Tracy JL, Matsumoto D (2008) The spontaneous expression of pride and shame: Evidence for biologically innate nonverbal displays. *Proc Natl Acad Sci USA* 105: 11655–11660, and erratum (2008) 105:20044.
45. Mauro R, Sato K, Tucker J (1992) The role of appraisal in human emotions: A cross-cultural study. *J Pers Soc Psychol* 62:301–317.
46. Williams LA, DeSteno D (2008) Pride and perseverance: The motivational role of pride. *J Pers Soc Psychol* 94:1007–1017.
47. Riskind JH (1984) They stoop to conquer: Guiding and self-regulatory functions of physical posture after success and failure. *J Pers Soc Psychol* 47:479–493.
48. Tracy JL, Robins RW (2007) The prototypical pride expression: Development of a nonverbal behavior coding system. *Emotion* 7:789–801.
49. Thomas KA, DeScioli P, Pinker S (2018) Common knowledge, coordination, and the logic of self-conscious emotions. *Evol Hum Behav* 39:179–190.
50. Shariff AF, Tracy JL (2009) Knowing who's boss: Implicit perceptions of status from the nonverbal expression of pride. *Emotion* 9:631–639.
51. Tiedens LZ, Ellsworth PC, Mesquita B (2000) Sentimental stereotypes: Emotional expectations for high- and low-status group members. *Pers Soc Psychol Bull* 26:560–575.
52. Tracy JL, Robins RW, Lagattuta KH (2005) Can children recognize pride? *Emotion* 5: 251–257.
53. Tracy JL, Robins RW (2008) The nonverbal expression of pride: Evidence for cross-cultural recognition. *J Pers Soc Psychol* 94:516–530.
54. Sadalla EK, Kenrick DT, Vershure B (1987) Dominance and heterosexual attraction. *J Pers Soc Psychol* 52:730–738.
55. de Bruyn EH, Cillessen AH, Weisfeld GE (2012) Dominance-popularity status, behavior, and the emergence of sexual activity in young adolescents. *Evol Psychol* 10:296–319.
56. Chudek M, Heller S, Birch S, Henrich J (2012) Prestige-biased cultural learning: Bystander's differential attention to potential models influences children's learning. *Evol Hum Behav* 33:46–56.
57. Martens JP, Tracy JL (2013) The emotional origins of a social learning bias: Does the pride expression cue copying? *Soc Psychol Personal Sci* 4:492–499.
58. Tiedens LZ, Fragale AR (2003) Power moves: Complementarity in dominant and submissive nonverbal behavior. *J Pers Soc Psychol* 84:558–568.
59. Mazur A (1985) A biosocial model of status in face-to-face primate groups. *Soc Forces* 64:377–402.
60. Savin-Williams RC (1977) Dominance in a human adolescent group. *Anim Behav* 25: 400–406.
61. Darwin C (1872) *The Expression of the Emotions in Man and Animals* (John Murray, London).
62. Barkow JH, et al. (1975) Prestige and culture: A biosocial interpretation. *Curr Anthropol* 16:553–572.
63. Omkar DR, Strayer FF, Freedman DG (1980) *Dominance Relations: An Ethological View of Human Conflict and Social Interaction* (Garland, New York).
64. Altmann SA (1962) A field study of the sociobiology of rhesus monkeys, *Macaca mulatta*. *Ann N Y Acad Sci* 102:338–435.
65. Deag JM (1977) Aggression and submission in monkey societies. *Anim Behav* 25: 465–474.
66. Trivers RL (1972) *Parental Investment and Sexual Selection*, ed Campbell B (Aldine-Atherton, Chicago), pp 136–179.
67. Wilson M, Daly M (1985) Competitiveness, risk taking, and violence: The young male syndrome. *Ethol Sociobiol* 6:59–73.
68. Daly M, Wilson M (1988) *Homicide* (Aldine de Gruyter, New York).
69. Orth U, Robins RW, Soto CJ (2010) Tracking the trajectory of shame, guilt, and pride across the life span. *J Pers Soc Psychol* 99:1061–1071.
70. Blurton Jones N, Hawkes K, O'Connell JF (1997) Why do Hadza children forage? *Uniting Psychology and Biology: Integrative Perspectives on Human Development*, eds Segal NL, Weisfeld GE, Weisfeld CC (American Psychological Association, New York), pp 297–331.
71. Anderson C, Ames DR, Gosling SD (2008) Punishing hubris: The perils of over-estimating one's status in a group. *Pers Soc Psychol Bull* 34:90–101.
72. Schlenker BR, Leary MR (1982) Audiences' reactions to self-enhancing, self-denigrating, and accurate self-presentations. *J Exp Soc Psychol* 18:89–104.
73. Tracy JL, Robins RW (2004) Putting the self into self-conscious emotions: A theoretical model. *Psychol Inq* 15:103–125.
74. Simon-Thomas ER, et al. (2012) An fMRI study of caring vs self-focus during induced compassion and pride. *Soc Cogn Affect Neurosci* 7:635–648.
75. Henrich J, Heine SJ, Norenzayan A (2010) The weirdest people in the world? *Behav Brain Sci* 33:61–83.
76. Boyd R, Richerson PJ (1988) *Culture and the Evolutionary Process* (Univ Chicago Press, Chicago).
77. Geertz C (1973) *The Interpretation of Cultures: Selected Essays* (Basic Books, New York).
78. von Fürer-Haimendorf C (1967) *Morals and Merit: A Study of Values and Social Controls in South Asian Societies* (Univ of Chicago Press, Chicago).
79. Dong Q, Weisfeld G, Boardway RH, Shen J (1996) Correlates of social status among Chinese adolescents. *J Cross Cult Psychol* 27:476–493.