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Historical Migration Patterns Shape Contemporary Cultures of Emotion

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Abstract
Human emotional behavior varies across cultures. Smiling at a passing stranger on the street may seem perfectly normal in one culture and profoundly strange or even suspicious in another. What are the origins of cultural differences in emotional expression, communication, and regulation? We review new evidence in favor of one answer to this question. A socioecological factor, historical heterogeneity—defined as the ancestral diversity of the world's regions based on human migration patterns over centuries—accounts for important cultural variations in emotional experience and expression. We summarize findings from studies of large global samples that link the migratory history of a country's population with present-day cultural differences in how overtly and clearly emotions are expressed to others, in the frequency and meaning of smiles, and in associated character traits. New research also extends the analysis to the historical heterogeneity of the United States, and country-level findings are replicated at the level of the states. We suggest that enduring emotional behaviors and traits evolve from the opportunities and challenges posed by the commingling of people of diverse ancestries. We conclude by highlighting the questions and challenges for future research stemming from this approach.

Keywords
historical heterogeneity, culture, emotion, facial expression

Millions of dollars have been spent over the past decade on training people to express emotions appropriately in cross-cultural contexts. Workshops provide cross-cultural emotional-intelligence training (Alon & Higgins, 2005; Emmerling & Boyatzis, 2012), coaching East Asian business people to smile wider in transactions with Westerners and teaching American business people to restrain their expressions when traveling to Russia. Meanwhile, "smile campaigns" in Paris and other cities with reputations for interpersonal coolness encourage members of the service sector in particular to make tourists feel welcome by smiling more. Before the 2018 World Cup soccer tournament hosted by Russia, several Russian organizations and companies coached employees on why and when people from other cultures tend to smile.

Our willingness to spend money on these initiatives has outstripped the science, however. Let us start with what we do know: Although some universals seem to exist, there is good evidence for cultural variability in emotional expression and experience (Gendron, Roberson, van der Vyver, & Barrett, 2014; Russell, 1994; van Hemert, Poortinga, & van de Vijver, 2007). Moreover, interactions between cultural groups inevitably involve misunderstandings about facial and bodily expressions of emotion that have potent and lasting effects (Matsumoto & Wilson, 2008). Within the behavioral sciences, strong claims in favor of either complete universality or the cultural construction of emotions and their expressions are no longer defensible. Instead, researchers now focus on the extent to which emotional expression is influenced by socialization, context, and observational learning (Cordaro, Keltner, Tshering, & Flynn, 2016; Scarantino, 2017).

What is less clear, however, is why cultural variability in emotional expression emerges in the first place. What features of a culture and its environment best explain how its inhabitants experience and express emotion?

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Identifying and quantifying the causes of such cultural variability will be necessary if scientists are to predict emotions and changes in emotional behavior over time without relying on exhaustive (and exhausting) descriptions of each country's or region's unique norms and practices (Varnum & Grossmann, 2017). Theory-driven explanations of cultural variability will also improve cross-cultural competency training for business and diplomacy by indicating which training strategies should generalize to other cultures.

In the first section of this review, we show that many cultural differences can be understood as adaptive responses to environmental or social pressures. This cultural evolutionary perspective is gaining traction in the behavioral sciences because it generates precise and testable hypotheses regarding which cultures should differ from one another and on what dimensions (Henrich & McElreath, 2003). In the second section we examine the heterogeneity of long-history migration (or, simply, historical heterogeneity), a socioecological variable that refers to the migratory history of the world's countries, states, or regions (Putterman & Weil, 2010). We propose that the conditions created by the long-term commingling of the world's people had predictable effects on emotion. Large-scale studies provide initial evidence linking historical heterogeneity with display rules for emotional expressivity, the transparency of emotional expression, and, with smiling, a fundamental reward and trust-building behavior. Moreover, recent investigations of the historical heterogeneity of smaller-scale regions—in particular, the individual states of the United States—has also replicated and extended the global analysis. We finish this review by providing a road map for future interdisciplinary research, with a focus on experimental designs, clarifying the construct of historical heterogeneity and the isolation of possible mechanisms underlying its effects on cultures of emotion.

Socioecological Roots of Culture

Humans, like all other organisms, must adapt to the specific demands of their environments to survive and reproduce (Sng, Neuberg, Varnum, & Kenrick, 2018). Such adaptation can occur over different timescales and via different mechanisms: If the demands of the environment persist for thousands of generations, organisms may adapt through biological evolution (i.e., genetic change; Feldman, Aoki, & Kumm, 1996; Henrich & McElreath, 2003). If the demands of the environment change within a single generation, adaptation must occur through individual learning. However, if social and environmental pressures change on a midrange timescale—say, on the order of decades or centuries—then adaptation is likely to take place via changes at the cultural level. Culture is defined as the explicit and implicit patterns of beliefs and knowledge embodied in institutions, practices, and artifacts; it is a package of adaptations transmitted from one generation to the next via social learning (Oishi, 2014). Thus, while measurable features of contemporary environments influence human behavior in real time, recent attention to historical conditions provides important insights into the pressures that have shaped features of culture (e.g., Lupyan & Dale, 2016). Just as with biological evolution, long-term physical and social environments produce cultural adaptations that may be sustained in a state of equilibrium and observed in present-day cultures (Nettle, 2009; Sng et al., 2018).

Whereas the most intuitive ecological pressures driving cultural change are properties of the physical environment, such as the climate's contribution to pathogen prevalence (Gelfand et al., 2011; Hruschka & Hackman, 2014; Murray, Schaller, & Suedfeld, 2013; Murray, Trudeau, & Schaller, 2011; Schaller & Murray, 2008; Schaller & Park, 2011), properties of the long-term social ecology can also underlie cultural differences. For instance, some cultures historically relied on ploughs to harvest cereals such as wheat, barley, and rye but not sorghum and millet. Because it required considerable physical strength, plough agriculture mostly relied on men, with little participation of women and children. Research suggests that the preindustrial use of ploughs among the ancestors of the citizens of a given country is related to far lower rates of female participation in the labor market and in politics (Alesina, Giuliano, & Nunn, 2013; Hansen, Jensen, & Skovsgaard, 2015). A history of plough use is also associated with individuals' attitudes reflecting gender inequality. This relationship is significant even after taking into account a wide range of historical ethnographic controls, including the presence of animals, religion, economic development, levels of political authority, warfare, and a tropical climate. It is also observed among second-generation immigrants whose ancestors have different histories of plough use but who are all currently living in the United States and facing the same labor market, institutions, and policies. The example of enduring influences of traditional plough use on social practices and attitudes demonstrates that cultural differences can persist beyond the social or environmental conditions that initially gave rise to them.

Historical Heterogeneity and the Culture of Emotion

Our species' history is characterized by bursts of extensive migration, first from Africa to the far reaches of the globe and, more recently, as a consequence of technology-assisted colonization and globalization (Diamond, 1997).

During periods of massive migration, intergroup contact can disrupt the practices and norms of individual cultures. Members of different cultural groups may absorb practices from each other and develop new practices as a way of adapting to the heterogeneous socioecological environment. We propose that populations that experienced historical migration from multiple source countries come to exhibit behaviors that facilitate basic communication and the efficient formation of new social connections, especially among strangers.

In particular, we argue that the long-term social and environmental pressures that contributed to forming the present-day populations of countries such as the United States and Brazil differed from those historically faced by the populations in countries such as Austria and Japan. For example, in the former pair of countries, the establishment of new groups and hierarchies, exchange of novel ideas and practices, and creation of institutions took place largely in the absence of a common language and shared social norms. We reason that a lack of shared cultural knowledge in burgeoning heterogeneous societies results in more unpredictable social environments, meaning it is harder to anticipate a social partner's behavior, feelings, or goals. Social unpredictability can be reduced if people make their intended behaviors, feelings, and goals more explicit through transparent nonverbal displays. Social unpredictability is less likely in homogeneous societies, which are composed of people whose ancestors inhabited the same geographical region hundreds or thousands of years before, resulting in comparatively more stable and predictable group boundaries, norms, and hierarchies. In support of these claims, indicators of the heterogeneity of the countries of the world, and of the states of the United States (see below for discussion), are negatively correlated with the tightness of prevalent social norms (in recent calculations, $r = -.43$ and $p < .02$ for countries and $r = -.72$ and $p < .001$ for states[1]). These correlations suggest that lower ancestral diversity is associated with a more pervasive endorsement of norms for behavior that are clearly defined and reliably upheld.

Historically heterogeneous societies possess an additional feature that should promote expressivity, particularly of positive emotion: They are higher in present-day relational mobility ($r = .56$, $p < .001$[2]), meaning social ties in heterogeneous societies tend to be less rigid than homogeneous societies, and people have more opportunities to form new connections (Thomson et al., 2018). Thomson and colleagues report evidence that greater relational mobility is associated with more "active" interpersonal behaviors intended to attract and maintain social partners, such as engaging in self-disclosure and trusting strangers. We argue the socioecological pressure to actively create and maintain social ties, which is positively related to a society's historical heterogeneity, encourages expressive displays that one is a trustworthy and desirable social partner.

One implication of the difference in relational mobility across cultures with high versus low ancestral diversity is that the differences in emotion culture are likely to manifest themselves in interactions between strangers and intergroup contact. For example, it would be adaptive in interactions with strangers, who can be seen as potential future in-group members, that people in historically heterogeneous—but not homogeneous—societies show enhanced expressiveness and clarity (Oishi, Ishii, & Lun, 2009). Emotional communication with intimate others may show somewhat less divergence because individuals from both types of cultures already share emotional language and norms for emotional practices with people who are well-known to them.

In the following sections we review initial survey and behavioral evidence for general relationships between historical heterogeneity and emotional expression. We refer to high and low historical heterogeneity or high and low ancestral diversity throughout, all the while acknowledging that this socioecological factor exists as a continuum and is not represented by two distinct societal categories. We also note that some countries that did not experience heterogeneous long-history migration are experiencing more recent waves of migration and immigration not accounted for in available measures of country-level historical heterogeneity.

The world migration matrix

Historical heterogeneity of the countries of the world was quantified by Putterman and Weil (2010). Using genetic and historical data, they generated the world migration matrix, which summarizes the movement of people to and from 165 regions, defined by present-day nations' borders, since the year 1500. The year 1500 is significant because it corresponds roughly to the time at which advances in engineering and orientation permitted a new level of exploration and colonization. The matrix lists the countries that contributed[3] to a given country's population in 2000 (Fig. 1). These countries of origin are known as source countries, and the concept of heterogeneity is most closely represented by the number of source countries that contributed to a current population (Rychlowska et al., 2015).

A recent cross-cultural study evaluating the role that historical heterogeneity plays in explaining emotional expression revealed that the number of source countries is only moderately correlated with other aspects of culture such as present-day levels of immigration and ethnic diversity, individualism-collectivism, and (as

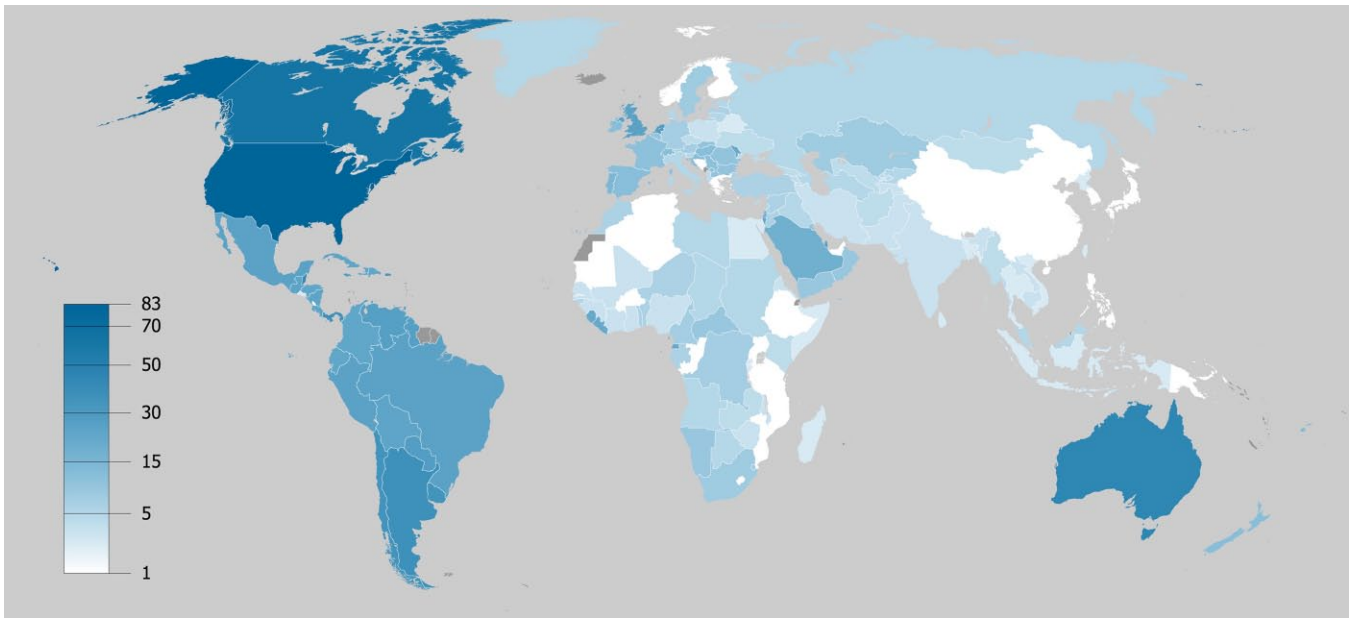

Fig. 1. Country-level historical heterogeneity. The map depicts the number of source countries that have contributed to the present-day population of every country of the world since 1500. Countries whose populations derived from more source countries are represented in darker colors. Values from Putterman and Weil (2010).

already noted) residential mobility. Historical heterogeneity is thus a socioecological factor that is distinct from these other descriptions of a culture (Rychlowska et al., 2015).

Historical heterogeneity and emotional behavior

Recent research that uses the world migration matrix to estimate historical heterogeneity reveals strong links between the migratory history of a country's population and contemporary cultural differences in how readily and clearly emotions are expressed to others, in the nature of smiles, and in associated character traits.

Emotional display rules. Display rules are defined as socially transmitted expectations about the degree to which emotions experienced in social interactions should be shown on the face and body and in the voice. Such expectations vary widely throughout the world, from norms that favor the suppression of emotions to those that favor expressing emotions when they are experienced (Matsumoto, Yoo, & Fontaine, 2008). Historical heterogeneity should explain significant variability in the rules of emotional expressiveness. In particular, Rychlowska and colleagues (2015) reasoned that the tasks confronted by people in societies of high ancestral diversity can be served by adherence to display rules according to which emotions should be expressed when felt.

Expressive displays can communicate a range of social motivations and intentions and be iteratively corrected and calibrated for precision of both meaning and intensity on-line, without relying on spoken language. Expressivity may also be adaptive because it fosters trustworthiness—social partners trust one another more if one person believes that he or she knows what the other person is feeling and intending (Boone & Buck, 2003). This should be true of expressions of both positive (Schug, Matsumoto, Horita, Yamagishi, & Bonnet, 2010) and negative (Butler et al., 2003) states. Trust, in turn, facilitates the creation and achievement of cooperation goals, which is a challenge confronted by people in environments of high ancestral diversity.

In contrast, in social environments in which language about emotion can be used to communicate social motivations and intentions, and in which normative behaviors and emotional responses to events are well-defined, high expressivity may be viewed as unnecessary, disruptive to the social structure, or insensitive to the social context (Matsumoto, Yoo, & Chung, 2010). The relationships and knowledge bases that serve as the foundation for social organization and cooperation are centuries old in environments with low ancestral diversity, making trust bonds formed through emotional expressiveness less necessary. Furthermore, to the extent that emotional expressions are communicative behaviors (Crivelli & Fridlund, 2018), they may adhere to the same principles of efficiency as verbal language (Hawkins, 2014). Speakers tend not to overdescribe or

overexplain, providing sufficient but not redundant information to convey an idea (Engelhardt, Bailey, & Ferreira, 2006). We speculate people will tend to be similarly efficient with nonverbal communication, being only as expressive as is normative and necessary to convey their feelings and intentions. Over time a social group's display rules will settle into an equilibrium state—a specific level of expressivity and a set of expressive norms—that maximizes the trade-off between the advantages and disadvantages of nonverbal expressivity.

An existing set of cross-cultural data from 32 countries with 5,361 participants (Matsumoto et al., 2008) was reanalyzed to examine the relationship between historical heterogeneity and display rules governing the expression of anger, contempt, disgust, fear, happiness, sadness, and surprise (Rychlowska et al., 2015). Individuals reported the extent to which they believed that a person should express emotions on scales ranging from expressing nothing to showing more than one actually feels when experiencing an emotion.[4] In contrast to countries with low historical heterogeneity, countries with high historical heterogeneity had display rules that dictated the overt expression of felt emotion (Rychlowska et al., 2015). The effect held even when analyses were adjusted for other factors that might relate to expressivity norms, including gross domestic product (GDP), population density, individualism, and residential mobility, Thus, individuals from countries such as New Zealand and Israel favored expressiveness norms, whereas individuals from Poland and India favored a greater dissimulation of emotion. Furthermore, two indices of present-day population heterogeneity, current migration rates and ethnic fractionalization (Alesina, Devleeschauwer, Easterly, Kurlat, & Wacziarg, 2003), did not account for significant variance, suggesting that recent increases in demographic diversity do not immediately exert the same cultural influences as does long-term ancestral diversity.

Interpretability of emotional expression. In addition to shared norms for the overt expression of emotion, a second adaptation to the challenges of life in societies with high historical heterogeneity concerns the clarity or interpretability of emotional expressions. When expectations about likely emotional responses to a given situation and language for emotion are not shared across members of a given society, precision in nonverbal communication is at a premium. Thus, people in countries with high historical heterogeneity may adjust their displays of emotion to ensure accurate recognition by others. Such a hypothesis is supported by recent evidence revealing that individuals can update their initial representations of emotions depending on the intensity of the expressions encountered in their environment (Plate, Wood, Woodard, & Pollak, 2018).

In addition, although the facial expressions of people from different cultures share some physical and dynamic features, there is evidence of some culture-specific features of emotional expression (Elfenbein & Ambady, 2002). As an example, in Thailand, anger is often conveyed with tense smiles that may be unambiguous to other Thai people but confusing to people unfamiliar with Thai culture (Cavanagh, 2006). In societies experiencing large-scale migration, culture-specific expressions or features of expressions are no longer effective and may be replaced by more cross-culturally unambiguous expressions. Thus, Thai immigrants settling in an emerging heterogeneous society might shift toward producing more universally recognizable anger displays to be understood. Indeed, some extant findings are consistent with this prediction (Elfenbein & Ambady, 2003).

Existing data sets were recently reanalyzed to test the hypothesis that expressions of emotion produced by citizens of countries with high ancestral diversity are more accurately recognized cross-culturally than are expressions of emotion displayed by members of homogeneous cultures (Wood, Rychlowska, & Niedenthal, 2016). In the 92 articles included in the reanalysis, emotion recognition was assessed with objective indicators of accuracy, most often forced-choice emotion-categorization tasks (Elfenbein & Ambady, 2002). For example, experimental participants from one culture labeled the facial, bodily, and/or vocal expressions of emotion displayed by members of another culture using experimenter-provided labels for emotional states such as fear and disgust. The studies typically identified cultures at the level of country (e.g., China), but others examined ethnic or racial subcultures within countries (e.g., West Indian Canadian). The studies in the analysis included participants from 79 cultures and expressions from 32 cultures. As anticipated, historical heterogeneity of the country of the expresser was positively related to emotion-recognition accuracy, with expressers from historically heterogeneous countries making displays that were easier to decode (Fig. 2). Moreover, the relationship persisted even when other aspects of culture were taken into account.

Frequency of smiling. People in many countries judge other people who are smiling to be more trustworthy than those who are not (Todorov, Pakrashi, & Oosterhof, 2009), and smiles are crucial for the formation of cooperative relationships (Manzini, Sadrieh, & Vriend, 2009; Mehu, Little, & Dunbar, 2007; Schug et al., 2010). Beyond conveying positive affect, smiles more generally convey benign intentions, facilitating and regulating social interactions (Martin, Rychlowska, Wood, & Niedenthal, 2017).

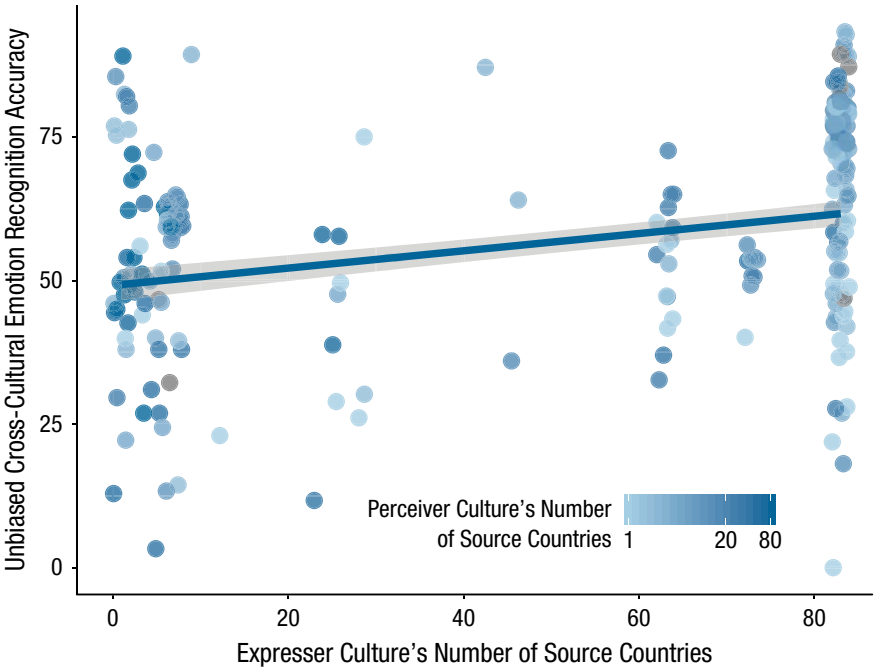

Fig. 2. Effect of historical heterogeneity of the country of the expresser on cross-cultural accuracy of emotion recognition. The graph shows a reanalysis of 92 cross-cultural emotion-recognition studies in which people from a perceiver culture attempted to categorize the emotion conveyed by an expresser culture. Accuracy was positively predicted by the expresser culture's heterogeneity (number of source countries; unreported effect size, $\eta_p^2 = .08$) but not the perceiver culture's heterogeneity. Each point represents the average cross-cultural emotion-recognition accuracy from a single study sample. The regression line represents the linear mixed-effect model estimate of the effect of the expresser number of source countries on emotion-recognition accuracy, controlling for the perceiver number of source countries (adapted from Wood, Rychlowska, Korb, & Niedenthal, 2016). The gray areas on either side of the regression line represent the 95% confidence interval.

Evidence that smiling is related to historical heterogeneity was found in a study that analyzed spontaneous smiling by 866,726 participants from 31 countries as they watched advertisements varying in interest value and pleasantness (Girard & McDuff, 2017). The frequency of smiling while viewing these stimuli was related to several other aspects of culture, such as individualism (i.e., members of more individualistic cultures smiled more than those from less individualistic cultures) and population density (i.e., people in more populated places smiled less than those in less populated places), but ancestral diversity was the best predictor. Holding all other variables constant, participants from countries with the highest ancestral diversity (e.g., Panama or the United States) smiled for roughly twice the amount of time as participants from the countries with the lowest ancestral diversity (e.g., the Philippines or China).

A recent analysis of self-reports of frequency of smiling published in the 2017 Gallup World Poll replicated this result and extended the reach of the findings to most of the countries of the world (Niedenthal, Rychlowska, Wood, & Zhao, 2018). Measures of smiling and laughter in the Gallup World Poll are based on nearly 149,000 interviews with adults in 142 countries. Respondents to the poll were asked whether they smiled or laughed a lot on the previous day. Note that this self-report measure complements the previous behavioral measure of smiling (Girard & McDuff, 2017), as it includes smiling and laughter elicited by any cause, not just in response to specific stimuli that might be more or less amusing across cultures. As before, historical heterogeneity was a significant predictor of smiling and laughter frequency, even after taking GDP and present-day diversity into account (Fig. 3). Thus, people from countries with high historical heterogeneity reported more frequent smiling and laughter on the previous day than did people from countries with low historical heterogeneity.

Types of smiles. One of the unsurprising findings of the studies just summarized is that smiling occurs more frequently in some countries than in others. Other studies have also shown this to be true. For example, smiles

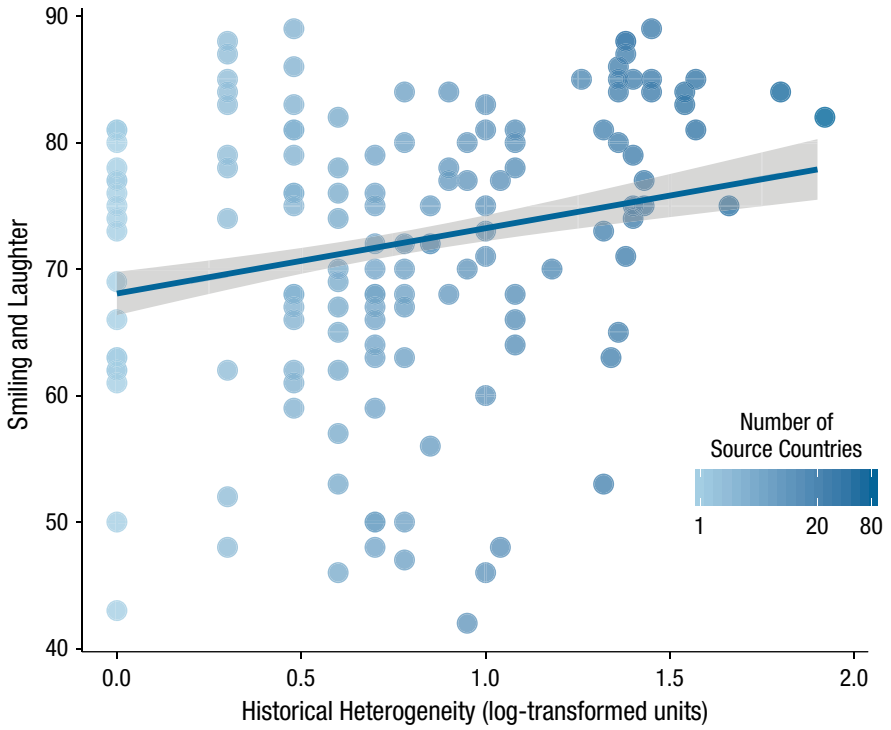

Fig. 3. Smiling and laughter across countries as a function of country-level historical heterogeneity. Heterogeneity scores are shown in log-transformed units. The regression line represents the estimate of the effect of heterogeneity in a multiple regression model including gross domestic product and ethnic fractionalization. The gray areas on either side of the regression line represent the 95% confidence interval.

appear in the social media of Western Europeans far more often than in the social media of Eastern Europeans (Szarota, 2010). But there is important variability in the form of the smile expression itself, leading to two questions: Just how many meaningful smile expressions are there? And are all types of smiles equally prevalent across cultures? A classic answer to the first question is that smiles either are authentic displays of current states of positive emotion—they are broadcasts of a happy feeling—or are feigned to manipulate the perceiver (Krumhuber & Manstead, 2009). But variability in the physical form of the human smile extends beyond the dichotomy between "true" and "false" smiles (Martin et al., 2017).

A sociofunctional account of facial expression seeks to determine whether and how a particular expression has come to solve the basic tasks of social living. Recent theory finds a role for smiles in the resolution of three such tasks, including rewarding the self and others for desirable or adaptive behaviors; signaling nonthreat and openness to interactions, especially those with strangers; and negotiating existing social hierarchies. These have been called reward, affiliation, and dominance smiles, respectively (Fig. 4). Naive participants classify all three expressions as smiles (Martin et al., 2019; Rychlowska et al., 2017), and the expressions serve the functions of reinforcement, social smoothing, and social challenge (Martin, Abercrombie, Gilboa-Schechtman, & Niedenthal, 2018; Rychlowska et al., 2017).

In one study, respondents to a survey were invited to rate the extent to which different underlying states and motives give rise to smiling in their culture (Rychlowska et al., 2015). The sample included between 65 and 100 individuals from each of the 9 countries that spanned the continuum of historical heterogeneity, with a total of 726 respondents. Possible causes of smiling included expressing friendliness, manipulation, being happy, showing superiority, and acknowledging similarity. Respondents worked in their native language. A factor analysis applied to ratings of the causes of smiling revealed an underlying three-category structure that corresponded to the functions expressing positive response (reward), openness to interaction without threat (affiliation), and the negotiation of hierarchical relationships (dominance).

Other analyses showed that the ratings of respondents from a given country were similar to the ratings of respondents from some countries but different from

Fig. 4. Three functional smiles. Examples of reward (left), affiliation (middle), and dominance (right) smiles are shown.

others. In particular, the total set of data from the participants across the nine countries could be clustered meaningfully into two groups of respondents with two distinct patterns of smiling. The cluster a participant belonged to, as derived from their self-reported reasons for smiling, was best predicted by the historical heterogeneity of their home country. Respondents assigned to the cluster that tended to endorse affiliative reasons for smiling less and dominance reasons for smiling more were mostly from countries with low historical heterogeneity, such as Japan, Indonesia, France, India, and Germany. Participants who endorsed affiliative reasons for smiling relatively more and dominant reasons for smiling relatively less were more likely to be from heterogeneous cultures, such as the United States, New Zealand, Israel, and Canada (Fig. 5).

The fact that respondents from countries with low historical heterogeneity endorsed affiliative causes of smiles to a lesser extent than did respondents from those with high historical heterogeneity may be related to other findings suggesting that in certain (low historical heterogeneity) countries, such as France and Poland, excessive smiling is interpreted as a lack of sincerity or as naivete (Krys, Hansen, Xing, Szarota, & Yang, 2014; Krys et al., 2015). It is possible that in such societies smiles function primarily to communicate positive feelings but are rarely used with strangers to invite safe social interaction. That is, a smile expressed as a signal

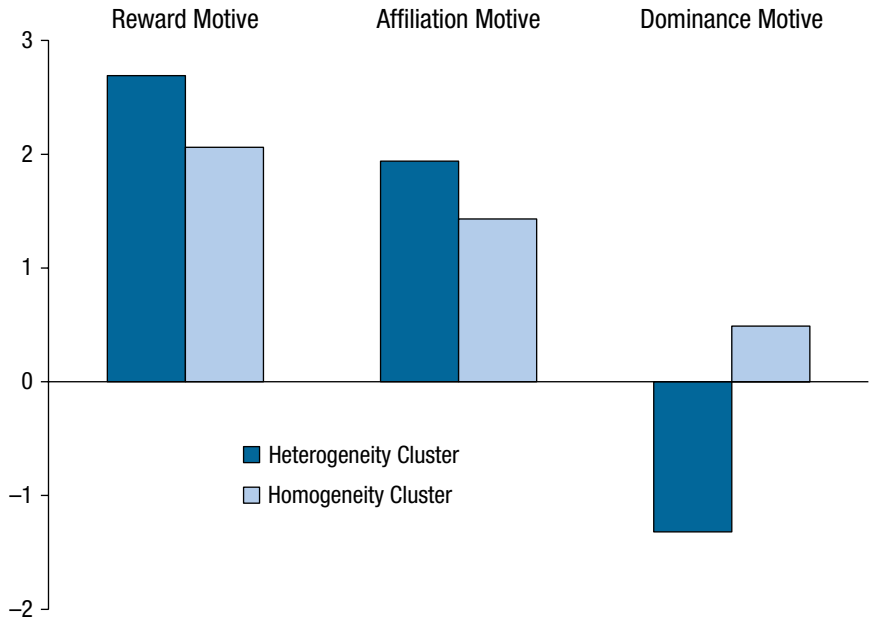

Fig. 5. Reasons for smiling in nine countries. The graphs show the endorsement of reward, affiliation, and dominance motives for smiling from respondents in two groups. The homogeneity cluster includes mostly respondents from Japan, Indonesia, France, India, and Germany, and the heterogeneity cluster includes mostly respondents from the United States, Canada, Israel, and New Zealand.

of trust and openness to interaction may be misinterpreted in countries with low historical heterogeneity as false or dishonest because it violates overarching cultural rules.

Historical homogeneity and personality traits

We have suggested that one adaptive response to the problems of communication and coordination imposed by living in societies formed by people with diverse ancestry is to display emotion in an overt and transparent way and to readily display smiles with particular meanings. And because historical heterogeneity is positively correlated with relational mobility (Thomson et al., 2018), being open to new social ties might be especially adaptive in highly heterogeneous societies. To the extent that such behaviors have produced effective outcomes over time, they are likely to be transmitted through social and observational learning, ultimately becoming dispositions expressed as character traits (Shariff, Norenzayan, & Henrich, 2011).

A recent study (Shrira, Wisman, & Noguchi, 2018) examined the responses of 17,837 individuals from 56 countries spanning 6 continents to subscales from the Big Five Inventory (Soto & John, 2009), a measure of personality. Results revealed that heterogeneity of long-history migration was significantly predictive of openness to experience—a trait proposed to be particularly adaptive in countries with high ancestral diversity. As might be expected, citizens of nations with greater ancestral diversity scored higher on openness than did citizens of nations with low historical heterogeneity. It is noteworthy that historical heterogeneity was not related to extraversion, conscientiousness, neuroticism, or agreeableness. Thus, along with transparent and spontaneous expressiveness and frequent smiling, ancestral diversity appears to be related to the average openness levels of its people. Because personality traits are heritable to a degree (Jang, Livesley, & Vemon, 1996), it is certainly possible that successful migrants are individuals with the openness to experience trait. However, the data are also consistent with the present interpretation that heterogeneous contexts and the pressures they present shape people to be more open. Other research has revealed that simple exposure to unfamiliar beliefs and customs increases people's ability to embrace novelty and difference (Zimmermann & Neyer, 2013). Affiliative uses of humor, which is often accompanied by smiling and laughter, are positively associated with the openness to experience trait (Vernon, Martin, Schermer, & Mackie, 2008), and smiling individuals are judged as being higher in openness as well (Mehu, Little, & Dunbar, 2008).

Historical heterogeneity within the United States

The world migration matrix (Putterman & Weil, 2010) has given researchers a metric of heterogeneity at the country level that permits tests of the implications of ancestral diversity. However, a strength of the historical heterogeneity construct is that populations do not have to be described or measured at the level of the country or clusters of countries. Geographically and culturally vast nations such as the United States are composed of regions, sometimes defined at the level of states, that vary in migratory history. Are the differences between the emotion cultures of the Southeastern United States (with lower historical heterogeneity) and the Great Lakes states (where waterways have promoted higher ancestral diversity) similar to the differences between the emotion cultures of Norway and Belize?

Recent findings suggest that they are. In one study, the heterogeneity of the United States was estimated using the U.S. Census reports of the foreign-born population from 1850 to 2010 (Fig. 6; Niedenthal et al., 2018). Controlling for income level and present-day ethnic diversity, historical heterogeneity positively predicted the frequency of smiles and laughter, as illustrated in Figure 7 (Niedenthal et al., 2018). These effects replicate the country-level effects observed in the research reviewed thus far, as they show that the historical heterogeneity of regions other than countries is related to aspects of emotion culture. The findings also demonstrate that the association between historical heterogeneity and emotional experience and expression does not rely on use of the scores in the world migration matrix: Other indicators of historical heterogeneity relate similarly to contemporary emotion culture.

Implications and Questions for Future Research

One of the messages that emerges from the research reviewed here is that some differences in behavioral norms and the prevalence of character traits across the globe can be interpreted as slow adaptations to long-term socioecological forces. Successful responses to the challenges of social living become part of a culture and are propagated through both explicit and implicit learning pathways, such as institutional socialization and observational learning, respectively. The adaptations thereby persist beyond the existence of the ecological conditions that gave rise to them in the first place. It is likely that no magic number of decades or centuries is required for cultural shifts in emotional experiences, expression, and practices, and it is not clear that the time-change relationship will be linear (Varnum &

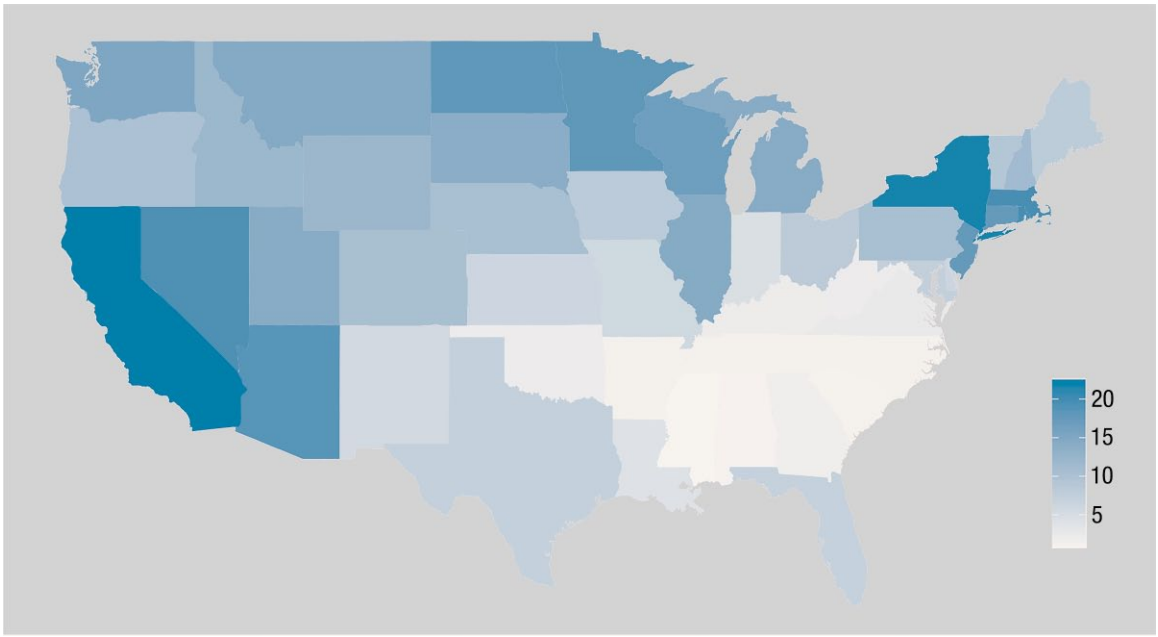

Fig. 6. Heterogeneity of the U.S. population since 1850. Shown for each state is the average percentage of foreign-born residents from 1850 to 2010 (based on U.S. Census data; Niedenthal et al., 2018). The darker blue color represents higher historical heterogeneity.

Grossmann, 2017). Existing findings do show that metrics of ancestral diversity explain the variance that is unique from that explained by measures of present-day diversity (e.g., Niedenthal et al., 2018). The diversity of recent immigration should be seen as the very beginning of the push toward adaptive cultural shifts, not the end. Indeed, the ancestral diversity of any given country is constantly evolving. Future research will be able to establish the time course, or approximate speed, of the emergence of emotional behaviors and traits that support successful living in contexts of high ancestral diversity. Given that most of the evidence discussed in this review focuses on positive emotional expressions, another important open question relates to the relevance of historical migration to positively versus negatively valenced displays of emotion.

The causal claims suggested in this review cannot be directly demonstrated using the correlational data we have presented. Ongoing work will therefore complement this initial evidence, largely relying on self-reports, with laboratory manipulations and behavioral measures. The initial conditions assumed to be at work in emerging heterogeneous societies, and less so in homogeneous ones, can be approximated and manipulated experimentally to evaluate their role in producing relevant behavior. For instance, ongoing research in our laboratory manipulates the possibility of communication through language (present or absent) between members of dyads working on cooperative, emotionally evocative tasks. Successful completion of the tasks relies on the sharing of emotional information. If individuals who cannot communicate with language make clearer and more coordinated expressions of emotion, this suggests that the initial absence of a common language (as often occurs as cultures become more heterogeneous) is a social environmental feature that fosters reliance on nonverbal communication. Manipulating the presence and content of common social goals (e.g., forming bonds with strangers) can similarly serve to isolate the features created by a commingling of immigrants from diverse backgrounds.

Note that laboratory studies that manipulate specific pressures of heterogeneous societies might produce context-dependent and temporary changes in individuals' behavior even if short-term demographic changes, such as recent increases in population diversity, cannot produce culture-level changes in behavior. This is because other aspects of social interaction such as motivation, task parameters, and even overall similarity between individuals can be held constant across participants. Further, although much of human behavior is flexible and sensitive to context—emotional behavior being no different—more stable, context-invariant behavioral patterns, such as traits of expressiveness or openness to new experiences, take generations to become pervasive cultural adaptations (Henrich & McElreath, 2003).

Laboratory manipulations will go only so far in explaining the emergence of emotion cultures, and they cannot fully rule out alternative accounts. For instance,

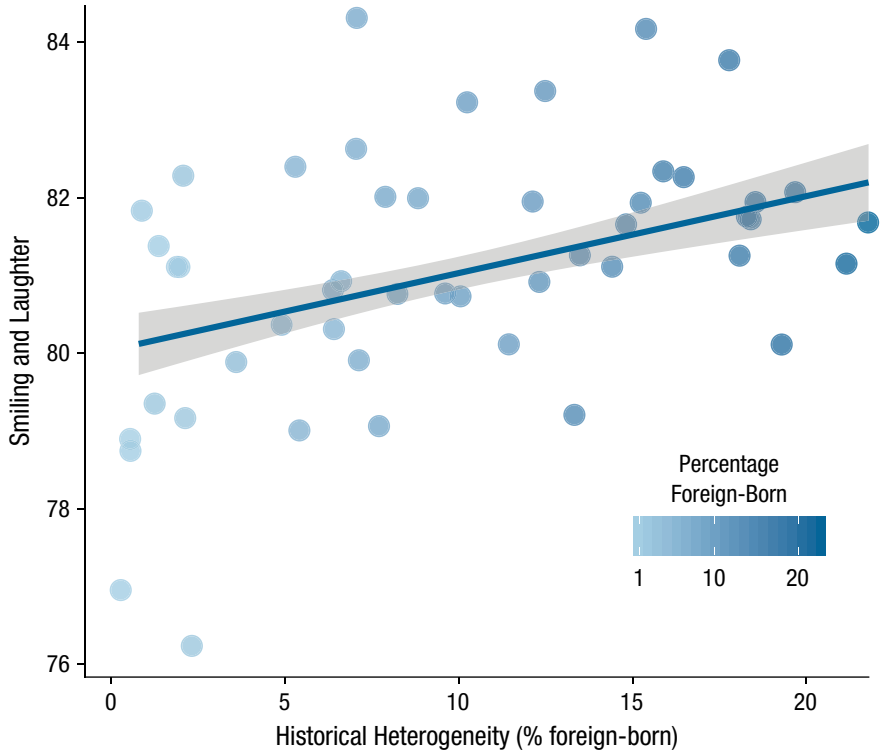

Fig. 7. Smiling and laughter as a function of state-level historical heterogeneity. The regression line represents the estimate of the effect of heterogeneity in a multiple regression model including income and number of source countries in 2016. The gray areas on either side of the regression line represent the 95% confidence interval.

a self-selection narrative is also compatible with the present data: Perhaps people who migrated were systematically more disinhibited, action-oriented, or open to new experiences, and their descendants are therefore more emotionally expressive (Chen, Burton, Greenberger, & Dmitrieva, 1999; Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006). Through this mechanism, highly heterogeneous countries could also have promoted economic development and growth (Putterman & Weil, 2010). Given that humans occupy a broad range of socioecological habitats that vary in multiple ways, it is difficult to establish that global diversity in emotional expressiveness or the nature of smiling is due to any one feature of human habitats (Fiedler, Harris, & Schott, 2018; Nettle, 2009), such as historical heterogeneity. Some cultural differences in expressive behaviors are sure to be due to other socioecological features. The concepts (Lindquist & Gendron, 2013) and values (Bastian, Kuppens, De Roover, & Diener, 2014; Kotchemidova, 2005) woven into a culture can determine the nature of emotional experience and expression. In addition, some evidence supports Montesquieu's famous claim that individuals who live closer to the equator are more emotionally expressive (Pennebaker, Rimé, & Blankenship, 1996). A focus on a single socioecological variable should not detract from efforts to understand the other causes of variability in emotion behaviors across the globe.

Nevertheless, the research findings reviewed here can be relied on to guide the content of cultural diversity training and provide the groundwork for emotion campaigns of all types. The frequency, meaning, and necessity of expressing emotion, particularly certain types of emotions, and the prevalence of related behavioral dispositions and traits do seem to be related to socioecological conditions that can be quantified. Furthermore, as individuals prepare for cross-cultural interaction, whether in business, diplomacy, or tourism, they may be reminded that socioecological conditions such as low or high ancestral diversity and the cultural adaptations that they encourage are, in themselves, neither good nor bad. Cultural differences are responses to socioecological pressures that unfold over time and reflect present environments that are wildly diverse. Reframing cultural variability as useful adaptations that reflect the rich history of a culture may ultimately promote greater tolerance of differences and mitigate the tendency for members of one culture to accuse members of another of displaying phony smiles or excessive coldness.

Action Editor

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Notes

1. Pearson correlations were computed using openly available aggregate tightness-looseness scores for countries (Gelfand et al., 2011) and for the United States (Harrington & Gelfand, 2014), as well as country- and state-level heterogeneity scores (Niedenthal et al., 2018).
2. Pearson correlations were computed using openly available relational mobility scores aggregated at the country level (Thomson et al., 2018) and country-level heterogeneity scores (Rychlowska et al., 2015).
3. The percentage of a present-day nation's population that descends from any one source country ranged from 0.002% to 100% (M = 9.72%, SD = 24.69%).
4. Specifically, the response alternatives corresponded to the six expression management modes: "show more than you feel it" (*amplification*), "express it as you feel it" (*expression*), "show the emotion while smiling in the same time" (*qualification*), "show less than you feel it" (*deamplification*), "hide your feelings by smiling" (*masking*), and "show nothing" (*neutralization*). The option "other" was available but was almost never selected by the participants. Participants' responses were reduced to a single dimension of overall expressivity on the basis of the response frequencies for each alternative. One pole corresponded to not displaying anything ("express nothing"), and the other pole corresponded to displaying more than one feels ("amplify;" see also Matsumoto et al., 2008).

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