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Original Article

Evolved priors for ethnolinguistic categorization: A case study from the Quechua–Aymara boundary in the Peruvian Altiplano

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ABSTRACT

Ethnic categories uniquely structure human social worlds. People readily form stereotypes about these, and other social categories, but it is unclear whether certain dimensions are privileged for making predictions about strangers when information is limited. If humans have been living in culturally-structured groups for much of their evolutionary history, we might expect them to have adaptations for prioritizing ethno-linguistic cues as a basis for making predictions about others. We provide a strong test of this possibility through a series of studies in a field context along the Quechua–Aymara linguistic boundary in the Peruvian Altiplano where the language boundary is not particularly socially meaningful. We find evidence of such psychological priors among children and adults at this site by showing that their age, and the social categories' novelty affect participants' reliance on ethno-linguistic inductive inferences (i.e. one-to-many predictions). Studies 1–3 show that participants make more ethno-linguistic inferences when the social categories are more removed from their real-world context. Additionally, in Study 4 when the category is marked with acoustic cues of language use, young children rely heavily on ethno-linguistic predictions, even though adults do not.

1. Introduction

Humans are the only species structured into ethnic categories — that is they live in symbolically marked groups whose members share cultural norms, beliefs, expectations, and skills. Virtually no aspect of a person's behavioral repertoire and daily life is unaffected by local culture. In this paper we address whether people have psychological adaptations for categorizing others and making inferences about them based on their ethnic category. There are various reasons to believe that this may be the case. First, there is currently no place on earth where people do not assort into ethnic groups, and this has been the case as far back as there are historic records (Levine & Campbell, 1971). Second, the paleoanthropological record suggests that humans were symbolically marking themselves with shell beads and ochre as far back as 110,000 years ago (d' Errico, Henshilwood, Vanhaeren, & van Niekerk, 2005; Henshilwood et al., 2011). However, it is unclear what these markers meant, and how they mapped onto other cultural attributes or social identities. Furthermore, the pace of evolution is much debated, and it is unclear whether people have lived in culturally structured ethnic categories long enough for selection to produce psychological adaptations.

Here we test one possible component of a psychological adaptation for reasoning about ethnic groups; namely a bias towards making predictions about others based on their ethno-linguistic category. Categorizing others according to their ethnic membership may foster useful predictions, particularly in situations where information about others is limited or difficult to acquire. Generally, categories are useful when their members are homogenous relative to non-category members and when this is true for multiple traits (Mervis & Rosch, 1981; Murphy, 2002). The higher the relative homogeneity and the number of attributes, the richer the inductive potential of the category is — i.e. it has greater predictive power or information-richness. Rich inductive potential has often been discussed as the functional reason for essentialist beliefs about various kinds (Atran, 1998; Barrett, 2001; Coley, Medin, & Atran, 1997; Gelman, 1988), such as species.

Ethnic categories are likely to have rich inductive potential thanks to various cultural evolutionary processes. Conformist or prestige biases in social transmission have the effect of reducing the amount of within-category variation, thus homogenizing ethnic units (Henrich & McElreath, 2003; Perreault, Moya, & Boyd, 2012; Richerson & Boyd, 2005). Additionally, multiple cultural traits tend to cluster with one another (Holden & Mace, 2003; Richerson & Boyd, 2005). This covariance of traits can result from the fact that people learn several attributes from the same model set, and that cultural information may be transmitted in packages since various attributes functionally depend on one another (e.g. learning to cook acorns only makes sense if one knows how to leech them of toxins beforehand). Ethnic categories have the additional benefit of being readily detectable because they are often symbolically marked with visual

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or acoustic cues such as clothing or language, and thus allow quick predictions. In this paper we test whether the human categorization system evolved to expect this kind of culturally clustered world organized around ethno-linguistic categories.

It is worth clarifying that this account does not require ethnic stereotypes to be correct representations of the world. While there are several empirical and theoretical reasons to believe that social concepts are not always accurate or useful to individuals, a full discussion of these possibilities is beyond the scope of the current paper (Lee, Jussim, & McCauley, 1995; O'Flaherty & Sethi, 2008). In fact, a mismatch between evolved biases like the ones we are investigating and modern social taxonomies might be one of various sources of stereotype inaccuracy.

1.1. A proposal for an ethnic categorization system

Humans may have an evolved prior expectation that ethnic category membership will be predictive of a variety of cultural features. While we use terms such as "expectation" or "hypothesis" to describe a child's prior beliefs, we mean this in the Bayesian sense (Tenenbaum, Griffiths, & Kemp, 2006; Tenenbaum, Kemp, Griffiths, & Goodman, 2011) of a probability distribution of values before observations are taken into account, and do not intend to imply that this needs to be a theory-rich conceptualization. Simply put, an individual learning about their social world might start with some greater weight assigned to the likelihood that categorizing others based on ethnic cues is useful for making inferences about novel individuals and their attributes. As a child develops, such a prior should be updated based on their observations, either strengthened if they get confirmatory evidence, or weakened if it's contradictory.

Given that dialect or language use is a cross-culturally and historically common cue to ethnic category membership (Giles, 1977; Labov, 1972; Michalopoulos, 2012; Nettle, 1998), children may start off with a second additional expectation that linguistic features are predictive of ethnic category membership. A child learning about his social world faces an adaptive challenge in picking out which of the infinite number of distinctions between humans designates the locally relevant ethnic boundary. Therefore, an evolved prior that weighs cues like language or dialect use, as likely indicators of the ethnic boundary would help direct the child's attention and learning processes.

However, to be of any use, the adaptation must direct children's development into competent adults and allow them to update their prior expectations about the predictive power of language in their local context. While ethnic boundaries are pervasive, the exact ways in which they are marked are cross-culturally variable. For this reason, a fixed prior expectation that language category stereotypes will be useful bases of predictions will backfire in cases where, for example, religion, territorial boundaries, or sartorial markers denote the socially meaningful local ethnic boundary. Furthermore, even in cases where ethnic units are marked by linguistic features, human cognitive systems face the challenge of determining which features of language use matter (e.g., phonemic or language differences).

Natural selection faces a tradeoff between efficiency and accuracy when selecting how immutable to make this evolved prior. How strong should the prior expectation that ethno-linguistic categories have rich inductive potential be? In Bayesian terms, the stronger the prior that language is predictive of ethnic category membership, the more resistant this belief will be to updating in the face of contradictory information. The strength of the prior that natural selection would favor should be a function of 1) the cue validity of linguistic markers – i.e. the conditional probability that individuals belong to a specific ethnic category given that they have the corresponding marker (Rosch & Mervis, 1975) – 2) the likelihood that non-category members shared the same marker, and 3) how consistently language was a cue to ethnic category membership over evolutionary time. This would have the benefit of quickly guiding learning and reducing the amount of sampling that a child would have to engage in, but the cost of increasing the error rate when language was not in fact predictive of ethnic category membership and other corresponding cultural features.

We propose that humans may have adaptations for acquiring local social taxonomies that are analogous to a language acquisition device. Most evolutionary researchers agree that humans alone have adaptations that allow them to learn languages with complex structure quickly (Chomsky, 1965; Pinker, 1995), although the exact nature of these cognitive mechanisms is much debated (Evans & Levinson, 2009; Hauser, Chomsky, & Fitch, 2002). However, this adaptation requires cultural input to develop normally and must be capable of acquiring any human language. Children are not born knowing whether they will have to learn to speak Quechua, Spanish or any of the thousands of languages that humans have culturally evolved. Similarly, we propose that humans have adaptations that allow them to readily acquire social taxonomies, including ethnic ones, but that these mechanisms require cultural inputs to develop normally and to determine the nature of the local social boundaries. Minimally, such cognitive mechanisms would include priors about cues that are predictive of ethnic category membership, priors about the traits that cluster along ethnic boundaries, and rules for updating both of these.

In this paper we consider just one possible component of this adaptation, namely, that humans have evolved priors for making inductive inferences based on language use, and that they update these through the course of development in the face of contradictory information. While there is some evidence for similar folkbiological adaptations for acquiring knowledge about the natural world (Atran, 1990), we believe it is worth investigating folksociology as a separate system. Our proposal is similar to Hirschfeld's (1996), but focuses on reasoning about ethnic kinds and provides an account of why these categories specifically would have had rich inductive potential thanks to various cultural evolutionary processes.

1.2. Language use as a privileged dimension of categorization

Several developmental psychologists have documented that children treat various category boundaries as having rich inductive potential. Children reason that animals denoted with the same label have more inductive potential than those characterized by visual similarity (Gelman & Markman, 1986). Similarly, labeling increases object categorization even in infancy (Fulkerson & Waxman, 2007; Xu, 2002) suggesting that humans are designed to consider social input early on to guide inferences. However, there may be some domain specificity to this effect. While labels also increase the inductive potential of social categories, they have no such effect when the same visual stimuli are described as dolls (Heyman & Gelman, 2000b).

Children also treat personality traits (Heyman & Gelman, 2000a) and social categories, such as gender, religiosity, ethnicity, and social status (Diesendruck & HaLevi, 2006), as having rich inductive potential. In the latter study children in Israel treated the Arab–Jewish distinction as the most information-rich even though adults made more personality-based assessments on the task. However, it is difficult to gauge to what extent children's responses are the output of cognitive mechanisms designed for ethnicity-based predictions. Instead, they might be outputs of learning mechanisms that allow children to learn various beliefs from adults, including views that the latter do not wish to express in a laboratory setting because of social desirability concerns.

There are some limited data regarding how much inductive potential children ascribe to linguistic categories. American preschoolers do treat language use as predictive of various features such as skin color, dwelling, and clothing (Hirschfeld & Gelman, 1997). However, these data come from a social context where language