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Diversity of historical ancestry and personality traits across 56 cultures

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ABSTRACT

Prior research has found that the diversity of a culture's ancestry over the previous 500 years—its *historical heterogeneity*—has an impact on existing cultural differences in social behavior in adaptive ways. The present paper examined whether historical heterogeneity, which reflects the degree to which a culture's population has a long-term legacy of interacting with people from different cultural backgrounds, would be related to individual personality traits in that culture. Using a large sample of respondents from a variety of world cultures, the results found that historical heterogeneity was associated with greater openness to experience. The findings suggest that openness to experience may have been socialized more strongly in diverse societies because this trait promotes tolerance of differences and facilitates cooperation. These results highlight the importance of considering social–historical factors in understanding the origin of cultural traits.

1. Introduction

When visiting a new country for the first time, visitors often form theories about how and why the locals they encounter are different from themselves and people from other countries. Such lay cultural theories have recently been put to systematic testing by psychologists, who explain cultural variation in traits as adaptive responses to particular ecological and social conditions people have faced in their environments (Murray & Schaller, 2008; Nettle, 2009).

In this paper, we seek to understand the influence of one such factor: the degree of social contact occurring among different cultural groups throughout a country's history. Recent research has measured this factor using a variable termed *historical heterogeneity*, defined as the number of countries that have contributed to a culture's current population, based on where their ancestors lived in the year 1500 CE (Putterman & Weil, 2010). At one extreme, *heterogeneous* cultures are made up of a more diverse ancestry (e.g., Australia, Canada), with their current inhabitants descending from a wider range of countries around the world. In these environments, then, people were historically more accustomed to encountering people from unfamiliar cultural backgrounds. Conversely, people in *homogeneous* cultures descend primarily from ancestors who have lived in that same region over the past 500 years (e.g., India, Taiwan), and whose social interactions have occurred predominantly with people having a similar cultural background and language.

Historical heterogeneity has been used to understand some

important features of contemporary culture (Niedenthal, Rychlowska, & Wood, 2017). For example, heterogeneity is thought to influence why emotions are expressed more strongly in some nations than in others (Wood, Rychlowska, & Niedenthal, 2016). Because members of heterogeneous societies were more likely to speak different languages and hold different norms and behavioral practices, they would have needed to rely on clearer and stronger displays of non-verbal expressiveness to communicate with their fellow countrymen (Niedenthal et al., 2017). As a result, people in heterogeneous cultures today agree that expressing one's true emotions openly is more socially appropriate, and their actual emotional expressions are more animated and more easily identified by people in other cultures (Rychlowska, Miyamoto, Matsumoto, Hess, et al., 2015; Wood et al., 2016). In contrast, people living in homogenous cultures have depended on a shared language and assumptions to communicate, with less concern about having to amplify their expressiveness to people who come from different backgrounds (Rychlowska et al., 2015).

Beyond emotional expressivity, we propose that historical heterogeneity may also influence basic personality traits. First, consistent with the aforementioned findings, inhabitants of heterogeneous societies might exhibit greater *extraversion*, because a stronger motivation to socially engage with others would have helped to overcome communication barriers between those speaking different languages and holding different customs (Parker & McEvoy, 1993).

Second, we expect heterogeneous populations to be higher in *openness to experience*, in response to their recurring contact with

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members of diverse cultural groups. Under many conditions, regular exposure to unfamiliar customs and ideas increases people's acceptance of these differences, and importantly, leads to greater openness toward novelty more generally (Zimmermann & Neyer, 2013). Furthermore, early heterogeneous environments may have led to elevated openness because this disposition facilitates cooperation with people from different backgrounds. Whereas people low in openness find comfort in routines and distrust things that are unfamiliar, those high in openness respond more favorably to new people and ideas, and are more likely to consider views that run counter to their own (Brandt, Chambers, Crawford, Wetherell, & Reyna, 2015). Because individuals high in openness tend to be more accepting of people's differences and more receptive to new information (Thompson, Brossart, Carozzi, & Miville, 2002), they are also less likely to rely on outgroup stereotypes and report less prejudice toward other groups (e.g., people of different ethnicities, religions, and nationalities; Brandt et al., 2015; Flynn, 2005; Sibley & Duckitt, 2008). As a result, people high in openness are more likely to forge trusting relationships with individuals of different cultural backgrounds (Jackson & Poulsen, 2005; Thompson et al., 2002).

Intergroup cooperation would have been particularly important in historically heterogeneous societies, providing more economic opportunities, exposure to new ideas, reductions in intergroup hostilities, and the creation of alliances to defend against outsiders. Individual traits that promoted this cooperation, such as openness and extraversion, may have grown stronger in these societies through a process of cultural selection (Boyd & Richerson, 2005; Cohen, 2001). Behaviors that produce successful outcomes are more likely to spread via social learning, and in the process, shape norms that favor corresponding behavioral dispositions, expressed as personality traits (Mesoudi, 2008; Shariff, Norenzayan, & Henrich, 2011). Although norms may be slow to proliferate in a culture, once established they can persist over for long periods of time, even after the conditions that gave rise to them have changed (Triandis, 1994). By contrast, in homogeneous societies where people rarely encountered cultural outgroups, increased extraversion and openness would have had less instrumental value, keeping these trait levels lower.

In one study consistent with these ideas, Camperio Ciani, Capiluppi, Veronese, and Sartori (2007) compared the personality traits of people with varying degrees of contact with outside cultures. They examined three cultural groups: inhabitants of one of several small islands off the western coast of Italy, whose ancestors resided on their island for about 20 generations in isolation (islanders); mainlanders living on the nearby coast of Italy, who had the same geographic origins and spoke the same language as the islanders (mainlanders); and former mainlanders who had immigrated to the islands at some point in their life, typically when they were adults (immigrants). Camperio Ciani et al. found that the islanders scored lower in extraversion and openness to experience than both mainlanders and immigrants to the islands. For islanders, whose homogeneous cultural history gave them little contact with outsiders, there was probably less benefit in socializing and maintaining greater extraversion or openness over the preceding generations. Conversely, greater openness and extraversion would have adaptive byproducts of a social legacy of heterogeneous contact for the descendants of people growing up on the mainland (Camperio Ciani et al., 2007).

Their study also found that the mainlanders and immigrants to the islands were similarly high in openness and extraversion, indicating that the immigrants did not simply adopt the typical trait levels of their new environment. This finding suggested that *long-run* intergroup contact may be a more potent influence on these traits than recent contact, for a couple of reasons. First, personality traits are relatively stable once they take shape during a person's formative years of development, rather than mere reflections of one's current social environment (Costa Jr. & McCrae, 1997). Second, cultural differences in traits tend to arise from values and experiences that accumulate over generations of socialization, and early conditions sometimes exert disproportionate influence on existing cultural traits (Cohen, 2001;

Putnam, 1993).

The present study examined whether historical heterogeneity—the number of source countries from 1500 CE contributing to the present-day population—would be related to increased extraversion and openness across a much larger sample of cultures. Using personality data gathered from respondents in 56 cultures (Schmitt, Allik, McCrae, Benet-Martinez, et al., 2007), we tested whether the mean levels of openness and extraversion would be predicted by a culture's historical heterogeneity and several control variables (infection level, per capita GDP, and two measures of contemporary cultural diversity), which were included to rule out alternative explanations.

2. Method

We employed ordinary least squares (OLS) regression analyses in which each personality trait were regressed on historical heterogeneity and our control variables.

2.1. Personality traits

Schmitt et al. (2007) collected data by administering the Big Five Inventory (BFI; John & Srivastava, 1999; Soto & John, 2009) to 17,837 respondents in 56 cultures spanning six continents (mean sample size per culture, $M = 319$). Most of these cultures used college student samples, and the remaining ones used either community-only respondents or a mix of community members and college students.

The BFI is a 44-item self-report questionnaire that measures a person's standing on the five core dimensions of personality (Extraversion, Openness to Experience, Agreeableness, Conscientiousness, Neuroticism). Each item was assessed on a 5-point scale. For the entire sample, the internal reliabilities (Cronbach's alphas) of the five trait measures were 0.77, 0.76, 0.70, 0.78, and 0.79, respectively. There was some variation in the alphas across cultures, but Schmitt et al. did not report separate alphas for each culture. Schmitt et al. transformed all the raw scores into standardized T -scores—giving them a mean of 50 and standard deviation of 10—to facilitate interpretation of the scores and make them easier to compare to the results of other cross-cultural findings (see Schmitt et al., 2007). Schmitt et al. reported each culture's overall mean T -score for each of the five personality traits.

Although we had no hypotheses about whether heterogeneity would be related to the three other Big Five traits (agreeableness, neuroticism, conscientiousness), we included them in our initial analysis to examine whether historical heterogeneity was specific to the hypothesized traits, rather than having some generalized effect on personality.

2.2. Historical heterogeneity

Humans have been migrating across the planet for many thousands of years (Diamond, 1997), but only over the past 500 years has it been possible to compile migration records to and from many parts of the world. Putterman and Weil (2010) used genetic and historical records to estimate the proportion of a country's present-day population whose ancestors lived in their own and all other modern-day country's territories in the year 1500 CE. A cultural index based on the *proportion* of foreign descendants, however, can mask the variety of multi-cultural inputs into the population (e.g., whether a large non-native proportion consists of just 1 or 2 cultural groups, as opposed to 20 or 30 different groups). Instead, the historical heterogeneity index counted the *number* of source countries (including one's own), a measure that better reflected the historical likelihood of encountering unfamiliar cultural outgroups (see Rychlowska et al., 2015; Wood et al., 2016).

Historical heterogeneity values ranged from 1 to 83. For example, Taiwan and India descend from relatively homogeneous populations (scoring 2 and 3, respectively), whereas Australia and Canada have populations descending from many parts of the world, scoring 46 and 63, respectively. Values were available for all 56 cultures used in the

current study, and these scores were log transformed to correct for excessive skewness and kurtosis.

2.3. Contemporary cultural diversity

One prior study found that openness and extraversion levels were higher in metropolitan districts with more ethnically diverse compositions (i.e., a lower proportion of Caucasian residents; Rentfrow, Jokela, & Lamb, 2015). We therefore used current indexes of diversity in a country as control measures to show that *historic* diversity of ancestry, rather than current diversity, was an independent predictor of personality traits. We included two popular measures of recent diversity. First, *ethnic diversity* was assessed with Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg's (2003) index of ethnic fractionalization, measured between 1981 and 2001. This variable reflects the probability that two individuals who are randomly selected from a country belong to different ethnic groups. Scores ranged between 0 and 1, with higher values representing greater ethnic diversity. Data were available for all the cultures in our dataset.

The second measure was Fearon's (2003) index of linguistic fractionalization, which we refer to as *linguistic diversity* here. Scaled in the same way as Alesina et al.'s (2003) index and ranging from 0 to 1, Fearon's measure denotes whether two randomly-selected people spoke languages from the same linguistic group. Fearon's measure contained data points for only 53 of our 56 cultures, which reduced the sample size for analyses that included this measure.

2.4. Pathogen level

Previous research has shown that people living in cultures with historically high infection levels report lower openness and lower extraversion, probably as a defensive response to avoiding diseases (Murray & Schaller, 2008). We controlled for historical pathogen prevalence to rule out this influence on personality. Murray and Schaller (2010) created a pathogen index for each culture based on the estimated historical severity of nine serious infectious diseases: dengue, filariae, leprosy, malaria, leishmanias, schistosomes, trypanosomes, typhus, and tuberculosis. The nine disease scores were converted to standardized values, then averaged together to create an overall pathogen index for each culture.

2.5. GDP per capita

Gross domestic product (GDP) per capita (log transformed) was used as an additional control because prior work has found it to be related to national variations in some of the big five personality traits (e.g., McCrae, 2001; Meisenberg, 2015). GDP per capita represents the total value of all services and goods generated for each person in a country, and it is considered a proxy for a country's overall standard of living and level of wealth. Values (for the year 2000) are adjusted for purchasing power parity (International Monetary Fund, 2005). We included all our raw data in a Supplementary Table.

3. Results

Table 1 reports the zero-order correlations between our predictors and each mean trait scores in a culture. Historical heterogeneity was strongly related to greater openness to experience ($r = 0.35$, $p = 0.008$), but contrary to our hypothesis, heterogeneity was not significantly correlated with extraversion ($r = 0.21$, $p = 0.13$). Therefore, we do not examine extraversion any further, and focus instead on the relationship between openness and heterogeneity. The data also revealed that heterogeneity was not related to any of the other big five traits (i.e., conscientiousness, neuroticism, or agreeableness).

We entered historical heterogeneity and the four control variables into a simultaneous regression predicting openness to experience.

Because of the high intercorrelation between the ethnic diversity and linguistic diversity measures, however, we conducted two separate regression models by including only one of the two diversity measures in each model (see Table 2). In both regressions, historical heterogeneity remained a significant predictor of openness to experience.

As a check that these models satisfied assumptions of normality, we also present descriptive statistics of the standardized residuals (errors) for each model in Table 3. These values indicate that the distributions of errors approximated normality, with no outliers (Tabachnick, Fidell, & Osterlind, 2001).

4. Discussion

Openness to experience has numerous implications at the individual and societal levels. Greater openness bolsters generalized trust, which serves as a social and economic lubricant that provides the foundation for all kinds of relationships, particularly when people interact regularly with strangers and acquaintances (Miklikowska, 2012). Similarly, openness is negatively related to authoritarian and ethnocentric values (McCrae, 1996). Openness also leads to greater innovation by cultivating an environment where people feel comfortable diverging from the status quo and exploring new ideas, which in the long-run strengthens a society's economic success (Baldwin, 2004).

Our results found that populations who descend from many parts of the world were higher in openness to experience than those descending from a less diverse ancestry. One compelling question concerns the mechanisms by which historical heterogeneity could have resulted in greater openness. Our view is that the amount of intergroup contact and the nature of this contact could have shaped the socialization of personality. In heterogeneous societies, frequent interactions between diverse cultural groups would have increased the incentives for intergroup cooperation and strengthened the selection pressures for dispositions that facilitate this goal (Chudek & Henrich, 2011).

In addition to the effects of direct social contact, institutional differences between heterogeneous vs. homogeneous societies may have also shaped personality (Putterman & Weil, 2010). Political, legal, economic, and religious institutions of a society reflect the perspectives and value of its people, and these institutions in turn have a large influence in socializing traits, even independent of people's direct social interactions (Lamb & Bornstein, 2013). Finally, the link between historical heterogeneity and openness may also occur through selective migration (self-selection) of people with certain personalities into social environments that were well-suited to their individual dispositions, leading certain genes to gravitate toward these environments and remain there over generations. For example, people with gene variants that underlie greater openness may have been more likely to migrate to heterogeneous social environments than those low in openness (Camperio Ciani et al., 2007).

Our hypothesis that extraversion would be related to historical heterogeneity was not supported, although the correlation trended in the expected direction. One possibility is that heightened extraversion may increase the likelihood in establishing initial contact with outgroup members, it is probably plays a lesser role in cultivating trusting relationships that provide mutual long-term benefits (Zimmermann & Neyer, 2013). Future work may wish to test whether historical heterogeneity is more strongly related to facets of extraversion that relevant to social cooperation (e.g., warmth). The cross-cultural personality data we used could not be disaggregated to test for distinct facets of extraversion across countries.

We also found no significant relationships between current level of diversity with openness or extraversion, in contrast to previous research (Rentfrow et al., 2015). One possible reason for this discrepancy is that our study tested these relationships at a different level of analysis than Rentfrow et al.'s study. Whereas our unit of analysis was the entire culture, Rentfrow et al. (2015) focused on metropolitan districts, which may have provided greater precision in estimating the degree of social

Table 1
Zero-order correlations of predictors and personality variables (N = 56).

	1	2	3	4	5	6	7	8	9	10
1 Historical heterogeneity	–									
2 Ethnic diversity	0.17	–								
3 Linguistic diversity ^a	0.08	0.78**	–							
4 Pathogen index	–0.34*	0.24	0.17	–						
5 GDP per capita	0.32*	–0.55**	–0.47**	–0.64**	–					
6 Extraversion	0.21	0.24	0.20	–0.25	0.02	–				
7 Openness	0.35**	0.06	0.08	–0.23	0.04	0.27*	–			
8 Agreeableness	–0.04	0.27*	0.29*	0.28*	–0.34*	0.20	0.26	–		
9 Conscientiousness	0.09	0.40**	0.26*	0.24	–0.40**	0.25	0.20	0.65**	–	
10 Neuroticism	–0.02	–0.44**	–0.41**	0.02	0.39**	–0.49**	–0.09	–0.49**	–0.57**	–
Mean	1.92	0.36	0.27	–0.12	9.14	49.00	47.53	46.88	50.41	49.31
Standard deviation	1.13	0.24	0.20	0.63	1.03	1.66	3.08	3.36	2.51	2.82
Range	0–4.42	0.002–0.87	0–0.67	–1.31–0.97	6.26–10.44	44.86–51.95	39.05–54.82	37.82–55.71	44.58–57.87	41.53–54.69

^a Sample sizes for all Linguistic Diversity correlations was N = 53.

* p < 0.05.

** p < 0.01.

Table 2
Multiple regression models predicting openness to experience.

s	Model excluding Ethnic diversity (N = 53)			Model excluding Linguistic diversity (N = 56)		
	β	t	p	β	t	p
Historical heterogeneity	0.31	2.05	0.046	0.38	2.54	0.014
Ethnic diversity	–	–	–	–0.12	–0.72	0.476
Linguistic diversity	0.04	0.25	0.806	–	–	–
Pathogen intensity	–0.19	–1.02	0.312	–0.29	–1.74	0.088
GDP per capita	–0.11	–0.49	0.628	–0.34	–1.62	0.112
F _{regression}	1.89 (p = 0.127)			2.82 (p = 0.035)		
Adjusted R ²	0.064			0.117		

Note. Standardized betas, t-values, and their p-values.

Table 3
Descriptive statistics of standardized residuals (errors) of each model.

	Model excluding ethnic diversity (N = 53)	Model excluding linguistic diversity (N = 56)
Mean	0.00	0.00
Minimum	–2.86	–2.90
Maximum	1.95	1.88
Skewness	–0.42	–0.61
Kurtosis	0.85	0.87

contact among different cultural groups, relative to the greater variability in social environments across an entire country (Lawless & Lucas, 2011). As we mentioned earlier, the effects of intergroup contact on personality traits probably do not occur overnight, particularly if these effects are mediated by cultural evolutionary processes (Boyd & Richerson, 1985), and thus recent population composition may have yet to affect cultural traits. Additionally, our results did not find an association between historical heterogeneity and current ethnolinguistic diversity. Perhaps this lack of correspondence between historical and current diversity has been reduced by factors such as intermarriage, more recent immigration, and cultural assimilation of immigrants (Bisin & Verdier, 2000).

The aggregate nature of the data also prevented us from examining (and controlling for) characteristics at the individual level. For example, one important question is whether the effect of heterogeneity on openness would be moderated by a person's own group identity (e.g., ethnicity). Certainly, members of the majority and minority groups in a culture may have had very different intergroup experiences that are relevant to their orientation toward novelty. Examining whether a

legacy of intergroup hostilities would moderate the effect of heterogeneity on openness levels could provide some insight into the underlying mechanism of our findings. We expect heterogeneity may not lead to greater openness in societies with a history of intense intergroup competition (e.g., civil wars), particularly for members of historically oppressed groups. Future research will need to test these possibilities using more detailed information at the individual level.

Finally, it is important to keep in mind that openness to experience does not have uniformly position consequences, and that its benefit depends on the context. For example, greater openness is likely to be problematic in environments high in danger or uncertainty, where unfamiliar people, animals, or foods pose serious risks (McCrae, 1996). Thus, further work will do well to consider environmental risk when judging the adaptiveness of cultural traits.

4.1. Conclusion

Most cultural researchers would probably agree that long-term historical factors contribute to present-day traits; however, quantifying these factors and disentangling them from existing conditions is no easy task. Our study suggested that long-run migration into a culture and ancestral diversity influence the openness levels of its people. Importantly, the ability to link these variables over such an extensive timespan implies that historical heterogeneity will continue to influence a culture's openness for generations to come. Likewise, historical heterogeneity may prove useful in understanding other cultural characteristics that result from people living in a diverse society.

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