Hum Nat (2015) 26:1–27
DOI 10.1007/s12110-015-9224-9

Different Selection Pressures Give Rise to Distinct Ethnic Phenomena

A Functionalist Framework with Illustrations from the Peruvian Altiplano

Cristina Moya · Robert Boyd

Published online: 4 March 2015

Abstract Many accounts of ethnic phenomena imply that processes such as stereotyping, essentialism, ethnocentrism, and intergroup hostility stem from a unitary adaptation for reasoning about groups. This is partly justified by the phenomena's co-occurrence in correlational studies. Here we argue that these behaviors are better modeled as functionally independent adaptations that arose in response to different selection pressures throughout human evolution. As such, different mechanisms may be triggered by different group boundaries within a single society. We illustrate this functionalist framework using ethnographic work from the Quechua-Aymara language boundary in the Peruvian Altiplano. We show that different group boundaries motivate different ethnic phenomena. For example, people have strong stereotypes about socio-economic categories, which are not cooperative units, whereas they hold fewer stereotypes about communities, which are the primary focus of cooperative activity. We also show that, despite the cross-cultural importance of ethnolinguistic boundaries, the Quechua-Aymara linguistic distinction does not strongly motivate any of these intergroup processes.

Keywords Ethnicity · Categorization · Intergroup relations · Stereotyping · Essentialism · Cooperation

Electronic supplementary material The online version of this article (doi:10.1007/s12110-015-9224-9) contains supplementary material, which is available to authorized users.

C. Moya (✉)
Department of Psychology, University of British Columbia, 2136 West Mall, Vancouver, BC, Canada V6T 1Z4
e-mail: cmoya@psych.ubc.ca

R. Boyd
School of Human Evolution and Social Change, Arizona State University, 900 S. Cady Mall, Rm. 233, Tempe, AZ 85287-2402, USA

Ethnic phenomena uniquely, and pervasively, characterize human societies. Minimally this means that people identify as members of groups and often share norms, beliefs, or theories about common origins with other group members. However, such boundaries often also motivate stereotyping, essentialism, signaling one's membership, in-group loyalty, and intergroup hostility. Although these ethnic phenomena often co-occur, the causal relationship between them remains an open topic of research (Bastian and Haslam 2006; Brewer 1999; Brubaker 2004; Cashdan 2001; Halperin et al. 2011; Haslam et al. 2002; Hirschfeld 1998; Richerson and Boyd 2001). Despite these unresolved debates, many accounts of social cognition imply that reasoning about ethnic groups is served by a well-integrated set of mechanisms (Brewer 2007; Gil-White 2001; Tajfel 1982; van den Berghe 1987). Furthermore, the range of social categories that serve as inputs to these mechanisms is often underspecified, adding ambiguity to models of the cognitive architecture.

We propose that different cognitive mechanisms underlie several functionally distinct ethnic phenomena. Other evolutionary psychologists have made similar claims, but their proposals are limited by their emphasis on the kinds of threats that out-groups pose, and the focus on groups they envision as homologous to primate troops (Cottrell and Neuberg 2005; Schaller and Neuberg 2008). Insofar as natural selection played a role in the functional design of these cognitive mechanisms, we will call them *psychological adaptations*. These are likely the outcome of selection pressures in response to both different kinds of social groups throughout human evolutionary history and the need to learn large repertoires of cultural information. It is not our goal in this paper to arbitrate between models invoking selection pressures specifically for learning about social groups and those only requiring selection for learning about a broader set of cultural traits. However, the broader social cognition literature suggests that humans have at least some of the former mechanisms for reasoning about arbitrarily tagged social groups (Brase 2001; Heyman and Gelman 2000).

Cultural co-evolutionary processes will often lead to the co-occurrence of social structures that trigger several of these ethnic psychological adaptations, making it difficult to parse the boundaries of cognitive mechanisms. For example, because it may be easier to cooperate with others who share various norms, boundaries of collective action might also correspond to limits of social assortment for coordination games. Convergence on similar norms for coordination can in turn increase the cultural clustering of multiple traits that motivates ethnic stereotyping. Such an equilibrium may be mistaken for the outcome of a single ethnic psychological adaptation. However, alternate cultural equilibria are theoretically viable. For example, equilibria where only cooperative norms cluster should be stable. Given that members of such groups would share only a limited set of behaviors, such boundaries would not necessarily foster much stereotype formation, or social assortment for the purposes of coordinating with similar others. These kinds of social contexts have led many social scientists since the 1960s to reject notions of ethnicity that relied on cultural similarity (Moerman 1965; Wimmer 2013). We believe such conclusions to be premature because the relevance of cultural similarity likely depends on the specific ethnic psychological adaptation in question.

One way to test whether ethnic phenomena are caused by a single psychological mechanism is to examine their distribution cross-culturally. Evidence that different group boundaries trigger different ethnic reasoning adaptations would support the

functional independence of these cognitive mechanisms. Unfortunately, much of what we know about ethnic psychology and behavior comes from extensive research in industrialized urban settings (Allport 1954; Baron and Banaji 2006; Hilton and von Hippel 1996; Schaller and Neuberg 2008; Sidanius and Pratto 1999; Tajfel and Turner 1986), contexts in which long-distance migrations—forced and voluntary—have shaped the ethnic landscape. Not only does this represent a small sliver of the cross-cultural and historical variation in ethnic boundaries, there are also reasons to believe that "Western" college-age participants commonly used in psychological experiments deviate systematically from global central tendencies (Henrich et al. 2010). Furthermore, some evolutionary psychologists have argued that the racialized social group hierarchies prevalent in these societies are novel, and unlike the kinds of social group boundaries for which human psychological adaptations evolved (Kurzban et al. 2001). As such, making claims about the universality of ethnic reasoning requires cross-cultural comparisons of social taxonomies. This anthropological enterprise also helps flesh out which cultural equilibria are likely to evolve with respect to ethnic phenomena.

A second goal of this paper is to test whether linguistic boundaries necessarily motivate ethnic phenomena. Linguistic differences readily serve as ethnic identity markers and affect interethnic interactions in many cultural settings (Giles 1977; Mathew and Boyd 2011; Nettle 1998; Wiessner 1982). Based on such observations and other theoretical arguments, many evolutionary social scientists have proposed that language boundaries are particularly likely to inspire ethnic phenomena, including cooperation, reciprocity, and categorization (Cohen 2012; Moya 2013; Nettle and Dunbar 1997; Pietraszewski and Schwartz 2013). However, there are known exceptions to these patterns (see Jackson 1983 for a rare case of prescriptive linguistic exogamy), and the extent to which linguistic communities correspond to cultural units has also been a point of contention within anthropology for decades (Hymes 1962; Moerman 1965). Furthermore, for the reasons outlined in the previous paragraph, it is necessary to examine how pervasive societies whose language boundaries organize components of ethnic group behavior are in the ethnographic record.

This article tests the functional relationship between various intergroup processes by examining an ethnographic case study of Huatasani on the Quechua-Aymara linguistic border in the Peruvian Altiplano. There are various ways in which the social taxonomy there differs markedly from that of urban industrialized settings more commonly studied by social psychologists. In the Altiplano, linguistic and community boundaries are neither racialized nor morphologically marked, do not correspond to large power differences (either driven by numerical, economic, or political differences), do not represent differences between migrant and host populations, and are thought of as relatively fluid. See Section 1 of the ESM for background on the broader Andean ethnography on identity ideologies.

Several cross-cutting social boundaries in the Huatasani area allow us to compare the extent to which different kinds or borders trigger patterns of ethnic reasoning. We primarily focus on responses to (1) the Quechua-Aymara language boundary, (2) community boundaries within the region, and (3) socioeconomic boundaries associated with differences in market integration. When illustrative, we also discuss perceptions of (4) local morphological variation, (5) political parties, and (6) Catholic-Evangelical religious boundaries.

We structure the discussion by potential ethnic psychological adaptation, roughly in order from those selection was likely to have favored earliest in human evolutionary history to those likely to have been most recently selected in response to cultural evolutionary processes, although we recognize that these likely co-evolved. Furthermore, these cognitive mechanisms are likely to incorporate pre-adaptations for reasoning about other categories (e.g., individuals, coalitions, species) making a clean temporal sequence of selection pressures difficult. The ethnic phenomena we consider are (1) stereotyping, (2) essentialism regarding the biological transmission and stability of group membership, (3) essentialist beliefs about mutual exclusivity of membership, (4) intentional marking, (5) assortment for the purpose of coordination or cooperation, and (6) intergroup competition and hostility.

The organization of ethnic phenomena along distinct social boundaries in the Peruvian case study supports the claim that ethnicity is not the consequence of a single adaptation. Different social boundaries in Huatasani motivate group loyalty, identity signaling, essentialism, and stereotyping. This casts doubt on accounts of ethnicity that imply it is a unitary social phenomenon. Furthermore, this ethnographic context illustrates that language boundaries do not always have large consequences for the way social activities are organized, or for people's social schemas. In Huatasani, Aymara and Quechua language categories are not the bases of many stereotypes, are not essentialized, do not strongly motivate assortment, and are not a locus of group loyalty.

We first introduce the research site within its regional ethnographic context and describe the linguistic, community, and socioeconomic boundaries that will be our main focus. Second, we describe our sample. The third section presents the bulk of the analysis, discussing the adaptive significance of each potential ethnic psychological mechanism and the extent to which each social boundary triggers it. Finally, we propose two primary adjustments to common conceptualizations of ethnicity: (1) different social boundaries can structure different ethnic phenomenon at the same site, suggesting that several cognitive mechanisms underpin these behaviors, and (2) language boundaries need not strongly motivate any of these.

Ethnographic Context

Huatasani—the capital of Huatasani district—is on the Quechua-speaking side of the Quechua-Aymara linguistic boundary that usually follows the Chekasura River (Fig. 1). This is the more rural of the two main Quechua-Aymara boundaries in the southern Peruvian department of Puno. This more rural boundary has experienced less of a language shift to Spanish, the lingua franca and higher-prestige language in the area. The census of the district population counted 4,156 individuals, with 1,966 in the capital (INEI 2007), though widespread labor migration means that this may be poorly estimated. While the district of Huatasani is predominantly Quechua-speaking, it belongs to the province of Huancané, which is majority Aymara-speaking. The village of Huatasani has some government services, such as schools and a health clinic, and is connected to other regional cities by informal transportation networks.

Several social categories in the Huatasani region have ethnic features. However, we refrain from referring to any one of them as an ethnic group since none of them has the

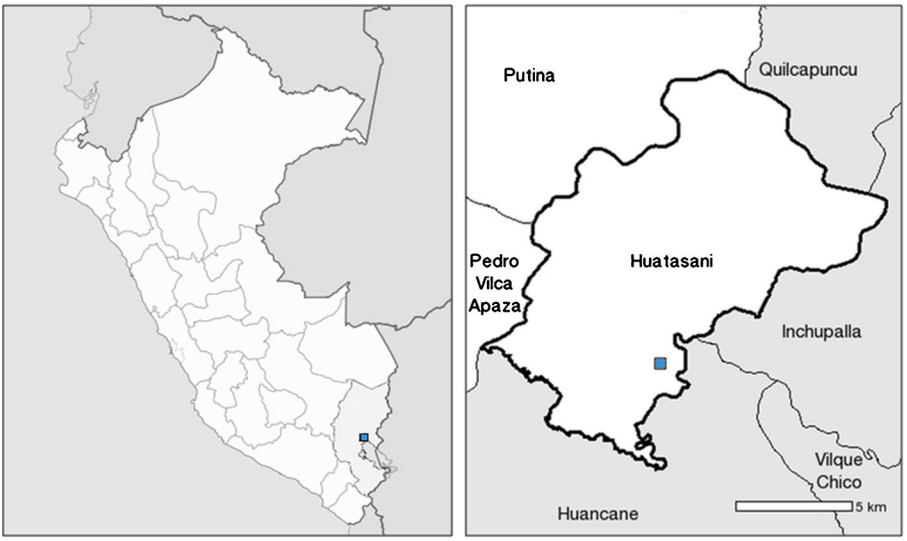

Fig. 1 Huatasani in its national context. Denoted by the *square* (*left*) and among neighboring districts (*right*). On the right, the *square* denotes the district capital. *Grey* districts are predominantly Aymara-speaking. Districts in *white* are predominantly Quechua-speaking. Huancané is both the name of an adjacent district and of the province to which Huatasani and all the Aymara speaking districts on the right belong

full set of traits that would make them unarguably the primary boundary of self-identification, cultural clustering, intentional marking, and group loyalty. In this section we briefly introduce (1) linguistic, (2) community, (3) socioeconomic, (4) morphological, (5) political, and (6) religious categories in the region. Most of our data focus on the first three groups, but all categories are described more fully in Section 2 of the ESM.

Linguistic Categories

There is little ethnographic work on contemporary relations between speakers of different indigenous languages in the Andes (see Hosokawa 1980 and Primov 1974 for exceptions). Despite the fact that Quechua and Aymara are two of the mostly widely spoken indigenous languages in the Americas and share many boundaries, research has focused on one or the other at a time, or on indigenous and non-indigenous relations and social categorization (see ESM Section 1).

Aymara and Quechua are mutually unintelligible languages with distinct phylogenetic histories, despite much linguistic borrowing and contact over hundreds of years (Hardman et al. 1985; Heggarty 2008; Mannheim 1991). The modern Quechua-Aymara linguistic borders in this area are likely the result of both precolonial imperial expansions and early colonial divisions of bishoprics (Cerrón-Palomino 2010; Dominguez Faura 2010). Bilingualism with Spanish and one of the indigenous languages is the norm in Huatasani. Of the 104 adults interviewed in 2010, 83% were native Quechua speakers and the remaining 17% were native Aymara speakers. Only 6 of these adults did not speak Spanish, and those were all over 50 years of age. Census figures from 2007 in Huatasani district indicate a slightly higher proportion of Aymara speakers, both in the village and in more rural contexts. Furthermore, 19% of town

residents claimed Spanish as their native language in this census (ESM Section 2.1). Trilingualism among older residents or native Aymara speakers who live in town is also common. Furthermore, Quechua and Aymara speakers interact regularly when making use of governmental institutions in town (e.g., high school and clinic), or in weekly markets in Huatasani and Huancané. The fact that 54% of high school students in Huatasani were Quechua-speaking in 2008 and 46% were Aymara-speaking attests to the roughly equal distribution of speakers of the two languages in the local interaction sphere.

Communities

The roughly 36 settlements in Huatasani district range from fewer than 10 to more than 60 households (ESM Section 2.2). Although the majority are Quechua-speaking, the nearest rural communities to the village are Aymara-speaking, though technically in a different district. In a free-listing task, participants listed roughly an equal number of Aymara- and Quechua-speaking communities in their surrounding area (ESM Section 2.2). Because the village is larger than all the other communities, it is divided into four neighborhoods that have the same organizational features as communities.

Socioeconomic Categories

Nearly all the residents in the village and the countryside are subsistence agro-pastoralists with varying degrees of market integration. Most rely on their sheep for meat, their crops of tubers and grains for their own and their livestock's consumption, and if they are wealthier have some cows for milk and cheese production. Some villagers supplement this activity by selling groceries from small stores attached to their homes, but they are seldom exclusively business people. When we asked one such vendor whether they engaged in agriculture and pastoralism, she responded, "Of course. If not, what would we live off of?"—reflecting a common sentiment that household production was necessary for subsistence.

Labor migration provides a more significant source of cash for the village. Juliaca, the largest city in the region (~260,600 residents as of 2013), is a commercial center 70 km away that attracts rural migrants from across the southern Peruvian highlands. Nearly all people in Huatasani have visited the city and have kin who live there. Contact with the city has become even easier since the road was paved between 2009 and 2010. Additionally, many highlanders, including Huatasaneños, have family land in the eastern slopes of the Andes descending toward the Amazon jungle, where they grow citrus, coffee, and sometimes coca. Others go down to the eastern slopes to trade highland products for those from lower altitudes; still others engage in seasonal labor migration during the fruit-picking months. However, the most common source of cash for residents of Huatasani is gold mining. The most common destination for miners from Huatasani is about a 5-hour bus ride away and is rapidly growing. Many Huatasaneños go to work in the mines for several months at a time and regularly return home, especially for local festivals and to participate in the planting and harvesting of their crops. Variation in involvement and success in mining is also one of the main sources of economic inequality in the region. These socioeconomic differences cut across the linguistic divide.

Morphological, Political Party, and Religious Variation

Several other social boundaries in the region cross-cut the Quechua-Aymara language boundary. Morphological variation that in other societies forms the basis of ethnoracial taxonomies—such as skin tone or having epicanthic folds—is recognized but not given particular social significance locally. This is true both for such phenotypic variation within Huatasani—which is treated similarly to the way variation in height is treated in most societies—and for interregional variation in racial characteristics—which carries more social meaning but is often construed as relatively fluid and a function of residence rather than of biological potential (Orlove 1998; Radcliffe and Westwood 1996).

Political party and religious affiliations are salient only during prescribed periods of election campaigning or ritual celebration, respectively. While there is broad consensus in Huatasani with respect to national politics, local elections divide the population more. The latter political choices mostly reflect social networks and loyalties to the specific candidates, rather than strong commitments to a set of political beliefs. In both cases, several political parties are represented in each election cycle (e.g., five in Huatasani's recent mayoral election), and these can change considerably between cycles. The set of religious options is much more constrained. The vast majority of people around Huatasani identify as Catholic, syncretizing these religious practices with traditional Andean ones. A minority of residents identify as evangelicals, which is often used to subsume any non-Catholic form of Christianity (e.g., Seventh Day Adventists, Baptists, Mormons). This designation is particularly relevant during several festivals throughout the year since evangelical religions forbid participation by drinking, dancing, or chewing coca. Regular mass is not held, as there are currently no priests in the village, further diminishing this boundary's visibility.

Sample

The ethnographic observations presented here are a result of research conducted over the course of 15 months of fieldwork in the village of Huatasani, from 2007 to 2011. Most of the quantitative results are from structured demographic and social interaction interviews conducted with 104 adults in 2010 (mean age=39, 36% male). The qualitative results are mostly from in-depth interviews with 31 adult participants and from participant observation. A local research assistant helped in recruiting participants for this process, and in translating some questions for Quechua monolingual participants. However, the vast majority of participants were interviewed alone, in Spanish, in a private room near the village center.

There are some possible biases in these data. People refused to answer, or felt uncomfortable answering, some questions. These missing data are likely to be unrepresentative in systematic ways. For example, responses that would have suggested lower educational attainment, lower socioeconomic status, or greater indigenousness are likely underreported because of self-presentation concerns. Additionally, interviews were most often conducted in Spanish, though we could also conduct most interviews in Quechua. This might result in some underrepresentation of Aymara speakers. However there are few monolingual Aymara speakers in the village; they were likely to learn Spanish or Quechua to facilitate communication with their neighbors. Most

importantly, and most difficult to address, the participants in our sample, by virtue of being willing to talk to researchers, are likely more open-minded, better-traveled, and more comfortable with strangers and members of out-groups than the average resident of Huatasani.

Functionally Distinct Ethnic Processes

Below we consider six potential ethnic reasoning mechanisms, the adaptive problem they might have solved, and the extent to which various social boundaries in Huatasani trigger them.

Stereotype Use

Although psychologists have widely documented the extent to which people use ethnic stereotypes to make predictions about others, they usually consider this process alongside other kinds of social categorization, such as gender and age categorization (Bigler and Liben 2006; Greenwald et al. 1998; Tajfel and Turner 1986), treating them as functionally equivalent. In contrast, we expect that ethnic categorization is a uniquely human adaptive problem (Moya 2013). All animals need categorization rules for parsing and predicting behavioral variation among members of their same species (e.g., according to the conspecific's age, sex, dominance rank). However, human behavioral variation is additionally affected by culture to a much larger extent than is the behavior of other animals (Boyd and Richerson 1996). Furthermore, cultural variation is not evenly distributed across the landscape, but instead clustered, meaning that multiple cultural features co-vary (Gil-White 2001; McElreath et al. 2003; Richerson and Boyd 2005). Therefore, humans' social categorization rules should facilitate learning about these cultural clusters, how they are marked and their structure.

Social categorization experiments have shown that adults in Huatasani do not believe Quechua and Aymara language categories to be particularly useful bases for stereotyping (Moya 2013), at least relative to occupational categories. Even when characters were described as coming from different communities and speaking different languages, adults preferred making predictions about strangers based on occupational information, especially when the occupational differences implied different degrees of market integration. In structured, in-depth stereotype elicitation interviews, participants also expressed much ambivalence regarding the extent to which Aymara and Quechua speakers were behaviorally different. Although stereotypes about these linguistic categories were not commonly expressed in everyday life, most participants were willing to make distinctions between them when asked directly. However, this was often done only after downplaying the differences by claiming that Quechua and Aymara speakers were "almost the same." The most common belief was that Aymara women liked wearing brighter colors than Quechua women, although male speakers of both languages dressed the same. A couple of informants suggested that agricultural practices were different between the members of the linguistic categories, with Aymara speakers being faster to harvest their crops, more hard-working in this domain, and often contemptuous of Quechua speakers' laziness. One informant explicitly claimed that this was not due to ecological differences that would affect agricultural decision-

making. In later interviews we confirmed that speakers of both languages tended to agree with these beliefs when asked directly.

Participants in Huatasani seldom independently raised the stereotype that many urban-dwellers held of Aymara speakers being rebellious, fierce, and willing to engage in communal justice. When we asked about the accuracy of these stereotypes directly, most people would recognize the beliefs but would rephrase the association in terms of Aymara speakers being more united and better organized at community meetings. These traits did not necessarily have negative connotations, and in fact they seemed to imply negative characteristics about Quechua speakers even when the participants were Quechua speakers themselves. Only two of 31 participants in this interview made explicitly negative assessments of Aymara speakers, either for talking behind others' backs or for failing to be reliable partners in joint activities.

Participants' hesitation to suggest large differences between Quechua and Aymara speakers contrasts with their willingness to distinguish between the behavior of individuals more or less integrated to the market. This pattern suggests that it is not solely self-presentation concerns that prevented participants from voicing stereotypes about the language categories—especially given that city residents, who are often more cosmopolitan, readily expressed explicitly negative stereotypes about Aymara speakers. Urban dwellers were considered wealthier, more pretentious, more competent (implying skills for engaging in a market context or with state institutions), able to speak more correct Spanish, and less beholden to tradition. This was the case even when discussing Huatasaneños who had migrated to urban centers temporarily to work and who returned to live in the highlands. This tendency to adopt urban mannerisms and ways of thinking produced some tension between rural people who stayed behind and migrants who achieved prestige and money by relocating to cities or working there. Labor migrants return regularly to Huatasani, and even individuals who permanently relocate to cities often return to their natal communities for yearly festivals. Huatasaneños seemed to both respect such people's success in a market economy and resent what they perceived as contempt. One informant reflected a common sentiment that "we [rural people] cannot be their [urban migrants'] equals, in our speaking, in our thinking." However, others criticized the fact that many such migrants tried to deny their highland origins, tried to change their birthplace on their national identity cards, and "forgot about their [natal] town." Furthermore, wealth from market labor buys people various markers of status, such as better clothing, a higher-prestige diet that relies more heavily on processed food and meat, educational opportunities, dwellings made out of "noble material" (i.e., cement and brick rather than adobe), and the privilege/obligation of being a sponsor of one of several yearly festivals.

Communities in the area elicited few stereotypes on average. Participants did show consensus with respect to specific cultural features of nearby communities. For example, one community was considered particularly "well organized," meaning residents knew how to seek external development projects and protect themselves from outgroup thieves. Another community was considered a place with "bad people," including thieves who allegedly assaulted travelers along the road and formerly kidnapped women. However, the vast majority of communities were not associated with distinctive stereotypes.

Other geographical social boundaries in the hierarchically nested local taxonomy did elicit more stereotyping. Intermediate levels of stereotyping in hierarchically nested

taxonomies have been proposed as efficient solutions to the trade-off between accuracy and generalizability (Coley et al. 1997). Generalizing at really high levels in this taxonomy—i.e., by country—would result in inaccuracies from homogenizing too much variation, whereas really specific community-level stereotypes are more likely to be accurate but less powerful in terms of enabling individuals to make predictions about others. In Huatasani's social worlds, the intermediate level that optimizes this trade-off seems to correspond to the departmental level of Puno. Folk-sociological beliefs usually contrasted Puneños with other Peruvians, or with people from the neighboring department of Cusco. The most frequently mentioned stereotypes of Cuscqueños was that they spoke better, "more legitimate" Quechua, in contrast to Puneños, who spoke "ugly" Quechua mixed with Spanish and Aymara. People who had spent more time in Juliaca, which has neighborhoods of Cusqueños, also argued that these neighborhoods were unsafe because people from Cusco were disorganized and did not appropriately punish thieves. Various informants suggested that their fellow Puneños enjoyed drinking more, were harder working, and were more organized than Peruvians from other departments. This last distinction, "being organized," seems to be shorthand for several co-varying cultural institutions (e.g., efficient leadership organization, coordinated action, punishment of non-cooperators, high provisioning of public goods).

In contrast, Huatasaneños seldom homogenized all Peruvians, recognizing substantial cultural variation within the nation's borders. During semi-structured interviews about regional stereotypes, participants had a difficult time verbalizing differences between neighboring nation-states. One of the interviewees stated, "They say Bolivia is like Lima," suggesting that the relevant difference was one of urbanism, Bolivia being associated with the nearby capital of La Paz. A couple of participants did offer nation-level associations, often making vague allusions to Bolivians having different "ways of thinking," clothing, and musical traditions. However, an equal number of participants claimed that Bolivians' worldview was similar to their own. Of the social boundaries we investigated, racial terms describing morphological variation in the area and political party categories elicited the fewest stereotypes. People did not readily use these labels to explain variation among others, and where correlations between racial or political category membership and behavioral traits were noted, the association was perceived as driven by some other feature, such as socioeconomic status or degree of market integration. Participants deemed being evangelical predictive of various traits, but all of those traits stemmed from the restrictions these churches impose, particularly with respect to ritual celebrations. However, these differences are few, and usually unimportant for everyday interactions.

Essentialism—Biological Transmission and Identity Stability

There is much debate about the extent to which various features of essentialist thought are functional or adaptive (Ahn et al. 2001; Barrett 2001; Gelman 2005; Kanovsky 2007; Strevens 2000). We argue that essentialist beliefs about identity stability are not necessary to foster inductive reasoning and stereotyping (see Leslie 2015 for similar argument). Furthermore, their functional utility for ethnic reasoning relies on high rates of intergenerational inheritance and stability of ethnic identity through the life course. Inter-ethnic migrations are cross-culturally and historically pervasive, as confirmed by

the limited genetic structure at the population (Barbujani et al. 1997) or linguistic group level (Hunley and Long 2005) in humans. However, it is unclear how common such migrations would have had to be to undermine the usefulness of assuming identity or cultural trait stability.

Although many social categories in Huatasani fostered stereotyping, people did not strongly essentialize any of them—that is, they did not reason as if they were biologically inherited, nor did they believe that these social identities were constant throughout one's life. This is despite locals' beliefs that various morphological traits were prenatally inherited and stable (Moya et al. 2015).

Huatasaneños believed language category membership was extremely fluid and acquired by virtue of linguistic competence. In a set of experiments, participants were asked to ascribe identities to hypothetical characters with varying life histories and language competences. Across conditions we manipulated the timing and context of an individual's migration between a Quechua and an Aymara community, and the extent to which they spoke or understood each language (see Fig. 2 for list of scenarios). To assess whether people expressed degrees of essentialism not captured in other forced-choice experiments (Astuti et al. 2004; Kanovsky 2007; Moya et al. 2015), we asked 72 adult participants to judge the extent to which the character in these scenarios would be Quechua on a continuous sliding scale from 0 to 32, the highest score corresponding to "completely Quechua" and 0 corresponding to "not Quechua at all."

Across these conditions the vignette character's birth parents and natal origins barely influenced participants' choices regarding the character's linguistic identity. Even if a person moved late in life, at the time of marriage, from an Aymara-speaking to a Quechua-speaking region, most participants believed that person could become Quechua once she learned the language. In fact, participants judged that a migrant who married into a Quechua community and learned to speak Quechua would be nearly as Quechua as a native Spanish/Quechua bilingual (M=22.7 and 24.4, respectively; paired t-test t=1.6, p=0.1, df=70; see Fig. 2 for full results).

Biological transmission beliefs about linguistic identities were quite low, as evidenced in the "low Quechua identity" ascription for a child of Quechua parents who does not learn Quechua (M=3.1, bootstrapped SE=0.7). This is also reflected in participants' responses regarding the characters who only understood but did not speak

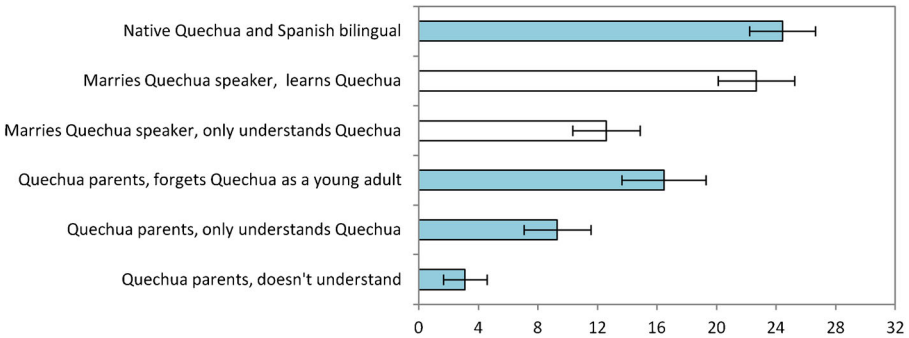

Fig. 2 Perception of degree of Quechua/Quechuista identity for characters with varying life histories and language competences. *Filled bars* represent scenarios where the target character had Quechua-speaking parents. Bootstrapped 95% CI shown. A continuous sliding scale was used, with 32 coded as most Quechua, and 0 as not Quechua at all (n=72)

Quechua; a person with no Quechua kin who married into a Quechua community was considered significantly more Quechua (M=12.6, bootstrapped SE=1.2) than a child whose parents happened to be Quechua but did not speak Quechua (M=9.3, bootstrapped SE=1.1, paired t-test t=3.13, p=0.003, df=71).

Participants seemed to hold some essentialist belief regarding identity stability given their reports of intermediate Quechua identity (M=16.5, bootstrapped SE=1.4) for an adolescent who moved to a city and forgot how to speak Quechua. However, several participants offered unsolicited justifications which suggested that this intermediate belief in identity stability was driven by participants' incredulity that someone could completely forget how to speak a native language, rather than by a belief in deep-seated essences.

Community identity, by contrast, is perceived to be under less individual control and more stable throughout one's lifetime, given the importance of birthplace in making these identity assessments. In a separate vignette experiment, participants were asked to make identity and trait assessments about hypothetical scenarios regarding migrants (Moya et al. 2015). In one of these we manipulated only where the child was born; the parents migrated from Huatasani to Lima either shortly before or shortly after the child was born. Birthplace had a large effect on people's choosing "Huatasaneño" as the child's regional identity. When the child was born in the parents' region, participants ascribed to him his parents' regional identity 61% of the time, compared with only 10% of the time when the child was born in the new group. Even though this result suggests stability of community membership within one's lifetime, it also indicates that the identity is not perceived as prenatally or biologically inherited. This suggests the importance of distinguishing essentialist stability vs. biological transmission beliefs. Note that a substantial 39% of respondents thought the child could acquire a new regional identity despite being born elsewhere, and in semi-structured interviews people expected many behavioral changes on the part of such migrants even if they left their natal land much later in their life, during early adulthood.

Participants explicitly conceived of socioeconomic status differences (including large ones associated with market integration), evangelical religious affiliations, and political party membership as outcomes of individuals' decisions within their lifetimes. Perhaps more surprisingly, actual switches between these categories are quite common. People regularly go through phases of relying more or less on labor migration relative to agro-pastoralism. Many individuals attempt to ascribe to evangelical prescriptions for some time but then return to Catholicism. People's political party affiliations change frequently across election cycles, depending on their social connection to the individuals running rather than based on deep-seated political ideologies. Also, the set of about six political parties involved in each election can change dramatically, often necessitating switches in category membership.

Essentialism—Mutual Exclusivity

Researchers have documented that the extent to which social identities are perceived as mutually exclusive does not map onto other components of essentialism (Haslam et al. 2000). Perhaps this should not be surprising given the different functional affordances of mutually exclusive ethnic categories compared with information-rich and intergenerationally stable ones. Cultural institutions mandating mutual exclusivity are

likely to be most useful for limiting individuals' outside options in such a way that they (1) can expect punishment if they violate local norms (Boyd and Richerson 1992) and (2) cannot seek conflicting alliances (DeScioli and Kurzban 2009) were intergroup tensions to escalate. Psychological biases to expect such sharp boundaries and mutually exclusive ethnic identities would only be useful in such circumstances.

In Huatasani the most mutually exclusive category membership is religious affiliation, despite the fact that people can change this membership easily. Similarly, one cannot simultaneously support two candidates from different political parties for the same position, although it is common to support different political parties across election cycles, or for different positions within the same election. On the other extreme, linguistic and occupational categories are not seen as mutually exclusive, since people can be multilingual and can engage in mining, market activities, and agro-pastoralism simultaneously, or at least within the same year.

Regional categories are intermediate between these. Respondents who stressed birthplace as constituent of community identity were more likely to draw sharp boundaries between these categories. One respondent described migrants to Lima as "believing themselves Limeños, but really they stay Huatasaneños," implying that both identities were incompatible and that the latter was more real. However, many respondents referred to people's ability to have multiple loyalties, which they considered defining features of regional identity. For example, one noted that "if a migrant feels himself over there [Lima] he is Limeño, but in the case that because of his birth he feels himself over here he can be Huatasaneño as well." Several women who married into Huatasani from other districts described similar feelings of multiple, non-mutually-exclusive loyalties. Given the relatively amicable relations between most communities, such beliefs about multiple membership may pose no problem.

The fact that language categories are not considered mutually exclusive is consistent with the prevalence of multilingualism locally. Low rates of language essentialism may also be reflected in locals' use of the terms *quechuista* and *aymarista* to refer to speakers of Quechua and Aymara, respectively. The "-ista" ending in Spanish is often used to denote chosen profession or political association (much like the suffix in dentist or socialist in English). However, in urban contexts, and in most political rhetoric the labels *quechua* and *aymara* are more common (ESM Section 2.5). In order to determine whether these terms had different connotations with respect to the categories' essentialist properties we asked participants whether a child born to Quechua parents but raised by Aymara parents would be Quechua or Aymara. Across participants we manipulated whether the labels used were *quechua* and *aymara* or *quechuista* and *aymarista*. Although the manipulation did not affect participants' choosing a prenatal transmission pathway for identity, it did affect their likelihood of offering a third option, namely that the child would be both. People assigned to the "-ista" condition were more likely to offer the response that the child would be both language categories—both *aymarista* and *quechuista*—than were people who were assigned to the *quechua*/*aymara* condition (OR=6.3, SE=3.9, p=0.003, n=74). The latter chose the non-mutually-exclusive identity option 11% of the time, compared with 43% of the time for those in the "-ista" condition. This suggests that the locally used terms connote a less sharp division between the language categories, and less mutual exclusivity between them. This is despite the fact that they do not have different connotations in terms of how biological or stable the identities are.

Intentional Markers

A common feature of ethnic groups is the intentional marking of group membership cross-culturally through visual, behavioral, or linguistic means. There is much debate about the extent to which such cheap markers of ethnic membership can foster cooperation on their own (Axelrod et al. 2004; Cohen 2012; Roberts and Sherratt 2001), but they can clearly be selected to facilitate assortment for coordination games (McElreath et al. 2003). Empirically distinguishing between intentional signals (Maynard Smith 2004) and incidental cues of group membership that were not designed to communicate information about group membership can be difficult. Because the following examples are not clearly functional except as conveyers of information, we believe they are more parsimoniously understood as signals. Regardless, people have various means of determining others' category membership for the social categories discussed above.

Sartorial choices mark economic, geographic, and linguistic boundaries to varying degrees. Not surprisingly, more expensive clothing is available to the more market-integrated individuals involved in labor migration. People recognize these items, including glasses and gold teeth casings, as cues to economic status and degree of market integration. But the most common sartorial distinction is between women who wear large skirts (*polleras*), tire rubber shoes (*ojotas*), shawls (*lliqllas*), and bowler hats—all indicators of indigenous identity despite being bought in the market, and those who wear more Western clothing associated with market integration and urbanism. Several female informants complained that their neighbors in Huatasani shamed them into wearing skirts even though they preferred to wear pants, and that they would switch clothing style depending on their current residence.

There are also some regional stylistic differences in handmade articles of clothing that women wear, but none of these differentiate communities within Huatasani. For example, in one district of Huancané women traditionally made distinctive black tops that were embroidered with bright floral and geometric patterns, and in another, women wore skirts with vertical pleats and woven belts with zoomorphic designs. Huatasaneños regularly encounter women wearing these markers at the weekly market in Huancané and readily recognize their district origin. However, younger women are increasingly choosing generic manufactured clothing that is not regionally specific, and men's clothing is similarly unmarked.

Although most Huatasaneños' clothing is bought in markets, people believe that Aymara- and Quechua-speaking women choose opposite ends of the available spectrum in terms of color. Both aymaristas and quechuistas believe Aymara-speaking women purchase clothing and yarn that are brighter and flashier colors (e.g., fuchsia) compared with Quechua-speaking women, who choose darker and more subdued colors (e.g., browns). However, these color choices are overlapping distributions and only apply to women, making signal detection difficult and error-prone. When we asked participants how they could detect whether a stranger spoke Aymara or Quechua during a trip to the multilingual Huancané market, their first response was inevitably to try to talk to them in the relevant language. The Spanish dialect used by native Aymara and Quechua speakers is the same and not perceptibly marked. Barring this obvious verbal marker of language competence, only some participants secondarily made reference to the different color preferences.

Religious and political affiliations are seldom signaled for most of the year. Markers of religious affiliation are only behavioral and thus can mostly be detected during ritual occasions in which evangelicals cannot participate, thus providing positive and costly evidence of their religious affiliation and therefore possibly the sincerity of their beliefs (Henrich 2009). More specifically, positive evidence of being evangelical will only be available during such festivities, since mass is not regularly given in Huatasani. However, people can conclude that someone is Catholic (or a hypocritical evangelical) if they are seen drinking alcohol or chewing coca at any time. Political parties have icons (e.g., a flower, a pot, a panpipe) associated with them that are used for campaigning and to facilitate voting. These lend themselves to being used as group markers, but they are mostly reserved for banners and murals. As such, individuals become associated with them only insofar as they campaign along with a particular candidate or paint their own house with political murals. These murals are usually detectable for at least a full election cycle, only disappearing as the adobe erodes or when painted over.

The fact that these markers are available for making inferences about social category membership does not mean that people act on this information or consider them for social interaction purposes. However, there are theoretical reasons to believe that people do assort according to some kinds of group membership.

Intragroup Assortment—Coordination and Cooperation

There are a number of reasons why people may be motivated to assort with others from the same social category. First, people may be ethnocentric so they can avoid coordination costs by interacting with others who share their same preferences, expectations, or personality characteristics (McElreath et al. 2003). Alternately, people may be motivated to interact with others from the same group for cooperative endeavors, knowing they will have recourse to group-based punitive institutions were their partner to defect (Bowles and Gintis 2004; Boyd and Richerson 1992). The former interactions, which are pure coordination games, differ from the latter, cooperative ones in that there is no incentive to defect on one's partner. However, behavioral patterns of assortment may reflect motivations for coordination, cooperation, or both, and without direct interventions it is nearly impossible to distinguish between them. Therefore, we discuss in-group preferences that may arise from either selection pressure jointly.

There are two time scales at which we might be able to detect preferences for interacting with members of the same social category: a historical one that produced the current social landscape, and a contemporary one reflected in individual decision-making. Simple preferences for not being in a numerical minority can result in spatially segregated landscapes across generations of residential location decisions (Schelling 1971). However, to detect even such simple in-group preferences within a generation, we need to control for such segregation (Kalmijn 1998). The fact that Huatasaneños preferentially interact with various kinds of in-group members implies the importance of at least the former, if not necessarily the latter, process.

Given the importance of inherited land holdings to agro-pastoralists, residential mobility allowing long-term spatial assortment is most common at the time of marriage, and only 43% of couples are endogamous at the level of community or village (Fig. 3). This means that, at a minimum, 28% of participants change residence at least once in

their lives, given that half of the individuals in exogamous couples must have done so (this might be a high estimate given that the sample is primarily villagers, who are likely to be more mobile than those who stayed in more rural communities). Additionally, there are cases of synchronous coordinated migrations and land purchases by various families from the same community. At least twice in recent memory, several families from one or two neighboring communities bought land in separate areas about 5 miles from their natal communities. Notably, these land purchases entailed moving from predominantly Aymara areas to predominantly Quechua-speaking areas.

These cases of coordinated migration indicate that people are trying to maintain their closer community-based (not just kin) social networks intact. It is likely that participants in these land purchases benefited from subsequent cooperation and coordination with known individuals. It is less clear whether these synchronous migrations imply an intralinguistic preference since at the regional level the migrants actually crossed the linguistic boundary when making these land purchases, and they were not coordinating their migration with speakers of the same language from different communities. However, since the linguistic boundary tracks the Chekasura River, and since people are linguistically endogamous (Fig. 3), and have more same-language than other-language interaction partners (Fig. 4) and godparents (Fig. 5), it is likely either that people currently have in-group assortment preferences or that historically they did so. Such historical preferences likely shaped residential mobility decisions, thus structuring the local social geography and affecting how easy it is for individuals of the current generation to interact with people from various social categories.

One way to discern peoples' current preferences given the spatial availability of interaction partners is to see whether they choose different kinds of partners for different activities. In structured interviews about social interactions we asked participants to identify the people they had most recently visited and helped, and those who had visited or helped them. Visiting is a relatively low-cost and common activity, whereas helping is more costly. This latter category included helping with agricultural labor, food processing, alloparenting, or food sharing. People may be motivated to seek in-group members in both kinds of interactions, but particularly so in helping interactions when coordination failures and defections are likely more costly. It is therefore likely that visiting interactions more accurately reflect an individual's neighborhood demographic composition.

Despite this difference in costs, people chose visiting and helping partners who spoke the same language as themselves at about the same rates (Fig. 4). That is, although interviewees overwhelmingly chose others who spoke the same language as

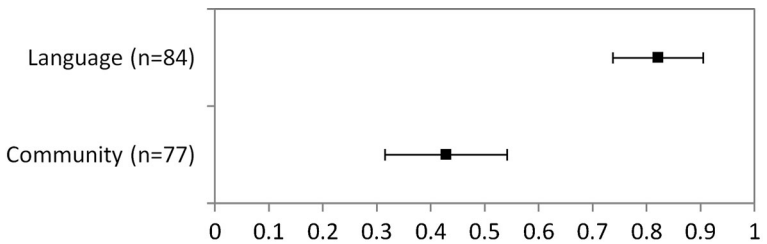

Fig. 3 Proportion of couples who are endogamous relative to language and community. Since significantly more community than language boundaries can be crossed, the endogamy rates are not directly comparable. 95% CI are shown

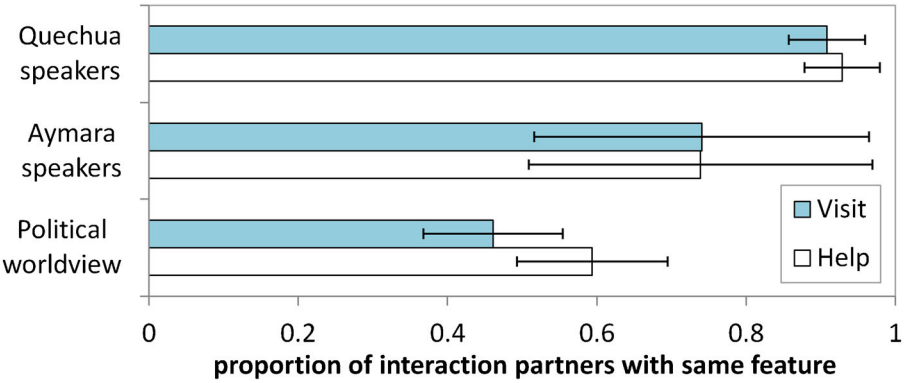

Fig. 4 Proportion of low- (visiting) and high- (helping) cost interactions among members of same social category. Robust 95% CI controlling for repeat responses from individuals are shown. Participants are plotted by their native language, whereas their interaction partners are coded by their language competence

themselves for interactions, this rate was the same regardless of the costs and potential benefits of the interaction. Tested another way, regression models predicting whether or not an interaction partner spoke Quechua or Aymara from the participant's native language, the kind of social interaction (i.e., low-cost visiting or high-cost helping), and the interaction of these two variables show no significant interaction (predicting the partner speaking Quechua: OR=0.42, SE=0.37, p=0.33; or speaking Aymara: OR=0.87, SE=0.76, p=0.88).

This pattern likely reflects a historical ethnocentric preference that produced segregated landscapes and relative indifference to the linguistic group membership of interaction partners among contemporary residents. Instead, both helping and visiting interactions probably reflect the base rate availability of neighbors who speak the participant's own language. Although most or our participants lived in the village, this urban center is somewhat spatially segregated, since rural migrants tend to purchase houses in the parts of the village that are nearest their natal communities. Therefore, Aymara speakers tend to cluster in a number of streets in town, making their pool of neighbors more heavily Aymara-speaking than that of Quechua speakers in the village.

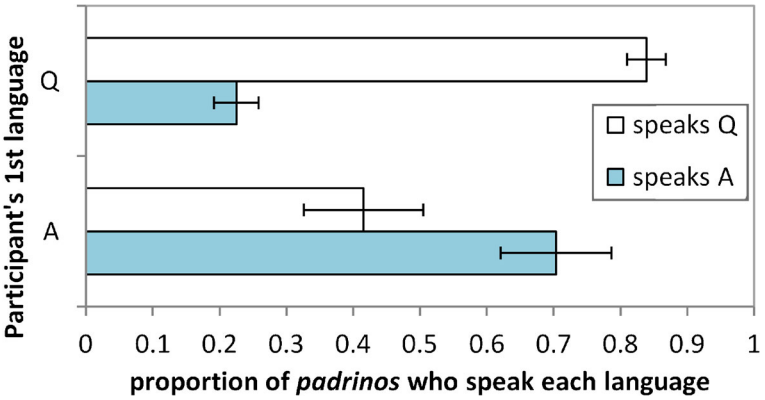

Fig. 5 Proportion of godparents (*padrinos*) who spoke Quechua (Q) and Aymara (A) by participant's native language. *Error bars* denote 95% CI. Godparents' spoken languages were not mutually exclusive to allow for multilingualism (n=727 godparents from 98 interviewees)

This interpretation of the interaction patterns between Quechua- and Aymara-speaking participants is consistent with the fact that native Aymara speakers show less in-group assortment than Quechua speakers do (Fig. 4). As a numerical minority in the village, Aymara speakers are surrounded by more linguistic out-group members, making it more likely that they will engage in intergroup interactions than will Quechua speakers, even if they are currently randomly selecting partners from among their neighbors.

Even for longer-term partnerships, in which there is more at stake, people chose partners of their own language category at about the same rates as they did for shorter-term cooperative ventures. For example, about 82% of marriages are linguistically endogamous (Fig. 3), which falls within the range of results for the helping and visiting questions. Similarly, Quechua speakers choose godparents who speak Quechua about 84% of the time (Fig. 5). Godparents (*padrinos*) are chosen for various occasions, such as a child's baptism, a child's first haircut, a couple's marriage, or the roofing of a house. These fictive kin are often chosen in order to build alliances with prestigious or economically well-off members of society. Given these priorities, a disproportionate number of *padrinos* live in cities or are professionals, and choosing linguistic similarity may be of less importance.

In contrast to the current generations' relative indifference to their cooperative partners' linguistic competence, interviewees' responses suggest that people considered their interaction partner's political worldview slightly more when engaging in helping rather than visiting interactions (Fig. 4). Overall assortment rates along the dimension of political worldview seem low; people responded that their interaction partner shared their same politics or way of viewing the world about 52% of the time. However, similar political worldviews were still less common in the low-cost visiting contexts than in the higher-cost helping contexts (OR=0.46, SE=0.15, p=0.02), suggesting that partner choice, and not just availability, is driving assortment along this dimension.

The base rates of assortment along political lines are difficult to compare with the linguistic assortment data because it is unclear how many categories people used to parse the variation in political views. Because people do not strongly affiliate themselves with political parties, and because questions regarding specific political candidate choices were sensitive, we asked a vaguer question: "Does this person have the same politics or way of thinking as you do?" This means that we *cannot* interpret the base rates in Fig. 4 as indicating less assortment along political than linguistic lines, although the pattern is consistent with people being less residentially segregated in the Huatasani region in terms of political worldviews.

Most naturally occurring, larger-scale cooperation beyond the dyad happens at the community level (or neighborhood level within the village). Community meetings are organized as the need arises, about every couple months. Participation is considered an obligation of all adult community members, and people think ill of those who do not participate frequently or promptly. Similarly, all married adults are expected to fulfill their duty of being community president and *teniente* for 1 year each. These authorities organize the community meetings, attend regional meetings of *tenientes*, and pay for an annual festival (*el qhaperado*). Meetings are usually called to organize the community's participation in festivals, to discuss how to distribute any public good, to choose authorities for the next year, to deal with conflicts that may arise between community members, and to decide how to deal with any major norm violation, such as theft.

Beyond the meetings, large-scale cooperation is common in dance competitions and when capturing and punishing suspected criminals, especially thieves from other communities. In the case of dance competitions, the larger, more coordinated groups tend to win cash prizes and improve the community's prestige and reputation for being "organized." Similarly, all adult community members are expected to partake in the collective punishment of criminals and risk being accused of being the criminal's accomplice otherwise. All neighbors stand to gain both from the reputational benefits of living in a well-defended community that is difficult to exploit and from direct help should they be victimized. Such cooperation is at least partly maintained by interaction norms rewarding those who behave more prosocially toward the group (Lyle and Smith 2014).

There are no comparable institutions for organizing collective action along other social boundaries. Members of the same political party or supporters of the same mayor will engage in a fair amount of cooperation (e.g., helping buy goods for potential voters, traveling for a campaign, painting murals), but only during the election season. People with similar degrees of market integration do not seem to coordinate any activity among themselves, except insofar as they might support similar policies in meetings. Despite the political rhetoric implying that Quechuas and Aymaras are corporate units, speakers of the same language seldom, if ever, bind together. Similarly, while evangelicals opt out of using and contributing to the public goods offered during festivities, Catholics and evangelicals do not otherwise cooperate as separate groups. Furthermore, there is no consensus about the extent to which evangelicalism excuses non-participation in the cooperative ventures surrounding festivals.

Intergroup Competition and Hostility

Some models suggest that intra-ethnic altruism would be unlikely to evolve genetically without sufficient between-group warfare (Choi and Bowles 2007). However, cultural learning processes and punishment institutions may homogenize individuals' altruism within groups (Mathew and Boyd 2011), allowing greater scope for the evolution of within-group cooperation even in the absence of intergroup hostilities (Bell et al. 2009). While inter-ethnic hostilities cannot emerge without within-group cooperation, we are less convinced that the converse is true. This is consistent with cross-cultural work showing different determinants of in-group preferences and intergroup hostility (Cashdan 2001; Silva and Mace 2014).

In Huatasani, the institutions for fostering intragroup cooperation are seldom used in overt intergroup conflict, and any hostility between members of different social categories is weak. Most commonly, intercommunity competitions take the ritualized form of dance or *sikuris* (panpipe ensembles) group contests.

However, intercommunity antagonism is sparked in some contexts, usually over territorial fights. In 2008, two neighboring communities threatened confrontation over a land dispute. The government had granted land near a community in Huatasani to four families from a community in Huancané in the late 1990s when Lake Titicaca flooded their lands. In the 2000s the community in Huatasani tried to reclaim some of this territory. In the end the dispute was resolved through a series of joint community meetings, without any violence. Furthermore, the source of the conflict was externally imposed, as the government had interceded during a natural disaster to distribute lands in a way that may not have been seen as legitimate. Various informants have claimed

that territorial disputes and active confrontation were more common during "[their] grandparents' time," but that things have settled down since.

Territorial disputes also occur over political boundaries when government funds are at stake. Several communities along the border with Huatasani district, and very near the capital itself, belong to the district of Huancané but mostly use the government institutions in Huatasani (e.g., high school and health clinic). Most Huatasaneños want these communities to join their district officially so they can receive more government funding, which is dependent on population size. Debate about these communities' district affiliations surfaced during the 2007 census, when residents of Ancomarca, Sustía, and Pongone were beseeched to register themselves in Huatasani (ESM Section 2.2). A couple of Sustia and Ancomarca residents with whom we spoke claimed there was a lack of consensus on this issue in their communities, with about half of the residents registering their national identity cards from Huatasani and the other half from Huancané. Although these communities are primarily Aymara-speaking, language category was never mentioned as a reason for the choice. Rather the trade-off was expressed as being between the convenience of having Huatasani's institutions and sources of monetary support nearby, and the independence and freedom offered by being farther away from their district or provincial capital.

Residents also respond with greater hostility to criminal activity from regional, but not from linguistic, out-group individuals. While punishing theft seldom escalates to aggression between communities, it is clear that people expect out-group thieves from other communities to be punished more harshly than thieves from within the community. When presented with vignettes about a neighbor who was caught stealing community members' sheep, or a stranger engaging in the same crime, participants were more likely to suggest beating, burning, or turning the thief over to authorities when it was a thief from a community out-group than when it was an in-group thief from the same community (proportion difference = 0.15, 95%CI=[0.04,0.25], p=0.008, n=68, within-subjects conditions). Participants justified these actions as the only ways to ensure they and others in the community were not taken advantage of again. In this same vignette study, participants did not differentiate between out-group thieves who came from another Aymara-speaking—versus another Quechua-speaking—community (proportion difference = 0.03, 95%CI=[−0.07,0.12], p=0.59, n=68 between-subjects condition). Fig. 6 shows the rates of severe punishment in each vignette broken down by type of punishment (corporal punishment vs. turning over criminals to authorities). Out-group thieves were particularly likely to receive corporal punishment if they were from a linguistic out-group (Aymara) community, and to be turned over to the police if they were from a linguistic in-group (Quechua) community. However, rates of corporal and authority-based punishment are not significantly different for Aymara versus Quechua thieves from a different community. Furthermore, the relative reliance on corporal punishment for Aymara out-group thieves mirrors the pattern of repsonses to in-group thieves, suggesting this may not be perceived as a harsher form of punishment.

Similarly, various informants mentioned that, in the 1970s, Huatasani—a primarily Quechua-speaking district—decided to join the overwhelmingly Aymara-speaking province of Huancané rather than staying under the jurisdiction of the Quechua-speaking province of Putina because the latter were considered hostile and oppressive. These same informants claimed that they were happy to be part of Huancané, and in fact none of the interviewees complained about their current provincial affiliation.

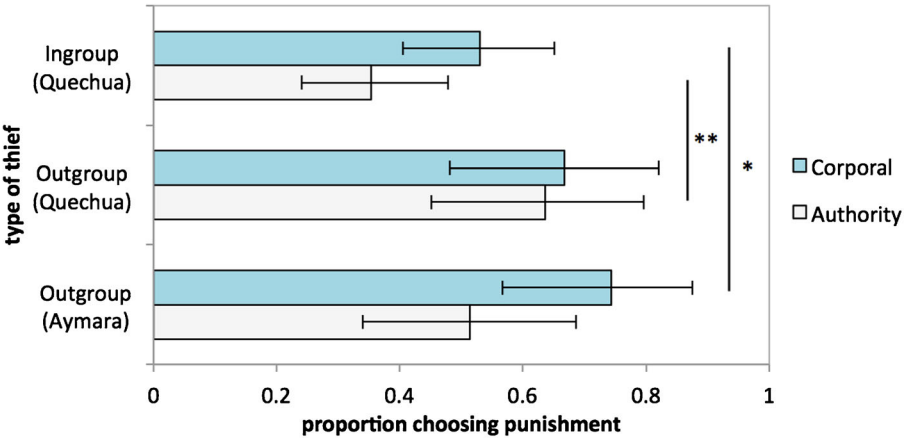

Fig. 6 Kinds of punishment expected for a thief of different regional and linguistic origins. From *top* to *bottom*: expected punishments for an in-group thief from Huatasani, an out-group thief from a Quechua-speaking community, and an out-group thief from an Aymara-speaking community. Punishment kinds were not mutually exclusive. 95% CI shown. *$p<0.05$, **$p<0.01$

Again, inter-regional hostilities seem to override the importance of the linguistic boundaries.

Curiously, while Quechua and Aymara speakers seldom act in concert, there seems to be a possibility of upsetting them as political constituents. This could explain the fact that all political coalitions for the mayoral races included native speakers of both languages, and that previous mayoral candidates had used propaganda that explicitly claimed inclusiveness along this linguistic dimension (ESM Section 2.5). In more quotidian settings, some interlinguistic tensions were apparent. Several Quechua-speaking high-school students complained about their peers' use of Aymara as an exclusionary tactic. So, although interlinguistic relations are overwhelmingly amicable, it remains to be seen whether intergroup hostility or resentment is easy to spark even along this non-ethnic linguistic divide. Urban-dwelling academics, politicians, and activists in the Puno region often resort to identity politics rhetoric that suggests a corporate nature to Quechua or Aymara speakers. Although this does not seem to accurately represent Huatasaneños' emic perspective, it may speak to the ease with which people accept and adopt such ideologies confounding language and cooperative units.

Conclusion

The nature of intergroup relations in Huatasani suggests that several functionally independent cognitive mechanisms underlie ethnic phenomena. Although cultural institutions that activate several of these psychological systems are likely to co-evolve, cultural settings such as the one described here show that a given social boundary can trigger some ethnic reasoning devices but not others. Furthermore, different group boundaries may elicit the strongest response in a given domain of behavior, depending on the function in question. These cultural contexts thus help reveal functional carvings of the cognitive architecture. Table 1 summarizes the strength of ethnic phenomena along the various social boundaries described in this paper.

Table 1 Summary of strength of ethnic phenomenon by social group boundary

Social group boundary	Ethnic phenomenon					
	Stereotyping	Essentialism: ID stability	Essentialism: mutual exclusivity	Intentional markers	Intragroup cooperation	Intergroup competition
Linguistic: Quechua vs. Aymara	Moderate	Low	Low	Low	Moderate	Low
Communities: within district	Moderate	Moderate	Moderate	Moderate	High	High
Socioeconomic: market integration	High	Low	Low	High	Low	Low
Morphological variation: within district	Low	Moderate	High	Low	Low	Low
Political parties: within district	Low	Low	High	High	High	High
Religion: Catholic vs. Evangelical	Moderate	Low	High	Low	Low	Low

Specifically in the Huatasani area it is the communities that might be the most similar to ethnic groups as traditionally conceived. They are clearly the primary locus of larger group cooperation, and various institutions support such collective action. These institutions can be leveraged for defense in the case of conflict or theft, though overt inter-community hostility is currently rare. However, even these units do not cluster much cultural variation beyond these organizational institutions and thus do not support much stereotyping. Furthermore, communities are neither strongly essentialized nor marked, and between-community migrations are common. On the other hand, categories associated with degree of market integration have some of the richest inductive potential such that people readily form novel stereotypes about them. However, they are not essentialized with respect to membership stability—nor, for that matter, are any of the other locally relevant social categories discussed in this paper. Furthermore, these socioeconomic categories are neither coalitional nor corporate units.

The functional independence of ethnic phenomena at sites such as Huatasani suggests caution in interpreting individual-level data from other studies showing associations between components of ethnic reasoning. For example, evidence that priming the stability of group boundaries makes participants in the Middle East exhibit less positive affect toward out-group members (Halperin et al. 2011) does not mean that these mechanisms are functionally and causally linked as components of a pan-human ethnic psychological adaptation. Indeed there are theoretical and empirical reasons to doubt such a relationship (Moya and Scelza 2015). Rather, these correlations between mental processes may be driven by culture-specific associations that adults learn are relevant to the local context. Future theoretical work should focus more clearly on the extent to which associations between ethnic phenomena should be expected at the group or individual level. Furthermore, finding individual-level relationships between social reasoning processes in cultural contexts such as the one illustrated here would strengthen claims for their functional interdependence.

The framework we have presented also questions the value of testing cultural evolutionary approaches as if they hinged on phenomena being organized at the ethnolinguistic level (Lamba and Mace 2011, 2013). Although evidence that ethnic phenomena are organized at the level of large cultural units suggests the importance of socially transmitted institutions (Mathew and Boyd 2011), the opposite finding that phenomena do not cluster at the ethnolinguistic level does not imply that cultural evolutionary processes are not at play. The level of organization that most motivates ethnic reasoning likely depends on the cognitive mechanism in question. For example, while one set of social boundaries may cluster many more culturally transmitted traits and promote stereotyping, a separate boundary that maps onto cooperative norms can inspire more collective action. In both these cases cultural evolutionary processes could be at play, but linguistic boundaries need not play a role.

Perhaps most interestingly given the cross-cultural prevalence (Cohen 2012; Giles 1977; Michalopoulos 2012; Nettle 1998) and psychological primacy (Kinzler et al. 2007; Moya 2013; Pietraszewski and Schwartz 2013) of linguistic social categories, language categories in Huatasani do not strongly motivate any ethnic phenomena among adults. Quechua and Aymara are not perceived as corporate units, are not essentialized with respect to identity stability or mutual exclusivity, and do not currently motivate in-group assortment or intergroup hostility, although they likely did motivate assortment in the past. Locals recognize some cultural differences between speakers of

each language when asked directly, but they generally downplay them in favor of causal explanations of cultural differences relying on socioeconomic status or community membership. The fact that multilingualism is so common in the Huatasani area may facilitate, or stem from, the emergence of such fluid language boundaries. Although our participants may have systematically tried to downplay the importance of language group boundaries or of intergroup hostility out of reputational concerns, this is likely less of a problem among rural Peruvians than it is among college students in the US and Europe, where most social cognition research has been conducted. Future research will examine more subtle in-group favoritism by measuring implicit biases to circumvent such social desirability concerns.

Furthermore, locals did not categorically deny the relevance of all linguistic differences. Participants were attuned to some important linguistic markers in the region, as evidenced by their beliefs that people from Cusco speak more "legitimate" Quechua for example. Importantly, these are within-language differences, and thus are objectively smaller than the differences between Quechua and Aymara. This suggests that it is only with accompanying beliefs about status or cultural differences that linguistic cues trigger ethnic phenomena. The Quechua-Aymara language boundary may be unrepresentative of those earlier in human evolution, given that it arose from relatively recent imperial expansions and religious colonial policies. However, the case study does suggest that language differences need not inspire any kind of ethnic reasoning.

Acknowledgments We thank our participants in Huatasani and our research assistants in the field: Saida Calancho, Mesa Dobek, and Sandy Enriquez. Clark Barrett, Dan Fessler, and three anonymous reviewers gave constructive feedback on earlier versions of this paper. This research was supported by National Institutes of Health grant 1RC1TW008631 and an International Cognition and Culture Institute mini-grant. This work was exempted by the UCLA Office for the Protection of Research Subjects, #08-169.

References

Ahn, W., Kalish, C., Gelman, S. A., Medin, D. L., Luhmann, C., Atran, S., Coley, J. D., & Shafto, P. (2001). Why essences are essential in the psychology of concepts. *Cognition, 82*, 59–69.

Allport, G. (1954). *The nature of prejudice*. Reading: Addison-Wesley.

Astuti, R., Carey, S., & Solomon, G. (2004). Constraints on conceptual development: a case study of the acquisition of folkbiological and folksociological knowledge in Madagascar. *Monographs of the Society for Research in Child Development, 69*(3), 1–135.

Axelrod, R., Hammond, R., & Grafen, A. (2004). Altruism via kin selection strategies that rely on arbitrary tags with which they coevolve. *Evolution, 58*(8), 1833–1838.

Barbujani, G., Magagni, A., Minch, E., & Cavalli-Sforza, L. L. (1997). An apportionment of human DNA diversity. *Proceedings of the National Academy of Sciences, 94*(9), 4516–4519.

Baron, A., & Banaji, M. (2006). The development of implicit attitudes evidence of race evaluations from ages 6 and 10 and adulthood. *Psychological Science, 17*(1), 53–58.

Barrett, C. (2001). On the functional origins of essentialism. *Mind and Society, 3*(2), 1–30.

Bastian, B., & Haslam, N. (2006). Psychological essentialism and stereotype endorsement. *Journal of Experimental Social Psychology, 42*(2), 228–235.

Bell, A. V., Richerson, P. J., & McElreath, R. (2009). Culture rather than genes provides greater scope for the evolution of large-scale human prosociality. *Proceedings of the National Academy of Sciences, 106*(42), 17671–17674.

Bigler, R. S., & Liben, L. S. (2006). A developmental intergroup theory of social stereotypes and prejudice. *Advances in Child Development and Behavior, 34*(3), 39–89.

Bowles, S., & Gintis, H. (2004). Persistent parochialism: trust and exclusion in ethnic networks. *Journal of Economic Behavior and Organization, 55*, 1–23.

Boyd, R., & Richerson, P. (1992). Punishment allows the evolution of cooperation (or anything else) in sizable groups. *Ethology and Sociobiology, 13*, 171–195.
Boyd, R., & Richerson, P. (1996). Why culture is common, but cultural evolution is rare. *Proceedings of the British Academy, 88*, 77–93.
Brase, G. (2001). Reasoning about coalitions: using markers of social group membership as probabilistic cues in reasoning tasks. *Thinking and Reasoning, 7*(4), 313–346.
Brewer, M. B. (1999). The psychology of prejudice: ingroup love or outgroup hate? *Journal of Social Issues, 55*, 429–444.
Brewer, M. (2007). The importance of being we: human nature and intergroup relations. *American Psychologist, 62*(8), 726–738.
Brubaker, R. (2004). *Ethnicity without groups*. Cambridge: Harvard University Press.
Cashdan, E. (2001). Ethnocentrism and xenophobia: a cross-cultural study. *Current Anthropology, 42*(5), 760–765.
Cerrón-Palomino, R. (2010). Contactos y desplazamientos lingüísticos en los Andes centrosureños : el puquina, el aimara y el quechua. *Boletín de Arqueología PUCP, 14*, 255–282.
Choi, J.-K., & Bowles, S. (2007). The coevolution of parochial altruism and war. *Science, 318*(5850), 636–640.
Cohen, E. (2012). The evolution of tag-based cooperation in humans. *Current Anthropology, 53*(5), 588–616.
Coley, J. D., Medin, D. L., & Atran, S. (1997). Does rank have its privilege? Inductive inferences within folkbiological taxonomies. *Cognition, 64*, 73–112.
Cottrell, C. A., & Neuberg, S. L. (2005). Different emotional reactions to different groups: a sociofunctional threat-based approach to "prejudice.". *Journal of Personality and Social Psychology, 88*(5), 770–789.
DeScioli, P., & Kurzban, R. (2009). The alliance hypothesis for human friendship. *PLoS One, 4*(6), e5802.
Dominguez Faura, N. (2010). Para una cartografía de la lengua puquina en el altiplano colonial (1548–1610). *Boletín de Arqueología PUCP, 14*, 309–328.
Gelman, S. A. (2005). *The essential child*. Oxford: Oxford University Press.
Giles, H. (1977). *Language, ethnicity and intergroup relations*. London: Academic.
Gil-White, F. J. (2001). Are ethnic groups biological "species" to the human brain? Essentialism in our cognition of some social categories. *Current Anthropology, 42*(4), 515–554.
Greenwald, A. G., Mcghee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition the implicit association test. *Journal of Personality and Social Psychology, 74*(6), 1464–1480.
Halperin, E., Russell, A. G., Trzesniewski, K. H., Gross, J. J., & Dweck, C. S. (2011). Promoting the peace process by changing beliefs about group malleability. *Science, 333*(6050), 1767–1769.
Hardman, M. J., Klein, H. M., & Stark, L. (1985). Aymara and Quechua: languages in contact. In H. Manelis Klein & L. Stark (Eds.), *South American languages: retrospect and prospect* (pp. 617–643). Austin: University of Texas Press.
Haslam, N., Rothschild, L., & Ernst, D. (2000). Essentialist beliefs about social categories. *British Journal of Social Psychology, 39*, 113–127.
Haslam, N., Rothschild, L., & Ernst, D. (2002). Are essentialist beliefs associated with prejudice? *British Journal of Social Psychology, 41*, 87–100.
Heggarty, P. (2008). Linguistics for archaeologists: a case-study in the Andes. *Cambridge Archaeological Journal, 18*(1), 35–56.
Henrich, J. (2009). The evolution of costly displays, cooperation and religion: credibility enhancing displays and their implications for cultural evolution. *Evolution and Human Behavior, 30*, 244–260.
Henrich, J., Heine, S., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*, 61–135.
Heyman, G., & Gelman, S. (2000). Preschool children's use of novel predicates to make inductive inferences about people. *Cognitive Development, 15*(3), 263–280.
Hilton, J. L., & von Hippel, W. (1996). Stereotypes. *Annual Review of Psychology, 47*, 237–271.
Hirschfeld, L. A. (1998). *Race in the making: Cognition, culture, and the child's construction of human kinds*. Cambridge: MIT Press.
Hosokawa, K. (1980). *Diagnostico sociolinguistico de la region norte de Potosi.* La Paz: Instituto Nacional de Estudios Lingüísticos (INEL).
Hunley, K., & Long, J. C. (2005). Gene flow across linguistic boundaries in native North American populations. *Proceedings of the National Academy of Sciences, 102*(5), 1312–1317.
Hymes, D. (1962). The ethnography of speaking. In T. Gladwin & W. Sturtevant (Eds.), *Anthropology and human behavior* (pp. 13–53). Washington, DC: Anthropological Society of Washington.
INEI (Instituto Nacional de Estadistica e Informatica), Government of Peru (2007). Censos nacionales. Retrieved from http://www.inei.gob.pe/.

Jackson, J. (1983). *The fish people: linguistic exogamy and Tukanoan identity in Northwest Amazonia*. Cambridge: Cambridge University Press.
Kalmijn, M. (1998). Intermarriage and homogamy: causes, patterns, trends. *Annual Review of Sociology, 24*, 395–421.
Kanovsky, M. (2007). Essentialism and folksociology: ethnicity again. *Journal of Cognition and Culture, 7*(3–4), 241–281.
Kinzler, K., Dupoux, E., & Spelke, E. (2007). The native language of social cognition. *Proceedings of the National Academy of Sciences, 104*(30), 12577–12580.
Kurzban, R., Tooby, J., & Cosmides, L. (2001). Can race be erased? Coalitional computation and social categorization. *Proceedings of the National Academy of Sciences, 98*(26), 15387–15392.
Lamba, S., & Mace, R. (2011). Demography and ecology drive variation in cooperation across human populations. *Proceedings of the National Academy of Sciences, 108*(35), 14426–14430.
Lamba, S., & Mace, R. (2013). The evolution of fairness: explaining variation in bargaining behaviour. *Proceedings of the Royal Society B, 280*, 2012–2028.
Leslie S-J (2015) The original sin of cognition: fear, prejudice, and generalization. *Journal of Philosophy*, in press.
Lyle, H. F., & Smith, E. A. (2014). The reputational and social network benefits of prosociality in an Andean community. *Proceedings of the National Academy of Sciences, 111*(13), 4820–4825.
Mannheim, B. (1991). *The language of the Inka since the European invasion*. Austin: University of Texas Press.
Mathew, S., & Boyd, R. (2011). Punishment sustains large-scale cooperation in prestate warfare. *Proceedings of the National Academy of Sciences, 108*(28), 11375–11380.
Maynard Smith, J. (2004). *Animal signals*. Oxford: Oxford University Press.
McElreath, R., Boyd, R., & Richerson, P. J. (2003). Shared norms and the evolution of ethnic markers. *Current Anthropology, 44*(1), 122–129.
Michalopoulos, S. (2012). The origins of ethnolinguistic diversity. *American Economic Review, 102*(4), 1508–1539.
Moerman, M. (1965). Ethnic identification in a complex civilization: who are the Lue? *American Anthropologist, 67*(5), 1215–1230.
Moya, C. (2013). Evolved priors for ethnolinguistic categorization: a case study from the Quechua-Aymara boundary in the Peruvian Altiplano. *Evolution and Human Behavior, 34*, 265–272.
Moya, C., & Scelza, B. (2015). The effect of recent ethnogenesis and migration histories on perceptions of ethnic group stability. *Journal of Cognition and Culture, 15*, 135–177.
Moya, C., Boyd, R., & Henrich, J. (2015). Reasoning about cultural and genetic transmission: developmental and cross-cultural evidence from Peru, Fiji and the US on how people make inferences about trait transmission. *Topics in Cognitive Science*, in press.
Nettle, D. (1998). Explaining global patterns of language diversity. *Journal of Anthropological Archaeology, 17*(4), 354–374.
Nettle, D., & Dunbar, R. (1997). Social markers and the evolution of reciprocal exchange. *Current Anthropology, 38*(1), 93–99.
Orlove, B. (1998). Down to earth: race and substance in the Andes. *Bulletin of Latin American Research, 17*(2), 207–222.
Pietraszewski, D., & Schwartz, A. (2013). Evidence that accent is a dedicated dimension of social categorization, not a byproduct of coalitional categorization. *Evolution and Human Behavior, 35*, 51–57.
Primov, G. (1974). Aymara-Quechua relations in Puno. *International Journal of Comparative Sociology, 15*(3–4), 167–181.
Radcliffe, S. A., & Westwood, S. (1996). *Remaking the nation: Place, identity and politics in Latin America*. London: Routledge.
Richerson, P., & Boyd, R. (2001). The evolution of subjective commitment to groups: A tribal instincts hypothesis. In R. Nesse (Ed.), *Evolution and the capacity for commitment* (pp. 186–220). New York: Russell Sage.
Richerson, P., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago: University of Chicago Press.
Roberts, G., & Sherratt, T. (2001). Does similarity breed cooperation? *Nature, 418*, 499–500.
Schaller, M., & Neuberg, S. (2008). Intergroup prejudices and intergroup conflicts. In C. Crawford & D. Krebs (Eds.), *Foundations of evolutionary psychology* (pp. 401–414). Mahwah: Lawrence Erlbaum Associates.
Schelling, T. (1971). Dynamic models of segregation. *Journal of Mathematical Sociology, 1*(2), 143–186.
Sidanius, J., & Pratto, F. (1999). *Social dominance: An intergroup theory of social hierarchy and oppression*. Cambridge: Cambridge University Press.

Silva, A., & Mace, R. (2014). Cooperation and conflict: field experiments in Northern Ireland. *Proceedings of the Royal Society: Biological Sciences, 281*(1792), 20141435. doi:10.1098/rspb.2014.1435.
Strevens, M. (2000). The essentialist aspect of naive theories. *Cognition, 74*(2), 149–175.
Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology, 33*, 1–39.
Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Chicago: Nelson-Hall.
Van den Berghe, P. (1987). *The ethnic phenomenon*. Westport: Praeger Paperback.
Wiessner, P. (1982). Risk, reciprocity and social influences on! Kung San economics. In E. Leacock & R. Lee (Eds.), *Politics and history in band societies* (pp. 61–84). Cambridge: Cambridge University Press.
Wimmer, A. (2013). *Ethnic boundary making:Institutions, power, networks*. Oxford: Oxford University Press.

Cristina Moya is a postdoctoral research fellow at the University of British Columbia in Vancouver. She received her BA in anthropology and psychology at UC Berkeley and her PhD in anthropology at UCLA. Her research addresses how humans have adapted to culturally-structured worlds, particularly in the domains of intergroup cognition and reproductive decision-making.

Rob Boyd is Origins Professor in the School of Human Evolution and Social Change at Arizona State University, Tempe, and Cowan Professor at the Santa Fe Institute. His research focuses on incorporating cultural transmission into the Darwinian theory of evolution and using the modified theory to understand why humans are such a peculiar creature. This work is set out in two books, co-authored with P. J. Richerson (*Culture and the Evolutionary Process* and *Not by Genes Alone*) and in a number of papers, many collected in a volume entitled *The Origin and Evolution of Cultures*. He has also published on the evolution of social behavior, especially reciprocity and collective action.