**Hidden Clusters Beyond Ethnic Boundaries**

BBS Commentary on Uchiyama et al., ‘Cultural evolution of genetic heritability’

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**Abstract**: Hidden cluster problems can manifest when broad ethnic categories are used as proxies for cultural traits, especially when traits are assumed to encode cultural distances between groups. We suggest a granular understanding of cultural trait distributions within and between ethnic categories is fundamental to the interpretation of heritability estimates as well as general behavioral outcomes.

**Body:** The target article argues that accounting for human social categories is essential for understanding aggregate measures of ostensibly non-social phenomena, such as the heritability of intelligence. Uchiyama et al. rightly highlight what they call the “hidden cluster problem,” in which geopolitical or ethnolinguistic boundaries often used by geneticists to account for culture may fail to accurately represent important cultural and even environmental clustering. We agree that this is a problem, and further propose that the hidden cluster problem creates challenges not only for behavioral genetics, but also for social scientists who want to better understand the full spectrum of influences to cultural and behavioral traits. We draw particular attention to the classic anthropological work of Barth (1969) in outlining the importance of developing more granular understandings of human cultural trait distributions.

As the human behavioral sciences have expanded over the last several decades, special attention to sampling and methodological issues, such as the WEIRD sampling and causal locus problems discussed by Uchiyama et al., have been extensively explored. In contrast, the hidden cluster problem has received less attention outside of the social sciences despite recurrent examples of cultural clustering in social-scientific and ethnographic accounts (Henrich, Heine & Norenzayan, 2010; Richerson & Boyd, 2008; Schulz et al. 2019; Colleran 2020). Hidden clusters represent a particularly pernicious problem because the categories that individuals use to socially identify themselves may not necessarily map onto well-defined cultural trait distributions. Consider, for example, caste and ethnicity in India and differentiation *within* these categories: Biswas & Pandey (1996) found that traditionally defined categories of identity in India did not map well onto self-perceived economic condition or social status once one accounts for economic mobility (also see Schooler, 2010). This means that using these endemic social categories with the aim of controlling for cultural differences between individuals does not ensure that the cultural differences represented by those categories are the ones most relevant for studying the problem at hand.

Hidden clusters can confound behavioral analysis when self-ascribed ethnicity is used as a proxy for culture, especially when there is scarce information about the distribution of cultural traits within and across ethnic groups in a society. In the case of estimating heritability, this can potentially blind us to the extent of cultural heterogeneity in the social environment, as outlined in the target article. Scholars going back as far as Barth (1969) have warned that self-ascribed ethnicity should not be used as a proxy for substantive cultural trait distributions between ethnic groups. Rather, because ethnicities emerge in the interactions between groups and cluster around particular cultural dimensions that give rise to demarcation, they do not reflect the entirety of the cultural trait distribution of a group, only the part of it that is relevant to the boundaries of group membership. Knowing these boundaries means knowing across which cultural dimensions groups differentiate from one another, which relates directly to the degree of heterogeneity of the social environment and its effect on heritability estimates.

Consider a society where two ethnic groups are differentiated by their cooking practices, but share other cultural traits, such as kinship norms, in common. These self-ascribed ethnic categories, demarcated by differences in cooking practices, tell us nothing about the clustered nature of kinship norms across ethnic groups. If (for the purposes of this example) kinship norms are causally intertwined with political preferences, and we want to study the genetic heritability of political preferences, researchers may be presented with hidden environmental homogeneity, which would increase the measured genetic heritability of political preferences, leading to the erroneous conclusion that one is accounting for cultural differences in the behavioral dimensions of interest. Using self-ascribed ethnicity as a proxy for culture opens us up to the risk of ignoring hidden clusters, leading us to overestimate the heritability of political preferences due to the residual variation explained by genes in our example.

In its moment (and beyond), the Barthian notion of ethnic identity was important for proposing ethnic ascription as an indicator of group-level interactions at work. In the study of cultural evolution, this way of thinking about identity has been generalized beyond ethnicity, particularly in contemporary notions of social identity and its relation to behavioral clustering (McElreath, Boyd & Richerson, 2003; Smaldino, 2019; Smaldino & Turner, 2021). Social identities emerge in an evolving ecology of groups, and thus are driven by potential patterns of coexistence, cooperation, competition, domination, dependence, hierarchization, etc. In human societies, where social identities can be nested and multidimensional (in great part owing to the possibility of multiple group membership), understanding which cultural clusters correlate with which facets of social identity is necessary in order to construct a sufficiently clear view of a society's cultural trait landscape. For example, the social identity dimension of social class can be defined, at least in part, by the bounded set of cultural traits that correlate with socio-economic status (Bourdieu, 1987). Certain traits, in this example, may be shared by all high socio-economic status members of a society, regardless of ethnicity (even though ethnicity is often non-independent of socio-economic status across groups). From this view, it becomes clear that, if the aim is to explain where a particular behavior comes from and the extent to which it is genetically heritable, the goal of understanding a society's cultural dynamics with fine granularity in regards to its unique traits—and even more critically, the extent to which these traits overlap with other cultural groups—must be incorporated into the research process.

Understanding the emergence of cultural clusters is a work in progress, with both theory and methodology still under construction. That said, turning a blind eye to cultural clustering in societies of interest is a potential problem for any science of human behavior that seeks to account for the effects of cultural differences. Accounting for the existence of hidden cultural clusters should be a default aim for *all* behavioral sciences, including but not limited to behavioral genetics.

**References**

Barth, F. (1969). *Ethnic groups and boundaries: The social organization of culture difference*. Boston: Little, Brown and Co.

Biswas, U. N., & Pandey, J. (1996). Mobility and perception of socioeconomic status among tribal and caste group. *Journal of Cross-Cultural Psychology*, *27*(2), 200-215.

Bourdieu, P. (1987). *Distinction: A social critique of the judgement of taste*. Harvard University Press.

Colleran, H. (2020). Market integration reduces kin density in women’s ego-networks in rural Poland. *Nature Communications, 11*, 266.

Henrich, J., Heine, S. & Norenzayan, A. (2010). Most people are not WEIRD. *Nature* *466***,** 29. https://doi.org/10.1038/466029a

McElreath, R., Boyd, R., & Richerson, P. (2003). Shared norms and the evolution of ethnic markers. *Current Anthropology*, *44*(1), 122-130.

Richerson, P. J., & Boyd, R. (2008). *Not by genes alone: How culture transformed human evolution*. University of Chicago Press.

Schooler, C. (2010). Culture and social structure: The relevance of social structure to cultural psychology. In: D. Cohen (Ed.), *Handbook of Cultural Psychology*, pp. 370-388. Guilford.

Schulz, J. F., Bahrami-Rad, D., Beauchamp, J. P., & Henrich, J. (2019). The Church, intensive kinship, and global psychological variation. *Science, 366,* eaau5141.

Smaldino, P. E., & Turner, M. A. (2021). Covert signaling is an adaptive communication strategy in diverse populations. *SocArXiv. December*, *2*.

Smaldino, P. E. (2019). Social identity and cooperation in cultural evolution. *Behavioural Processes*, *161*, 108-116.