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A Note on "Understanding Cultural Persistence and Change: A Replication of Giuliano and Nunn (2021)"

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A Note on "Understanding Cultural Persistence and Change: A Replication of Giuliano and Nunn (2021)"

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A note on "Understanding cultural persistence and change: a replication of Giuliano and Nunn (2021)"

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Abstract: This note addresses the questions, concerns, and issues raised in "Understanding cultural persistence and change: a replication of Giuliano and Nunn (2021)." In terms of replicability, all of the tables in Giuliano and Nunn (2021) are correct, and the replication files match the output reported in the tables. In their note, the authors suggest alternative, more-restricted samples (e.g., omitting observations: under five years of age, under 16 years of age, living in rural locations, first or second-generation immigrants, with unmarried spouses, from specific ancestral groups, from the 1930 Census, etc.) and also less-restrictive samples (e.g., including grandchildren in analyses of parent-to-child cultural transmission for households that comprise three generations). We re-explain the logic of our baseline samples and why these samples are the most natural, as well as discuss the issues, complications, and incorrect reasoning associated with the authors' suggested alternatives. We also show, reproducing all relevant tables in full for each alternative raised, that our conclusions do not depend on these decisions.

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1. Introduction

In this note, we clarify and address the questions, comments, and issues raised by Bertoli, Clerc, Loper and Èrica Roca Fernández (n.d.). While the document addresses these in detail in the remainder of this document, we first provide a general overview.

We first note that all results reported in the original publication are correct and as intended. The replication files are correct and produce the estimates that are reported in the paper. The issues raised by the authors come down to questions about the robustness of the results to alternative decisions one could make in the empirical analysis. As we explain here, the assumptions that we make are the correct ones. Some of the alternatives suggested by the authors are equally as logical as our baseline specification (e.g., omitting unmarried partners). In all of these cases, the estimates are virtually identical. Other alternatives suggested by the authors (e.g., omitting rural parts of the U.S. or individuals of immigrant origin) have no logical basis. However, as we show, even if one implements these incongruous analyses, the conclusions of the paper remain unchanged.

In this section, we provide a summary of these with a fuller description provided in the body of the paper.

1. The authors believe that in our analysis, we should omit individuals in rural locations living in the United States. Their motivation is the fact that rural locations in the United States are not assigned an MSA code when their population does not satisfy the requirement for them to be an MSA (Metropolitan Statistical Area), which is defined as a population of 1 million or more people. They feel that since the MSA code is "missing" individuals living in these locations have missing data, and so they should be dropped from the analysis. In this note, we explain why dropping the rural United States is going to lead to non-representative estimates, particularly for our analyses that examine Native Americans, who tend not to live in rural areas, and the 1930 Census, a period when very few cities in the U.S. had surpassed the population threshold needed to assign the Metropolitan status. Reporting all relevant tables in full (rather than selectively picking certain estimates from certain tables), we show that, even though this is clearly not the right thing to do, the paper's conclusions continue to hold.

2. In our analysis examining whether a foreign language (i.e., non-English language) is spoken

at home, we omit ancestral groups that, in general, do not know a language other than English (e.g., British, Australians, English-speaking Canadians, etc). The authors argue that we should drop the following additional groups: French Canadians, Puerto Ricans, Filipinos (those from the Philippines), Indians, Pakistanis, and Eritreans. These groups all traditionally speak a language other than English. Thus, there is no logical reason to drop these additional groups. Beyond this, we show that dropping them does not change the conclusions of our study. The different conclusion is explained by the fact that our note reproduces all tables in full after dropping the countries. The authors report one column from one table, which is for a specification that isn't the most direct test of transmission across generations. The estimates from the direct tests of heterogeneous cultural transmission – from mother to child or father to child – actually show larger effects with more precision than our baseline estimates.

3. The authors have difficulty replicating the construction of our dataset because IPUMS, in a Sept 15, 2021 revision, changed the public use data for the 1930 Census, which we use in our analysis. This included changes to variable names and also the sample for which information is reported. The IPUMS data that existed at the time of publication and that we used in our analysis, are available in our replication package. Thus, all our estimates can be replicated. If one wants to reconstruct the dataset we use, one must have access to restricted data at IPUMS. We have also communicated this to the authors prior to their note. We have also provided this information in an updated appendix (Giuliano and Nunn, 2023). Given their concerns about the 1930 Census data, we also show that all of our findings hold if one removes this year from our analysis (which comprised 1930, 1990, and 2000).

4. The authors suggest additional changes to the sample that is analyzed in various specifications, e.g., omitting children younger than five when looking at whether a foreign language is spoken at home; omitting individuals younger than sixteen in analyses that control for labor force status; omitting respondents of immigrant origin when looking at the importance of tradition in the World Values Surveys; or including grandchildren of three-generation households when looking at cultural persistence from parents to their children. We show, again reporting all relevant tables in full, that our findings are robust to each of these variations in the sample.

In some instances, we agree with the authors that there were imprecisions in the original analysis. In all cases, these are all very minor and either (1) purely expositional in nature (applying to the text and not the empirics) or (2) in one case, it does affect the estimates but in a manner that is trivial. We provide a summary of these below.

1. The authors had previously pointed out some imprecisions in wording in the original manuscript. These were corrected prior to this note, and we have thanked the authors in the paper's corrigendum. Some of these appear here again in this note. These include the fact that we used the word "mother tongue" instead of "language spoken at home" when describing a variable from the World Values Survey; we described observations as children of "immigrant parents" rather than "at least one immigrant parent" when describing observations in a regression equation; our description of the criterion used to identify those from ancestries who do not know a non-English language was incomplete; we used the word "country" rather than "group" when describing the ancestry of individuals in one analysis; and in the text, we did not explicitly note that one of our analyses included multiple census years with census year fixed effects rather than a single census year, which would be presumed taking the regression equation literally. For the interested reader, full details can be found in Giuliano and Nunn (2024).

2. The authors correctly point out that in our analysis of whether the children of immigrants marry someone from their ancestral country, the sample includes approximately 1,000 couples who are not married to each other but are "partners who live together.". Depending on one's definition of marriage and spouse, it is reasonable to assert that we should not have included these couples. We show, reporting all estimates from all relevant tables, that removing these observations has no meaningful effect on the estimates.

We now turn to a more detailed description of these issues. Each of the issues raised by the authors is covered in a separate section.

2. Omitting individuals residing in rural areas in the United States

In several specifications of our paper, we include location-of-residence fixed effects. The fixed effects we created were based on the recorded MSA in which a respondent is living. While urban and peri-urban localities within the U.S. are assigned an MSA code, rural locations are not since they are not "metropolitan" areas (which are defined as population centers of one million people or more). As explained in Giuliano and Nunn (2024), we treat rural locations without MSA codes as a location category when we code the location fixed effects.

The authors assert that MSA data are "missing" for these rural locations and that observations with "missing" data should be dropped from the analysis. This misunderstands what an MSA code is and what it means for a location to not have an MSA code assigned. Doing this would mean excluding all individuals living in rural locations in the United States. Given the well-documented sizable differences between urban and rural areas in the United States, particularly for issues related to tradition (e.g., conservative vs. progressive views), doing so would lead to an unrepresentative sample that would likely suffer from sample selection bias. Obviously, dropping these observations would not be the correct thing to do.

Although not raised by the authors, one could reasonably assert that the rural (non-MSA) category of our fixed effects is not sufficiently fine. Testing the sensitivity of our findings to this line of inquiry is reasonable and makes logical sense. Thus, we explore the robustness of the estimates to the creation of finer location fixed effects for individuals living in rural locations by exploiting the fact that we also know their state of residence. Thus, we can create a category that is all rural locations in a specific state – e.g., rural Arkansas, rural North Dakota, rural Vermont, etc. It is reasonable to ask how sensitive our estimates are to these finer fixed effects. We report these estimates for the tables mentioned by the authors (Tables 4, 5, 7, and 9). They are shown below in Tables R1–R4. As shown, the results remain fully robust.

In their note, the authors also claim that a control variable that we include in several of our specifications – namely, the fraction of respondents living in a location who were of a given ancestry in Table 5 or either first- or second-generation immigrants in Table 4 – is not correctly defined for the rural locations. This is incorrect. This fraction is calculated correctly and as intended. It is the fraction of individuals living in rural locations in that state.

While it doesn't make sense to exclude all of rural America in our baseline sample and for

our baseline estimates, as a robustness check, one could check whether the results are different for urban areas; specifically, whether they hold when we look at urban areas only. This is the specification the authors propose. One could motivate it, not because the location isn't an MSA and doesn't have an MSA code, but one could argue that the location is more precisely held constant. For example, if rural areas of a state is believed to be too heterogeneous of a location.

If, as the authors suggest, we drop all rural observations, then we obtain estimates for our analysis of whether one marries someone from the same ancestry and whether a foreign language is spoken at home that are qualitatively similar to the full representative U.S. sample. These are reported in Tables R5 and R6.

Dropping rural areas from our analysis of Native Americans is more difficult for multiple reasons. First, Indigenous populations, which fully comprise the sample and reserves, typically are not in metropolitan urban areas. This is especially problematic because the analysis that examines whether native populations speak their traditional language includes 1930, a period when there were few designated metropolitan areas in much of the West. For example, there were none at the time in Idaho, Montano, North Dakota, South Dakota, Nevada, Arizona, North Carolina, South Carolina, Maine, Vermont, New Hampshire, and Mississippi.[1]

If one is concerned about the inclusion of 1930 because of its lack of fine-grained fixed effects due to the large rural population, in this comment, we also show that the results are very similar if 1930 is omitted (these are reported in Tables R17 and R18 below.) Also, in the paper, our second analysis of Indigenous populations looks at groups from Canada. For these data, we have information on the exact location of individuals and include these fixed effects in the analysis. The estimates – see Tables 8 and 10 of the paper – are fully in line with the estimates using Indigenous populations from the United States.

Consistent with all of this, dropping all rural observations from our analysis of Indigenous Americans reduces the sample size significantly – for example, it is reduced by 65% for the sample of column 1 of Table 7 and by 80% and 75%, respectively, in the analysis looking at persistence relative to the father (columns 4 and 6) and the mother (columns 5 and 7). The number of ethnic groups also goes down from 83 to 30 in the main specification (Col 1 of Table 7) and becomes as low as 22 in columns 4 and 6. Thus, dropping all rural areas in the analysis that looks at Native American populations leaves almost no identifying variation.

[1]See for example: `https://www.census.gov/history/img/1930metrodist.jpg`

Despite all of this, for transparency, we report the estimates when we drop all individuals living in rural locations in the analysis of Indigenous populations speaking a traditional language at home. A version of Tables 7–10 with these observations dropped is reported in Tables R7–R10. As shown, despite the lack of variation, in most specifications (e.g., Tables R8–R10), the conclusions remain unchanged. The estimates that are most affected are those R7, although most estimates remain the same sign, they weaken significantly.

There are two possibilities for why the estimates weaken in some specifications. The first is that there is a loss of precision due to the dramatic decrease in sample size. For example, in column 5, which is the estimate for which we observe the most dramatic change, the sample size decreases from 35,403 to 9,569, the number of ethnic groups represented declines from 77 to 22, and the number of clusters (different grid cells traditionally inhabited by the ethnic groups) declines from 40 to 20.

The second explanation is that the persistence of culture, and how it is affected by ancestral climatic instability, is different among Indigenous populations who live in metropolitan cities. Indigenous people who are living in metropolitan areas are less likely to be living in or near their Indigenous community. Thus, they are likely a non-representative sample for which adherence to tradition is likely to be particularly low. It is possible that for this group, the importance placed on tradition is particularly low, and as a result, there is little variation and our margin of interest is weak. Of course, we have shown that in the full population, this is not the case (e.g. in our baseline analysis), but it is possible that for this particular subsample, which is a minority of the population, ancestral climatic instability does not affect reliance on tradition. If, for example, these individuals have zero adherence to tradition (i.e., are at a corner solution), then there will be no marginal effect.

Table R1: Women and men marrying a spouse from their origin country using the CPS 1994–2014, including state fixed effects for rural locations

	(1)	(2)	(3)	(4)
	Dependent variable: Indicator variable for spouse being from the same origin country			
	Sample: Married women		Sample: Married men	
	Origin country identified from father	Origin country identified from mother	Origin country identified from father	Origin country identified from mother
Climatic instability	**-0.264***	**-0.489*****	**-0.105**	**-0.250***
	(0.156)	**(0.176)**	**(0.140)**	**(0.149)**
Country-level controls:				
Distance from equator	-0.006**	-0.005*	-0.008***	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)
Economic complexity	0.009	0.020	-0.012	-0.020
	(0.026)	(0.034)	(0.039)	(0.037)
Political hierarchies	0.089***	0.084***	0.092**	0.084**
	(0.027)	(0.028)	(0.036)	(0.036)
Ln (per-capita GDP)	-0.004	-0.022	-0.003	-0.004
	(0.029)	(0.033)	(0.036)	(0.034)
Genetic distance from the United States	0.028	0.006	0.011	-0.012
	(0.044)	(0.052)	(0.044)	(0.044)
Fraction of population in location who are 1st or 2nd-generation immigrants from same country of origin	3.284***	3.532***	2.995***	3.356***
	(0.499)	(0.629)	(0.550)	(0.531)
Individual controls	yes	yes	yes	yes
Number of countries	108	105	110	105
Mean (st. dev.) of dependent variable	0.33 (0.47)	0.32 (0.47)	0.28 (0.45)	0.29 (0.45)
Observations	36,082	34,045	38,419	35,639
R-squared	0.242	0.256	0.225	0.247

Notes : OLS estimates are reported with standard errors clustered at the country-of-origin level in parentheses. In columns 1 and 2, the unit of observation is a daughter of at least one immigrant parent who is married at the time of the survey. In columns 1 and 2, the dependent variable is an indicator variable that equals one if the woman is married to someone with the same ancestry (i.e., an individual born in the country or with at least one parent who was born in the country). In columns 3 and 4, the unit of observation is a son of at least one immigrant parent who is married at the time of the survey. In columns 3 and 4, the dependent variable is an indicator variable that equals one if the man is married to someone with the same ancestry. The country of origin of the observation is defined by the country of birth of the father in columns 1 and 3 and the country of birth of the mother in column 2 and 4. The following controls are included in all specifications: a quadratic in age, two indicator variables for educational attainment (less than high school and high school), metropolitan-area fixed effects, and survey-year fixed effects. The mean and standard deviation of climatic instability is 0.29 (0.09). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R2: Speaking a foreign language at home in the Census 2000, including state fixed effects for rural locations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.423****	**-0.365****	**-0.714*****	**-0.292*****	**-0.296*****	-0.133	-0.119
	(0.164)	**(0.168)**	**(0.166)**	**(0.084)**	**(0.090)**	(0.122)	(0.119)
Father speaks a foreign language				0.505***		0.719***	
				(0.027)		(0.085)	
Father speaks foreign lang.* Climatic instability						**-0.789****	
						(0.305)	
Mother speaks a foreign language					0.515***		0.755***
					(0.030)		(0.080)
Mother speaks foreign lang.* Climatic instability							**-0.881*****
							(0.287)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	84	84	84	84	84	84	84
Mean (st. dev.) of dependent variable	0.12 (0.33)	0.11 (0.31)	0.23 (0.42)	0.22 (0.42)	0.23 (0.42)	0.22 (0.42)	0.23 (0.42)
Observations	3,343,097	2,915,673	427,424	330,226	400,062	330,226	400,062
R-squared	0.304	0.279	0.375	0.548	0.568	0.551	0.571

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.32 (0.07). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R3: Indigenous populations speaking their traditional language at home, including state fixed effects for rural locations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-0.486****	**-0.555****	**-0.363**	**-0.192**	**-0.110**	-0.071	-0.006
	(0.228)	**(0.238)**	**(0.226)**	**(0.182)**	**(0.137)**	(0.129)	(0.086)
Father speaks an Indigenous language				0.381***		0.542***	
				(0.037)		(0.061)	
Father speaks an Indigenous lang. * Climatic instability						**-0.677*** **	
						(0.207)	
Mother speaks an Indigenous language					0.404***		0.542***
					(0.028)		(0.044)
Mother speaks an Indigenous lang. * Climatic instability							**-0.583*** **
							(0.168)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	79	76	77	76	77
Number of clusters (grid cells)	40	40	40	40	40	40	40
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Observations	128,005	79,235	48,770	25,794	35,403	25,794	35,403
R-squared	0.431	0.486	0.372	0.476	0.492	0.479	0.495

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R4: Drought severity and speaking an indigenous language at home, including state fixed effects for rural locations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.425*** **	**-0.493*** **	**-0.313*** **	**-0.157** **	**-0.127***	-0.037	-0.035
	(0.134)	**(0.159)**	**(0.105)**	**(0.075)**	**(0.070)**	(0.047)	(0.039)
Annual standard deviation (PDSI)	0.333***	0.354***	0.296**	0.191**	0.174**	0.077	0.077**
	(0.125)	(0.127)	(0.126)	(0.083)	(0.071)	(0.047)	(0.035)
Father speaks an Indigenous language				0.372***		-0.161	
				(0.038)		(0.147)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-0.454** **	
						(0.212)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.381***	
						(0.074)	
Mother speaks an Indigenous language					0.393***		-0.093
					(0.026)		(0.139)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.400** **
							(0.192)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.341***
							(0.072)
R-squared	0.438	0.492	0.381	0.479	0.496	0.491	0.505
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-1.297*** **	**-1.403** **	**-1.114*** **	**-0.668** **	**-0.540** **	-0.232	-0.200*
	(0.491)	**(0.534)**	**(0.419)**	**(0.296)**	**(0.245)**	(0.168)	(0.118)
Annual standard deviation (PDSI)	0.462***	0.485***	0.421***	0.273***	0.241***	0.105*	0.099***
	(0.149)	(0.155)	(0.145)	(0.099)	(0.084)	(0.055)	(0.036)
Father speaks an Indigenous language				0.368***		-0.207*	
				(0.037)		(0.112)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-2.039** **	
						(0.816)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.636***	
						(0.160)	
Mother speaks an Indigenous language					0.390***		-0.130
					(0.026)		(0.103)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-2.064*** **
							(0.687)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.611***
							(0.140)
R-squared	0.440	0.493	0.384	0.481	0.497	0.493	0.507
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	82	82	78	75	76	75	76
Number of clusters (grid cells)	80	80	76	73	75	73	75
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Observations	127,986	79,224	48,762	25,791	35,397	25,791	35,397

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.35 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R5: Women and men marrying a spouse from their origin country using the CPS 1994–2014, dropping rural locations

	(1)	(2)	(3)	(4)
	Dependent variable: Indicator variable for spouse being from the same origin country			
	Sample: Married women		Sample: Married men	
	Origin country identified from father	Origin country identified from mother	Origin country identified from father	Origin country identified from mother
Climatic instability	**-0.325***	**-0.533****	**-0.140**	**-0.286**
	(0.192)	**(0.208)**	**(0.165)**	**(0.174)**
Country-level controls:				
Distance from equator	-0.006**	-0.005	-0.008**	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
Economic complexity	0.011	0.018	-0.013	-0.020
	(0.027)	(0.035)	(0.042)	(0.039)
Political hierarchies	0.088***	0.085***	0.093**	0.087**
	(0.028)	(0.030)	(0.038)	(0.038)
Ln (per-capita GDP)	-0.010	-0.026	-0.004	-0.007
	(0.031)	(0.034)	(0.039)	(0.037)
Genetic distance from the United States	0.018	-0.002	0.005	-0.020
	(0.047)	(0.053)	(0.046)	(0.045)
Fraction of population in location who are 1st or 2nd-generation immigrants from same country of origin	3.233***	3.483***	2.906***	3.230***
	(0.495)	(0.615)	(0.541)	(0.506)
Individual controls	yes	yes	yes	yes
Number of countries	106	105	110	105
Mean (st. dev.) of dependent variable	0.35 (0.48)	0.34 (0.47)	0.30 (0.46)	0.31 (0.46)
Observations	29,727	28,250	31,055	28,962
R-squared	0.236	0.249	0.223	0.244

Notes: OLS estimates are reported with standard errors clustered at the country-of-origin level in parentheses. In columns 1 and 2, the unit of observation is a daughter of at least one immigrant parent who is married at the time of the survey. In columns 1 and 2, the dependent variable is an indicator variable that equals one if the woman is married to someone with the same ancestry (i.e., an individual born in the country or with at least one parent who was born in the country). In columns 3 and 4, the unit of observation is a son of at least one immigrant parent who is married at the time of the survey. In columns 3 and 4, the dependent variable is an indicator variable that equals one if the man is married to someone with the same ancestry. The country of origin of the observation is defined by the country of birth of the father in columns 1 and 3 and the country of birth of the mother in column 2 and 4. The following controls are included in all specifications: a quadratic in age, two indicator variables for educational attainment (less than high school and high school), metropolitan-area fixed effects, and survey-year fixed effects. The mean and standard deviation of climatic instability is 0.28 (0.09). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R6: Speaking a foreign language at home in the Census 2000, dropping rural locations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.422****	**-0.353****	**-0.764*****	**-0.293*****	**-0.299*****	-0.154	-0.139
	(0.170)	**(0.170)**	**(0.193)**	**(0.096)**	**(0.102)**	(0.143)	(0.136)
Father speaks a foreign language				0.515***		0.680***	
				(0.027)		(0.087)	
Father speaks foreign lang.* Climatic instability						**-0.622***	
						(0.325)	
Mother speaks a foreign language					0.527***		0.719***
					(0.029)		(0.080)
Mother speaks foreign lang.* Climatic instability							**-0.717****
							(0.299)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	84	84	84	84	84	84	84
Mean (st. dev.) of dependent variable	0.14 (0.35)	0.12 (0.33)	0.26 (0.44)	0.26 (0.44)	0.27 (0.44)	0.26 (0.44)	0.27 (0.44)
Observations	2,392,607	2,072,227	320,380	244,021	300,118	244,021	300,118
R-squared	0.311	0.284	0.377	0.563	0.580	0.564	0.582

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.32 (0.08). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R7: Indigenous populations speaking their traditional language at home, dropping rural locations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-0.292**	**-0.365**	**-0.117**	**-0.100**	**0.053****	-0.044	0.039
	(0.202)	**(0.255)**	**(0.106)**	**(0.069)**	**(0.022)**	(0.070)	(0.031)
Father speaks an Indigenous language				0.286***		0.357***	
				(0.018)		(0.043)	
Father speaks an Indigenous lang. * Climatic instability						**-0.294**	
						(0.233)	
Mother speaks an Indigenous language					0.330***		0.313***
					(0.018)		(0.046)
Mother speaks an Indigenous lang. * Climatic instability							**0.069**
							(0.222)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	30	30	23	22	23	22	23
Number of clusters (grid cells)	24	24	20	20	20	20	20
Mean (st. dev.) of dependent variable	0.09 (0.28)	0.10 (0.30)	0.06 (0.25)	0.10 (0.30)	0.09 (0.29)	0.10 (0.30)	0.09 (0.29)
Observations	46,634	31,571	15,063	6,376	9,569	6,376	9,569
R-squared	0.311	0.360	0.262	0.380	0.402	0.381	0.402

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.10). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R8: Whether indigenous populations of Canada and the U.S. speak their traditional language: ethnicity-level estimates, dropping rural areas

	(1)	(2)	(3)	(4)	(5)
	United States	**Canada**			**U.S. & Canada**
	Indigenous language is spoken at home	Indigenous language is mother tongue	Indigenous language is spoken at home	Conversational in Indigenous language	Indigenous language is spoken at home
Climatic instability	**-5.331****	**-2.322*****	**-2.215****	**-1.852*****	**-5.013****
	(2.509)	**(0.741)**	**(0.877)**	**(0.626)**	**(2.160)**
Ethnicity-level controls:					
Distance from the equator	0.008	0.053***	0.055***	0.033***	0.009
	(0.027)	(0.009)	(0.011)	(0.008)	(0.022)
Economic complexity	-0.215***	-0.255***	-0.244***	-0.142***	-0.207***
	(0.073)	(0.036)	(0.053)	(0.031)	(0.067)
Political hierarchies	0.015	0.057	-0.076	-0.009	0.012
	(0.213)	(0.116)	(0.136)	(0.102)	(0.191)
Location FE	yes	yes	yes	yes	yes
Survey-year FE	yes	yes	yes	yes	yes
Number of ethnic groups	30	36	36	36	60
Number of clusters (grid cells)	24	24	24	24	41
Mean (st. dev.) of dependent variable	0.04 (0.14)	0.29 (0.25)	0.25 (0.26)	0.34 (0.26)	0.07 (0.18)
Observations (ethnicity-year-location)	3451	546	546	546	3,997

Notes : Poisson estimates are reported with standard errors clustered at the grid-cell level in parentheses. The unit of observation is an Indigenous ethnic group (from the U.S. and/or Canada), in a location, and observed in a census survey. The dependent variables are measures of the fraction of individuals who speak their traditional language. The American sample includes data from the 1930, 1990, and 2000 Censuses. The Canadian sample includes data from the 2001, 2006, and 2011 Censuses. The mean (and standard deviation) of Climatic instability is: 0.30 (0.10). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R9: Drougth severity and speaking an indigenous language at home, dropping rural areas

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.384*** **	**-0.475*** **	**-0.219*** **	**-0.074***	**-0.061*** **	-0.047	-0.017
	(0.115)	**(0.149)**	**(0.055)**	**(0.037)**	**(0.020)**	(0.036)	(0.018)
Annual standard deviation (PDSI)	0.264**	0.330**	0.142***	0.056**	0.024	0.042*	0.014
	(0.102)	(0.130)	(0.047)	(0.025)	(0.014)	(0.022)	(0.010)
Father speaks an Indigenous language				0.282***		-0.258	
				(0.021)		(0.286)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**0.088**	
						(0.062)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.247***	
						(0.085)	
Mother speaks an Indigenous language					0.324***		0.414***
					(0.022)		(0.125)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.532*** **
							(0.179)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.107**
							(0.051)
R-squared	0.325	0.378	0.268	0.380	0.402	0.380	0.405
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-1.012** **	**-1.241** **	**-0.588*** **	**-0.251*** **	**-0.136** **	-0.168**	-0.051
	(0.414)	**(0.533)**	**(0.208)**	**(0.084)**	**(0.059)**	(0.076)	(0.039)
Annual standard deviation (PDSI)	0.363***	0.452**	0.199***	0.087***	0.034*	0.064**	0.017
	(0.129)	(0.166)	(0.059)	(0.029)	(0.020)	(0.027)	(0.013)
Father speaks an Indigenous language				0.280***		0.230***	
				(0.021)		(0.081)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-0.965**	
						(0.671)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.196	
						(0.117)	
Mother speaks an Indigenous language					0.324***		0.409**
					(0.022)		(0.166)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-1.744*** **
							(0.468)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.274***
							(0.057)
R-squared	0.324	0.377	0.269	0.380	0.402	0.381	0.404
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	30	30	23	22	23	22	23
Number of clusters (grid cells)	30	30	23	22	23	22	23
Mean (st. dev.) of dependent variable	0.09 (0.28)	0.10 (0.30)	0.06 (0.25)	0.10 (0.30)	0.09 (0.29)	0.10 (0.30)	0.09 (0.29)
Observations	46,634	31,571	15,063	6,376	9,569	6,376	9,569

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.56 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.33 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R10: Drought severity and whether the traditional language is spoken by Indigenous populations in the U.S. and Canada, dropping rural areas

	(1)	(2)	(3)	(4)	(5)
	United States	**Canada**			**U.S. & Canada**
	Indigenous language is spoken at home	Indigenous language is mother tongue	Indigenous language is spoken at home	Conversational in Indigenous language	Indigenous language is spoken at home
	Panel A. Ancestral instability of the first moment of PDSI				
Climatic instability (PDSI)	**-3.985*** **	**-1.803** **	**-1.727***	**-0.861**	**-3.935*** **
	(1.118)	**(0.770)**	**(0.911)**	**(0.674)**	**(1.071)**
Annual standard deviation (PDSI)	3.119***	0.275	-0.133	0.213	3.004***
	(0.951)	(0.327)	(0.540)	(0.280)	(0.940)
	Panel B. Ancestral instability of the second moment of PDSI				
Climatic instability of annual standard deviation (PDSI)	**-9.593***	**-4.566*** **	**-2.111**	**-1.543**	**-9.386***
	(5.737)	**(1.580)**	**(2.385)**	**(1.368)**	**(5.056)**
Annual standard deviation (PDSI)	3.631**	0.784	-0.155	0.327	3.510**
	(1.466)	(0.584)	(0.813)	(0.464)	(1.423)
	Both Panels				
Ethnicity-level controls	yes	yes	yes	yes	yes
Location FE	yes	yes	yes	yes	yes
Survey-year FE	yes	yes	yes	yes	yes
Number of ethnic groups	29	30	30	30	53
Number of clusters (grid cells)	29	29	29	29	52
Mean (st. dev.) of dependent variable	0.04 (0.15)	0.25 (0.24)	0.22 (0.24)	0.30 (0.24)	0.06 (0.17)
Observations (ethnicity-year-location)	3,312	411	411	411	3,723

Notes : Poisson estimates are reported with standard errors clustered at the grid-cell level in parentheses. The unit of observation is an Indigenous ethnic group (from the U.S. and/or Canada), in a location, and observed in a census survey. The dependent variables are measures of the fraction of people who speak their traditional language. The American sample includes data from the 1930, 1990, and 2000 Censuses. The Canadian sample includes data from the 2001, 2006, and 2011 Censuses. For panel A, the mean (and standard deviation) of Climatic instability is: 0.66 (0.26). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is: 0.38 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

3. Omitting ancestral groups that do not speak a foreign (i.e., non-English) language

The authors raise questions about the exclusion of certain ancestries for our analysis which examines whether a foreign (i.e., non-English) language is spoken at home (Table 5). We use this as a measure of the persistence of traditions and customs and test whether the climatic instability of the ancestral environment affects this.

The issue one faces when doing this is that some ancestral groups do not speak a language other than English. For example, recorded ancestral groups include the British, English, (English) Canadians, Australians, etc. For these groups, they don't know a language other than English. Therefore, whether or not English is spoken at home does not likely capture the persistence of tradition.

Given this issue, in our analysis, we omitted the following ancestral groups from our sample: British, British Isles, English, Irish-various subheads, Celtic, Maltese, Scotch Irish, Scottish, Welsh, Bahamian, Barbadian, Belizean, Trinidadian, Antigua (1990-2000, ACS, PRCS), St. Vincent Islander (1990); Vincent-Grenadine Islander (2000 Census, 2005 ACS, 2005 PRCS), Grenadian, St Lucia Islander, Guyanese/British Guiana, Ghanian, Kenyan, Liberian, Nigerian, Sierra Leonean, South African, Australian, New Zealander, Tongan, Fijian, Anglo (1990-2000, ACS, PRCS), and (English-speaking) Canadians.

Picking groups individually who suffer from the problem described above is not a clear-cut exercise. For example, should South Africans be dropped? Much of South Africa speaks English, but many also speak Afrikaans, as well as Zulu and Xhosa. English is actually only the fourth most commonly spoken language in the country. However, there is also the issue that what is true for the country might not be true for immigrants to the United States. In this case, it might be the case that the vast majority of immigrants coming to the United States speak English as their first language, and for many, it will be the only language that they know.

Rather than doing a deep dive into these issues for each country, to exclude ancestries for which this is an issue, we took a very liberal definition that erred on the side of dropping too many ancestries rather than not enough. We used a criterion that is commonly applied by Universities to judge whether international students are deemed to be sufficiently fluent in English so that they do not need to take language proficiency exams as part of the application process. In their origin location, it must be the case that "English is the official language and the language of

instruction in higher education." Although this isn't directly a measure of whether they will know how to speak a language other than English (or whether a language other than English is their mother tongue), we felt that it would be very highly correlated. Also, given that Universities produce exact lists for incoming students, this was a concrete clear-cut criterion that can be used.

An important note on the classification that we use, and something the authors comment on, is that while "Canadians" (ancestr1d= 9310) are omitted from the sample, French-speaking Canadians are not – i.e., "French Canadians" (ancestr1d= 9350) are not. This follows directly the definition based on the criterion applied by U.S. Universities: "Canada (except for Quebec)" is deemed as having English as an official language (and language of instruction in higher education).[2]

From the list above, it is clear that this criterion omits a number of countries from the sample for which English is not the mother tongue. Examples include Ghanaian, Kenyan, Liberian, Nigerian, Sierra Leonean, and Tongan. All of these groups have a mother tongue other than English that could be spoken in the home. The data from our sample on the frequency in which individuals speak a language other than English at home confirms this: Ghanaian (39.0%), Kenyan (41.4%), Liberian (10.3%), Nigerian (32.2%), Sierra Leonean (57.1%), and Tongan (67.7%). Thus, our analysis took an overly conservative approach, omitting a large number of individuals from ancestries for which we have high certainty that there is a non-English (i.e., foreign) language that would be natural for them to speak at home. In all, we omitted 35% of the sample. Although it was overly conservative, we felt that there was a benefit to using a pre-existing criterion that was established, logical, clear-cut, and relevant to the issue of speaking a language other than English.

In their note, the authors write that we should omit additional ancestral groups from the sample – those from: French-speaking Canada (which comprise 71,315 obs., or 2.1% of the sample), Puerto Rico (36,844 obs., 1.1%), Philippines (16,031 obs., 0.5%), India (5,127 obs., 0.2%), Samoa (1,062 obs., 0.03%), Pakistan (712 obs., 0.02%), and Eritrea (24 obs., 0.0007%). These comprise the following ancestral groups recorded in the Census: French Canadians (70,969 obs.), Acadian (1990-2000, ACS, PRCS) (346 obs.), Eritrean (24 obs.), Indian (1990-2000, ACS, PRCS) (4,798 obs.), East Indian (1990-2000, ACS, PRCS) (329 obs.), Punjabi (44 obs.), Pakistani (1990-2000, ACS, PRCS) (668 obs.), Filipino (631 obs.), Puerto Rican (36,844 obs.), Samoan (1990-2000, ACS,

[2]See for example https://international.globallearning.cornell.edu/host-departments/j-1-language-requirement; https://grad.ncsu.edu/students/rules-and-regulations/handbook/english-as-official-language/; or https://biology.fau.edu/academics/graduate/countries_w_english_as_official_language.php.

PRCS) (1062 obs.). They use information from the CIA World Factbook to identify these countries.

From a cursory look at all of these countries, it is clear that in no case is the mother tongue of the group English. Not surprisingly, for all of these groups, we see that a substantial fraction of the individuals in our sample speak a language other than English at home: French Canadians (10.4%), Puerto Rican (70.7%), Filipinos (17.7%), Indians (46.6%), Samoans (44.4%), Pakistanis (62.5%), and Eritreans (75.0%).

Since our baseline specification was aggressive in terms of the number of ancestral groups that we omitted from the analysis, we see no logical reason to drop these additional countries. If anything, a reasonable robustness test is to refrain from omitting groups for which we know the mother tongue is not English. We view this as an important check that we perform here. If we loosen the restrictiveness of the definition and include the countries for which English is not the mother tongue – namely Ghanaian, Kenyan, Liberian, Nigerian, Sierra Leonean, and Tongan – we obtain very similar estimates. These are reported here in Table R11 below, which reproduces Table 5 from the paper.

The issue raised in their note and the discussion here highlights the fact that there is no clear 0-1 boundary that determines whether a group's mother tongue is a language other than English. The issue is further complicated by the fact that some groups often speak more than one language and can speak English to varying degrees. In some cases, English may be the mother tongue (e.g., the group "British"). In others, English is not the "mother tongue," but it is the medium of instruction in higher education (e.g., Nigeria). These were omitted from the sample using our criterion. In groups, English is not the mother tongue and it is not the medium of instruction in higher education (e.g., Eritrea or Pakistan). Beyond this, even within each of these groups, there is going to be variation in the availability of private schools, education levels, the use of English as an alternative language, its status in government, etc.

Rather than dropping larger and larger portions of the sample while losing sight of the original reason for the omission – to identify whether a non-English language is spoken by the group – a less-blunt approach is to include all countries in the sample but to account for these different categories of groups, and to account for their proficiency in speaking English. Whether English is spoken at home will not only be determined by ancestral climate stability (which affects the importance placed on tradition) but also by how easy it is to speak English in the home. Thus, one can simply control for this alternative determinant. We do this here, using a range of measures

of English proficiency, to check the robustness of our findings.

The estimates using this strategy are reported in Tables R12 and R13. The regressions include all ancestral groups but controls for the set of indicator variables described above. Table R12 includes an indicator for countries for which English is the official language and the language of instruction in higher education. Table R13 adds an additional indicator for countries that have English as an official language but it's not the language of instruction in higher education, which is the restriction proposed by Bertoli et al. (n.d.). As reported, comparing these estimates to the original estimates from Table 5 of the paper, we see that the results remain fully robust. In fact, the direct tests of cultural transmission, reported in columns 6 and 7, show effects that are significantly larger in magnitude than the baseline effects reported in the paper.

It is interesting to note that while the indicator corresponding to the definition used in our paper is often negative and significant, potentially justifying their exclusion, the indicator corresponding to the additional countries the authors would like to drop – "English is an official language but not the language of instruction in higher education" – is never significant.

Yet another strategy is to control directly for a person's English proficiency. The Census, in addition to reporting the language spoken at home, also asks about fluency in English. The variable is measured as a 0-1 indicator. We re-estimate the specifications described above with the English proficiency indicator as an added covariate. The estimates, which are reported in Tables R14 and R15, are fully robust.

For completeness, we make two additional notes. First, even with the authors' chosen expanded sample of ancestral groups to drop from the analysis, the estimates do not provide clear evidence against our hypothesis. In their note, the authors selectively report one specification among a set of seven estimates from Table 5. In addition, as noted, the direct test of cultural transmission appears in columns 6 and 7. These estimates are not reported by the authors.

For transparency and completeness, we reproduce the full table, which reports estimates after dropping the additional ancestries the authors would like to drop. These are reported in Table R16. As one can see, greater ancestral instability is associated with less persistence of tradition as measured by speaking a foreign language at home for the sample of individuals who live with their parents (column 3). The estimates are also significant for both direct tests of cultural transmission (columns 6 and 7). Further, the estimated effects are about 45% larger and much more precisely estimated. Thus, while the estimated relationships between climatic instability

and speaking a foreign language at home decline in magnitude and lose power, the estimated effect on cultural persistence increases in magnitude and gains power. Thus, it is hard to know what to conclude from this. Selectively omitting ancestral groups changes the estimates but not in a systematic direction.

Lastly, we note that the original text in the body of the paper was not precise about the exact definition of the criterion that was used to omit ancestral groups. We imprecisely reported this to be "English is the official language," a shorthand description often used by Universities. This was previously communicated to the authors and corrected in a corrigendum, both of which predate the posting of the I4R note by the authors. See Giuliano and Nunn (2024) for full details.

Table R11: Speaking a foreign language at home in the Census 2000, adding non-English speaking ancestries Ghanaian, Kenyan, Liberian, Nigerian, Sierra Leonean, and Tongan

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.454*** (0.167)**	**-0.391** (0.169)**	**-0.788*** (0.181)**	**-0.328*** (0.082)**	**-0.326*** (0.088)**	-0.162 (0.121)	-0.143 (0.118)
Father speaks a foreign language				0.509*** (0.029)		0.728*** (0.086)	
Father speaks foreign lang.* Climatic instability						**-0.805** (0.312)**	
Mother speaks a foreign language					0.519*** (0.032)		0.763*** (0.081)
Mother speaks foreign lang.* Climatic instability							**-0.894*** (0.294)**
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	90	90	90	90	90	90	90
Mean (st. dev.) of dependent variable	0.12 (0.33)	0.11 (0.31)	0.23 (0.42)	0.22 (0.42)	0.23 (0.42)	0.22 (0.42)	0.23 (0.42)
Observations	3,344,317	2,916,438	427,879	330,562	400,481	330,562	400,481
R-squared	0.293	0.268	0.365	0.546	0.566	0.549	0.569

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.32 (0.07). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R12: Speaking a foreign language at home in the Census 2000, controlling for an indicator for groups for which English is an official language and language of instruction in higher education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.427****	**-0.353***	**-0.831*****	**-0.362*****	**-0.363*****	-0.143	-0.120
	(0.177)	**(0.182)**	**(0.183)**	**(0.082)**	**(0.087)**	(0.117)	(0.115)
Father speaks a foreign language				0.493***		0.784***	
				(0.033)		(0.085)	
Father speaks foreign lang.* Climatic instability						**-1.056*****	
						(0.314)	
Mother speaks a foreign language					0.499***		0.825***
					(0.036)		(0.083)
Mother speaks foreign lang.* Climatic instability							**-1.174*****
							(0.306)
English speaking countries (Giuliano, Nunn, 2021)	-0.019	-0.016	-0.047*	-0.017*	-0.019*	-0.019**	-0.021**
	(0.017)	(0.016)	(0.027)	(0.009)	(0.010)	(0.009)	(0.010)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	107	107	107	107	107	107	107
Mean (st. dev.) of dependent variable	0.09 (0.29)	0.08 (0.27)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
Observations	5,162,026	4,553,894	608,132	467,529	568,246	467,529	568,246
R-squared	0.266	0.238	0.357	0.519	0.538	0.523	0.544

Notes : OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.33 (0.06). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R13: Speaking a foreign language at home in the Census 2000, controlling for an indicator for groups for which English is an official language and language of instruction in higher education and an indicator for groups for which English is an official language but not a language of instruction in higher education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.462****	**-0.405****	**-0.810*****	**-0.317*****	**-0.332*****	-0.071	-0.064
	(0.178)	**(0.182)**	**(0.187)**	**(0.088)**	**(0.091)**	(0.126)	(0.120)
Father speaks a foreign language				0.493***		0.803***	
				(0.032)		(0.083)	
Father speaks foreign lang.* Climatic instability						**-1.124*****	
						(0.301)	
Mother speaks a foreign language					0.500***		0.842***
					(0.036)		(0.080)
Mother speaks foreign lang.* Climatic instability							**-1.228*****
							(0.295)
English speaking countries (Giuliano, Nunn 2021)	-0.017	-0.012	-0.050*	-0.022*	-0.023*	-0.025**	-0.026**
	(0.014)	(0.012)	(0.028)	(0.012)	(0.012)	(0.012)	(0.012)
English speaking countries (Bertoli et al., 2023)	0.040	0.056	-0.033	-0.071	-0.050	-0.089	-0.070
	(0.106)	(0.099)	(0.131)	(0.057)	(0.055)	(0.061)	(0.058)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	107	107	107	107	107	107	107
Mean (st. dev.) of dependent variable	0.09 (0.29)	0.08 (0.27)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
Observations	5,162,026	4,553,894	608,132	467,529	568,246	467,529	568,246
R-squared	0.266	0.239	0.357	0.520	0.539	0.524	0.544

Notes : OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.33 (0.06). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R14: Speaking a foreign language at home in the Census 2000, controlling for fluency in English, an indicator for groups for which English is an official language and language of instruction in higher education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.425****	**-0.351***	**-0.831*****	**-0.362*****	**-0.364*****	-0.143	-0.120
	(0.176)	**(0.181)**	**(0.183)**	**(0.082)**	**(0.087)**	(0.117)	(0.115)
Father speaks a foreign language				0.492***		0.783***	
				(0.033)		(0.085)	
Father speaks foreign lang.* Climatic instability						**-1.056*****	
						(0.313)	
Mother speaks a foreign language					0.499***		0.825***
					(0.036)		(0.083)
Mother speaks foreign lang.* Climatic instability							**-1.174*****
							(0.306)
Fluency in English	-0.512***	-0.506***	-0.535***	-0.422***	-0.386***	-0.422***	-0.386***
	(0.148)	(0.158)	(0.120)	(0.135)	(0.124)	(0.136)	(0.124)
English speaking countries (Giuliano, Nunn, 2021)	-0.019	-0.016	-0.047*	-0.017*	-0.019*	-0.019**	-0.021**
	(0.017)	(0.016)	(0.027)	(0.009)	(0.010)	(0.009)	(0.010)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	107	107	107	107	107	107	107
Mean (st. dev.) of dependent variable	0.09 (0.29)	0.08 (0.27)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
Observations	5,162,026	4,553,894	608,132	467,529	568,246	467,529	568,246
R-squared	0.268	0.240	0.358	0.519	0.539	0.524	0.544

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.33 (0.06). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R15: Speaking a foreign language at home in the Census 2000, controlling for fluency in English, an indicator for groups for which English is an official language and language of instruction in higher education, and an indicator for groups for which English is an official language but not a language of instruction in higher education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.461****	**-0.404****	**-0.810*****	**-0.317*****	**-0.332*****	-0.072	-0.064
	(0.177)	**(0.181)**	**(0.187)**	**(0.088)**	**(0.091)**	(0.126)	(0.119)
Father speaks a foreign language				0.493***		0.802***	
				(0.032)		(0.083)	
Father speaks foreign lang.* Climatic instability						**-1.124*****	
						(0.301)	
Mother speaks a foreign language					0.500***		0.841***
					(0.036)		(0.080)
Mother speaks foreign lang.* Climatic instability							**-1.228*****
							(0.295)
Fluency in English	-0.514***	-0.509***	-0.535***	-0.421***	-0.386***	-0.420***	-0.386***
	(0.151)	(0.161)	(0.121)	(0.136)	(0.125)	(0.136)	(0.125)
English speaking countries (Giuliano, Nunn, 2021)	-0.017	-0.012	-0.050*	-0.022*	-0.023*	-0.025**	-0.026**
	(0.014)	(0.012)	(0.028)	(0.012)	(0.012)	(0.012)	(0.012)
English speaking countries (Bertoli et al., 2023)	0.041	0.057	-0.033	-0.071	-0.050	-0.089	-0.070
	(0.105)	(0.099)	(0.131)	(0.057)	(0.055)	(0.061)	(0.058)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	107	107	107	107	107	107	107
Mean (st. dev.) of dependent variable	0.09 (0.29)	0.08 (0.27)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
Observations	5,162,026	4,553,894	608,132	467,529	568,246	467,529	568,246
R-squared	0.268	0.241	0.358	0.520	0.539	0.525	0.545

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.33 (0.06). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R16: Speaking a foreign language at home in the Census 2000, dropping all additional countries proposed by Bertoli et al.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Not living with parents	Living with parents				
Climatic instability	**-0.008**	**0.039**	**-0.371***	**-0.124**	**-0.130**	0.124	0.124
	(0.194)	**(0.208)**	**(0.202)**	**(0.086)**	**(0.088)**	(0.075)	(0.076)
Father speaks a foreign language				0.497***		0.819***	
				(0.029)		(0.055)	
Father speaks foreign lang.* Climatic instability						**-1.174*** **	
						(0.208)	
Mother speaks a foreign language					0.503***		0.840***
					(0.033)		(0.056)
Mother speaks foreign lang.* Climatic instability							**-1.222*** **
							(0.212)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	77	77	77	77	77	77	77
Mean (st. dev.) of dependent variable	0.12 (0.32)	0.10 (0.30)	0.22 (0.41)	0.22 (0.41)	0.22 (0.41)	0.22 (0.41)	0.22 (0.41)
Observations	3,211,982	2,809,150	402,832	312,502	376,882	312,502	376,882
R-squared	0.317	0.287	0.407	0.569	0.585	0.574	0.590

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.32 (0.07). *, ** and *** indicate significance at the 10, 5 and 1% levels.

4. Exclusion of the 1930 Census and an explanation of changes made by IPUMS to 1930 Census data following the publication of the paper

One of our analyses examines whether Indigenous populations speak a Native language at home. This was done using individual-level data from the 1930, 1990, and 2000 Censuses. These data are made available in our replication folder. The authors have attempted to access the data we use directly from the IPUMS webpage, and one of the comments in their note is about the difficulties they have had doing so.

At the time in which the article was written, in the 1% public use census extract for 1930, there was a language variable called [LANGUAGE], which measured the language spoken at home. This is the variable that we used in our analysis to identify cases where Indigenous populations spoke their traditional language at home.

In September 15, 2021 (after our paper was published), IPUMS updated the 1930 1% extract, changing the label and definition of the variable from [LANGUAGE] to [MTONGUE]. For full details, see the revision history note for 9/15/21, which can be found at: `https://usa.ipums.org/usa-action/revisions#revision_02_09_2021`.

In the process of transitioning the data from the variable [LANGUAGE] to [MTONGUE], IPUMS also automatically substituted the value of "n/a" for the new [MTONGUE] variable anytime the person was not foreign-born. This is because although this information was sometimes recorded by enumerators for the Indigenous populations of our analysis, the official instruction was for the enumerators to only record this information when the person was born outside of the United States. With this recoding, the information on the language spoken at home for Indigenous populations in the U.S. in 1930 was no longer available from the 1930 1% extract. It was removed as part of the Sept 15, 2021 update.

Thus, after September 15, 2021, speakers of native American languages born in the U.S. are now always recoded as "n/a" for the [MTONGUE] variable even when this information was recorded. If after Sept 15, 2021, one downloads data from IPUMS, the information is different than in our replication files. As noted, we provide the data we downloaded and use in our replication files. If one wants to access these data from IPUMS one needs to access their restricted use data, where IPUMS provides the original string response to this question. The variable is [MTONGSTR]. That is, although the unrestricted data do not make this information available

(through the [MTONGUE] variable), the restricted data could be used.

Prior to the authors' report, this was explained to them. We have also updated our online data appendix to explain to the reader the revisions to the IPUMS data that occurred since our paper was published (see Giuliano and Nunn, 2023). In the appendix, we also explain how the interested scholar could obtain the data that we use in our paper. The updated appendix with this additional information was also sent to the authors.

Given the new definition and adjustment implemented by IPUMS, a reasonable check of our estimates is to test their robustness to drop the data from 1930, leaving the data for 1990 and 2000. We undertake this check by reporting alternative estimates for the individual-level regressions mentioned by the authors (Tables 7 and 9). As shown, the point estimates and significance are virtually identical, and the findings are virtually the same. These are reported below as Tables R17 and R18. Thus, the evidence indicates that any potential concerns about the 1930 U.S. Census data have no bearing on the conclusions of our study.

Table R17: Indigenous populations speaking their traditional language at home, dropping Census 1930

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-1.101*** **	**-1.230*** **	**-0.907*** **	**-0.391** **	**-0.289** **	-0.207*	-0.137
	(0.355)	**(0.416)**	**(0.273)**	**(0.156)**	**(0.121)**	(0.106)	(0.079)
Father speaks an Indigenous language				0.354***		0.488***	
				(0.025)		(0.036)	
Father speaks an Indigenous lang. * Climatic instability						**-0.562*** **	
						(0.164)	
Mother speaks an Indigenous language					0.396***		0.512***
					(0.024)		(0.037)
Mother speaks an Indigenous lang. * Climatic instability							**-0.492** **
							(0.181)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	19	19	19	19	19	19	19
Number of clusters (grid cells)	18	18	18	18	18	18	18
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Observations	116,537	73,478	43,059	21,433	30,519	21,433	30,519
R-squared	0.335	0.373	0.289	0.414	0.442	0.417	0.445

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R18: Drought severity and speaking an indigenous language at home, dropping Census 1930

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.751****	**-0.846****	**-0.603*****	**-0.275*****	**-0.222*****	-0.105	-0.084
	(0.270)	**(0.318)**	**(0.200)**	**(0.086)**	**(0.071)**	(0.070)	(0.053)
Annual standard deviation (PDSI)	0.600**	0.661**	0.505**	0.269***	0.235***	0.111	0.101*
	(0.227)	(0.259)	(0.181)	(0.092)	(0.075)	(0.071)	(0.053)
Father speaks an Indigenous language				0.347***		-0.134	
				(0.023)		(0.102)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-0.446****	
						(0.204)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.352***	
						(0.053)	
Mother speaks an Indigenous language					0.388***		-0.071
					(0.023)		(0.099)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.430****
							(0.185)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.333***
							(0.047)
R-squared	0.338	0.376	0.293	0.419	0.447	0.431	0.457
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-2.181***	**-2.435***	**-1.811****	**-0.872***	**-0.670***	-0.306	-0.225
	(1.049)	**(1.196)**	**(0.846)**	**(0.419)**	**(0.338)**	(0.224)	(0.163)
Annual standard deviation (PDSI)	0.822**	0.911**	0.690***	0.362***	0.301***	0.132	0.111*
	(0.291)	(0.337)	(0.225)	(0.114)	(0.092)	(0.081)	(0.057)
Father speaks an Indigenous language				0.344***		-0.183**	
				(0.024)		(0.067)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-2.002****	
						(0.768)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.605***	
						(0.139)	
Mother speaks an Indigenous language					0.386***		-0.116*
					(0.023)		(0.065)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-2.153*****
							(0.586)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.615***
							(0.105)
R-squared	0.339	0.377	0.295	0.419	0.447	0.432	0.458
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	19	19	19	19	19	19	19
Number of clusters (grid cells)	19	19	19	19	19	19	19
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)	0.20 (0.40)
Observations	116,537	73,478	43,059	21,433	30,519	21,433	30,519

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.34 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

5. Treatment of employment status variable

Another question raised by the authors is related to a control variable used in our analysis which examines whether Indigenous populations speak their traditional language at home. We test whether the stability of the environment of the traditional territory of the ethnic group is predictive of this proxy for the strength of tradition.

One of the control variables used in Tables 7 and 9 is based on the employment status variable [EMPSTAT] from the 1930, 1990, and 2000 Census. The variable takes the following values in the Census years 1990 and 2000 (0=NA, employed=1, unemployed=2 and 3=out of the labor force). In the 1930 Census, it takes the values of 1, 2, and 3 for employed, unemployed, and out of the labor force, respectively. In the 1990 and 2000 Census, the employment status of people younger than 16 was coded as 0 (i.e., N/A) because contemporary federal labor law prohibits the (non-farm) employment of children who are under 16 years of age. The fact that information was recorded for people under 16 reflects the different child labor practices in 1930. Since people below 16 years of age worked in 1930, there is no 0 (N/A) category like there is in 1990 and 2000 for this age group.

Because the sample and regressions include children under 16 who work (in 1930), for consistency, we treat the "0", "N/A" as a category which indicates that the individual is not in the labor force since, legally, they are not allowed to work in 1990 or 2000. Thus, this is the coding for the fixed effects for 1990 and 2000 that we use. The authors assert that one should delete observations from 1990 and 2000 that take on the value of zero.

In our analysis, we looked specifically at a subsample of individuals who lived at home. Therefore, it was important for us not to delete (mechanically or automatically) all individuals under 16 years of age in the 1990 and 2000 Census. Thus, we kept these observations and coded a consistent measure across the three Census years used in the analysis.

Motivated by the author's comment, a reasonable robustness check is to test the sensitivity of the results to dropping all observations for which [EMPSTAT] is equal to zero from the sample. The estimates, which reproduce Tables 7 and 9 of the paper, are reported in Tables R19 and R20 below. We see that our conclusions remain unchanged.

Another strategy is to simply eliminate all observations younger than 16 years of age. If we do this, as the estimates which are reported in Tables R21 and R22 show, the results are also very

similar.

Table R19: Indigenous populations speaking their traditional language at home, dropping observations for which empstat=0

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-1.237*** (0.406)**	**-1.235*** (0.412)**	**-1.218*** (0.398)**	**-0.394*** (0.142)**	**-0.369*** (0.135)**	-0.093 (0.075)	-0.057 (0.084)
Father speaks an Indigenous language				0.627*** (0.069)		0.965*** (0.063)	
Father speaks an Indigenous lang. * Climatic instability						**-1.542*** (0.234)**	
Mother speaks an Indigenous language					0.600*** (0.054)		0.903*** (0.046)
Mother speaks an Indigenous lang. * Climatic instability							**-1.328*** (0.216)**
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	79	76	77	76	77
Number of clusters (grid cells)	40	40	40	40	40	40	40
Mean (st. dev.) of dependent variable	0.21 (0.40)	0.20 (0.40)	0.21 (0.41)	0.27 (0.44)	0.26 (0.44)	0.27 (0.44)	0.26 (0.44)
Observations	92,689	73,721	18,968	10,527	14,441	10,527	14,441
R-squared	0.397	0.398	0.403	0.672	0.652	0.690	0.666

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R20: Drought severity and speaking an indigenous language at home, dropping observations for which empstat=0

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.923*** **	**-0.902*** **	**-0.972*** **	**-0.362*** **	**-0.316*** **	-0.042	-0.039
	(0.334)	**(0.335)**	**(0.332)**	**(0.093)**	**(0.083)**	(0.049)	(0.053)
Annual standard deviation (PDSI)	0.658**	0.659**	0.653**	0.252***	0.244***	0.042	0.061
	(0.254)	(0.258)	(0.248)	(0.073)	(0.072)	(0.037)	(0.045)
Father speaks an Indigenous language				0.628***		-0.207	
				(0.056)		(0.146)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-1.051*** **	
						(0.251)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.676***	
						(0.072)	
Mother speaks an Indigenous language					0.599***		-0.082
					(0.042)		(0.135)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-1.127*** **
							(0.268)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.629***
							(0.077)
R-squared	0.394	0.397	0.396	0.674	0.654	0.706	0.680
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-2.654** **	**-2.558** **	**-2.998** **	**-1.112** **	**-0.970** **	-0.138	-0.156
	(1.239)	**(1.223)**	**(1.258)**	**(0.456)**	**(0.399)**	(0.168)	(0.174)
Annual standard deviation (PDSI)	0.898***	0.897**	0.915***	0.338***	0.324***	0.044	0.064
	(0.336)	(0.340)	(0.326)	(0.106)	(0.098)	(0.042)	(0.049)
Father speaks an Indigenous language				0.623***		-0.336***	
				(0.058)		(0.087)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-3.769*** **	
						(0.960)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						1.108***	
						(0.174)	
Mother speaks an Indigenous language					0.596***		-0.200***
					(0.043)		(0.062)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-4.337*** **
							(0.949)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							1.137***
							(0.173)
R-squared	0.395	0.398	0.403	0.674	0.655	0.706	0.681
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	82	82	78	75	76	75	76
Number of clusters (grid cells)	80	80	76	73	75	73	75
Mean (st. dev.) of dependent variable	0.21 (0.40)	0.20 (0.40)	0.21 (0.41)	0.27 (0.44)	0.26 (0.44)	0.27 (0.44)	0.26 (0.44)
Observations	92,670	73,710	18,960	10,524	14,435	10,524	14,435

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.34 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R21: Indigenous populations speaking their traditional language at home, dropping people younger than 16

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-1.248*** (0.405)**	**-1.240*** (0.414)**	**-1.255*** (0.357)**	**-0.603*** (0.159)**	**-0.496*** (0.146)**	-0.240* (0.122)	-0.136 (0.123)
Father speaks an Indigenous language				0.506*** (0.057)		0.781*** (0.062)	
Father speaks an Indigenous lang. * Climatic instability						**-1.132*** (0.191)**	
Mother speaks an Indigenous language					0.511*** (0.050)		0.769*** (0.046)
Mother speaks an Indigenous lang. * Climatic instability							**-1.051*** (0.194)**
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	73	70	71	70	71
Number of clusters (grid cells)	40	40	40	39	40	39	40
Mean (st. dev.) of dependent variable	0.21 (0.40)	0.20 (0.40)	0.21 (0.41)	0.27 (0.44)	0.26 (0.44)	0.27 (0.44)	0.26 (0.44)
Observations	87,599	72,902	14,697	7,206	10,730	7,206	10,730
R-squared	0.395	0.398	0.396	0.587	0.585	0.597	0.595

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R22: Drought severity and speaking an indigenous language at home, dropping people younger than 16

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.904*** **	**-0.898*** **	**-0.909*** **	**-0.452*** **	**-0.361*** **	-0.091	-0.063
	(0.326)	**(0.334)**	**(0.287)**	**(0.113)**	**(0.097)**	(0.079)	(0.074)
Annual standard deviation (PDSI)	0.660**	0.658**	0.655***	0.324***	0.305***	0.057	0.082
	(0.254)	(0.259)	(0.234)	(0.097)	(0.086)	(0.063)	(0.063)
Father speaks an Indigenous language				0.513***		-0.212*	
				(0.046)		(0.124)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-0.862*** **	
						(0.225)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.592***	
						(0.068)	
Mother speaks an Indigenous language					0.509***		-0.091
					(0.037)		(0.117)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.978*** **
							(0.246)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.564***
							(0.070)
R-squared	0.393	0.396	0.393	0.588	0.588	0.615	0.611
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-2.603** **	**-2.554** **	**-2.786** **	**-1.417** **	**-1.124** **	-0.279	-0.245
	(1.216)	**(1.226)**	**(1.137)**	**(0.578)**	**(0.468)**	(0.254)	(0.223)
Annual standard deviation (PDSI)	0.907***	0.898**	0.930***	0.458***	0.413***	0.068	0.093
	(0.334)	(0.341)	(0.298)	(0.132)	(0.110)	(0.072)	(0.067)
Father speaks an Indigenous language				0.508***		-0.321***	
				(0.048)		(0.076)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-3.133*** **	
						(0.805)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.955***	
						(0.151)	
Mother speaks an Indigenous language					0.507***		-0.196***
					(0.038)		(0.056)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-3.767*** **
							(0.858)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							1.005***
							(0.160)
R-squared	0.394	0.397	0.398	0.588	0.589	0.616	0.611
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	82	82	72	69	70	69	70
Number of clusters (grid cells)	80	80	72	69	70	69	70
Mean (st. dev.) of dependent variable	0.21 (0.41)	0.20 (0.40)	0.22 (0.42)	0.29 (0.45)	0.28 (0.45)	0.29 (0.45)	0.28 (0.45)
Observations	87,588	72,894	14,694	7,204	10,728	7,204	10,728

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.34 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

6. Exclusion of individuals younger than five from the sample

For the same analyses that look at whether a traditional language is spoken at home among Indigenous populations, the authors have another comment related to a sample restriction by age.

The authors point out that for people who are younger than five, in the 1990 and 2000 Censuses, for the variable that records whether a foreign language is spoken at home [LANGUAGE], children aged 0 to 4 are automatically coded as "0." In other words, given their age, they are recorded as not speaking a foreign language at home. Given that we flexibly account for age in our analysis, we do not expect this determinant to bias our estimates of interest. However, it is reasonable to ask how the estimates differ if we omit from the sample children younger than five years old.

First, note that our previous robustness check, where we omit all individuals younger than 16 already omits all individuals younger than five. However, here we also separately check the sensitivity of the estimates to dropping all individuals under five. We do this both for our full sample (Census years 1930, 1990, and 2000) in Tables R23 and 24; or dropping these observations only in the Census 1990 and 2000 in Tables R25 and R26. (Each pair reproduces Tables 7 and 9 of the paper.) As shown, the results remain robust.

Table R23: Indigenous populations speaking their traditional language at home, dropping all individuals younger than five

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-1.194*** (0.386)**	**-1.225*** (0.407)**	**-1.130*** (0.354)**	**-0.416** (0.161)**	**-0.335** (0.136)**	-0.166 (0.103)	-0.122 (0.082)
Father speaks an Indigenous language				0.504*** (0.045)		0.724*** (0.057)	
Father speaks an Indigenous lang. * Climatic instability						**-0.954*** (0.223)**	
Mother speaks an Indigenous language					0.529*** (0.039)		0.711*** (0.052)
Mother speaks an Indigenous lang. * Climatic instability							**-0.789*** (0.218)**
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	78	75	76	75	76
Number of clusters (grid cells)	40	40	40	40	40	40	40
Mean (st. dev.) of dependent variable	0.20 (0.40)	0.20 (0.40)	0.19 (0.39)	0.25 (0.43)	0.23 (0.42)	0.25 (0.43)	0.23 (0.42)
Observations	115,977	76,871	39,106	20,265	28,451	20,265	28,451
R-squared	0.362	0.388	0.323	0.518	0.533	0.525	0.538

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R24: Drought severity and speaking an indigenous language at home, dropping all individuals younger than five

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.862*** **	**-0.890*** **	**-0.805*** **	**-0.354*** **	**-0.280*** **	-0.102	-0.084
	(0.305)	**(0.328)**	**(0.268)**	**(0.096)**	**(0.078)**	(0.073)	(0.054)
Annual standard deviation (PDSI)	0.643***	0.657**	0.617***	0.291***	0.262***	0.100	0.099*
	(0.242)	(0.254)	(0.223)	(0.097)	(0.082)	(0.065)	(0.053)
Father speaks an Indigenous language				0.498***		-0.174	
				(0.039)		(0.141)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-0.708*** **	
						(0.258)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.511***	
						(0.069)	
Mother speaks an Indigenous language					0.521***		-0.112
					(0.035)		(0.124)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.605** **
							(0.232)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.461***
							(0.062)
R-squared	0.361	0.387	0.323	0.523	0.538	0.543	0.555
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-2.483** **	**-2.531** **	**-2.378** **	**-1.072** **	**-0.857** **	-0.278	-0.253
	(1.163)	**(1.203)**	**(1.093)**	**(0.503)**	**(0.397)**	(0.249)	(0.184)
Annual standard deviation (PDSI)	0.874***	0.892***	0.836***	0.386***	0.340***	0.111	0.112*
	(0.316)	(0.334)	(0.288)	(0.131)	(0.107)	(0.076)	(0.058)
Father speaks an Indigenous language				0.495***		-0.256***	
				(0.041)		(0.089)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-3.031*** **	
						(0.975)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.887***	
						(0.175)	
Mother speaks an Indigenous language					0.519***		-0.174**
					(0.036)		(0.075)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-2.892*** **
							(0.743)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.832***
							(0.134)
R-squared	0.363	0.388	0.327	0.523	0.539	0.545	0.557
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	82	82	77	74	75	74	75
Number of clusters (grid cells)	80	80	75	72	74	72	74
Mean (st. dev.) of dependent variable	0.20 (0.40)	0.20 (0.40)	0.19 (0.39)	0.25 (0.43)	0.23 (0.42)	0.25 (0.43)	0.23 (0.42)
Observations	115,961	76,862	39,099	20,262	28,446	20,262	28,446

Notes: OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.35 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R25: Indigenous populations speaking their traditional language at home, dropping individuals younger than five in the Censuses 1990 and 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
Climatic instability	**-1.193*** **	**-1.224*** **	**-1.131*** **	**-0.389** **	**-0.318** **	-0.141	-0.105
	(0.387)	**(0.407)**	**(0.359)**	**(0.153)**	**(0.131)**	(0.094)	(0.076)
Father speaks an Indigenous language				0.524***		0.755***	
				(0.048)		(0.061)	
Father speaks an Indigenous lang. * Climatic instability						**-1.020*** **	
						(0.236)	
Mother speaks an Indigenous language					0.543***		0.732***
					(0.041)		(0.054)
Mother speaks an Indigenous lang. * Climatic instability							**-0.831*** **
							(0.227)
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	79	76	77	76	77
Number of clusters (grid cells)	40	40	40	40	40	40	40
Mean (st. dev.) of dependent variable	0.20 (0.40)	0.20 (0.40)	0.19 (0.39)	0.25 (0.43)	0.23 (0.42)	0.25 (0.43)	0.23 (0.42)
Observations	117,641	77,110	40,531	21,404	29,709	21,404	29,709
R-squared	0.363	0.389	0.326	0.535	0.546	0.543	0.552

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R26: Drought severity and speaking an indigenous language at home, dropping individuals younger than five in the Census 1990 and 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Not living with parents	Living with parents				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.866*** **	**-0.892*** **	**-0.817*** **	**-0.344*** **	**-0.273*** **	-0.093	-0.078
	(0.307)	**(0.328)**	**(0.274)**	**(0.093)**	**(0.076)**	(0.068)	(0.051)
Annual standard deviation (PDSI)	0.643***	0.657**	0.618***	0.280***	0.252***	0.095	0.095*
	(0.242)	(0.254)	(0.224)	(0.092)	(0.079)	(0.060)	(0.050)
Father speaks an Indigenous language				0.517***		-0.176	
				(0.042)		(0.145)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-0.740*** **	
						(0.262)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.527***	
						(0.069)	
Mother speaks an Indigenous language					0.536***		-0.111
					(0.036)		(0.127)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.628** **
							(0.238)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.471***
							(0.063)
R-squared	0.362	0.388	0.326	0.539	0.551	0.561	0.568
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-2.494** **	**-2.531** **	**-2.414** **	**-1.022** **	**-0.828** **	-0.248	-0.232
	(1.169)	**(1.203)**	**(1.111)**	**(0.480)**	**(0.384)**	(0.234)	(0.176)
Annual standard deviation (PDSI)	0.871***	0.891***	0.835***	0.365***	0.325***	0.103	0.105*
	(0.317)	(0.334)	(0.292)	(0.125)	(0.104)	(0.069)	(0.055)
Father speaks an Indigenous language				0.515***		-0.260***	
				(0.043)		(0.092)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-3.137*** **	
						(0.996)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.914***	
						(0.179)	
Mother speaks an Indigenous language					0.534***		-0.174**
					(0.037)		(0.077)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-2.970*** **
							(0.765)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.851***
							(0.138)
R-squared	0.364	0.389	0.329	0.539	0.552	0.562	0.570
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	82	82	78	75	76	75	76
Number of clusters (grid cells)	80	80	76	73	75	73	75
Mean (st. dev.) of dependent variable	0.20 (0.40)	0.20 (0.40)	0.19 (0.39)	0.25 (0.43)	0.23 (0.42)	0.25 (0.43)	0.23 (0.42)
Observations	117,622	77,099	40,523	21,401	29,703	21,401	29,703

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.21). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.35 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

7. Exclusion of unmarried partners from the sample

In Section 4.3.1 of the paper, we study whether children of immigrants in the United States marry someone who is from the same country of origin. We use this outcome as an indicator of adherence to the tradition of marrying someone from within the origin group.

The authors have some questions about our sample. They write: "the estimation samples in Table 4 include married individuals not co-residing with the spouse, e.g., 1,007 obs. (2.7%) in Col. (1), with 180 of these having the dependent variable equal to one. Thus, it is not possible to create the dependent variable in a way consistent with its description provided at p. 1562 for married individuals whose spouse is absent." The question that they raise is valid.

In the data, they observe cases where it is reported (for example) that the household head is identified as "being married, but with the spouse absent" [MARST=2]. For a small number of these cases – for example, as noted, in 1,007 observations in column 1 of Table 4 – we report the origin country of the spouse. The authors question how we are able to identify the origin country of the spouse when the spouse is absent. The answer is that in these cases, there is a woman in the household who is reported as being an "unmarried partner" [RELATE=1114]. It is the "new" partner whom we are considering in the analysis when asking whether they are from the same origin country as the husband. The authors are correct that we do not know the ancestry of the "absent spouse."

The inclusion of these observations, although unlikely ex-ante to affect any of our estimates given the frequency, could be perceived as being inconsistent with the text used in the paper where we describe the variable as "an indicator variable that equals one if an individual's spouse was born in the origin country c or if his or her mother or father was born in country c." Although not technically the definition of spouse, a natural interpretation of a "spouse" is a "significant other within a marriage." Thus, it would be reasonable to omit these couples from the analysis.

Given this, we have gone back to make sure that none of our conclusions are affected by this decision. Revised estimates with these observations removed are reported in Table R27 below (which replicates Table 4 from the paper).[3]. The results remain almost identical to the baseline estimates, which is not surprising given that only a fraction of the sample is affected.

[3]The estimates are obtained removing all unmarried partners, relate==1114, from the analysis

Table R27: Women and men marrying a spouse from their origin country, using CPS 1994–2014, omitting "unmarried partners"

	(1)	(2)	(3)	(4)
	Dependent variable: Indicator variable for spouse being from the same origin country			
	Sample: Married women		Sample: Married men	
	Origin country identified from father	Origin country identified from mother	Origin country identified from father	Origin country identified from mother
Climatic instability	**-0.270***	**-0.489*****	**-0.109**	**-0.263***
	(0.154)	**(0.176)**	**(0.138)**	**(0.149)**
Country-level controls:				
Distance from equator	-0.006**	-0.005*	-0.009***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
Economic complexity	0.007	0.015	-0.014	-0.022
	(0.029)	(0.037)	(0.040)	(0.040)
Political hierarchies	0.104***	0.094***	0.103***	0.095**
	(0.029)	(0.031)	(0.039)	(0.040)
Ln (per-capita GDP)	0.001	-0.015	0.002	0.000
	(0.032)	(0.035)	(0.037)	(0.037)
Genetic distance from the United States	0.029	0.008	0.012	-0.007
	(0.048)	(0.054)	(0.044)	(0.045)
Fraction of population in location who are 1st or 2nd-generation immigrants from same country of origin	3.523***	3.704***	3.197***	3.536***
	(0.529)	(0.665)	(0.508)	(0.497)
Individual controls	yes	yes	yes	yes
Number of countries	108	104	109	104
Mean (st. dev.) of dependent variable	0.33 (0.47)	0.32 (0.47)	0.28 (0.45)	0.28 (0.45)
Observations	34,021	32,075	36,619	33,904
R-squared	0.256	0.273	0.229	0.250

Notes: OLS estimates are reported with standard errors clustered at the country-of-origin level in parentheses. In columns 1 and 2, the unit of observation is a daughter of at least one immigrant parent who is married at the time of the survey. In columns 1 and 2, the dependent variable is an indicator variable that equals one if the woman is married to someone with the same ancestry (i.e., an individual born in the country or with at least one parent who was born in the country). In columns 3 and 4, the unit of observation is a son of at least one immigrant parent who is married at the time of the survey. In columns 3 and 4, the dependent variable is an indicator variable that equals one if the man is married to someone with the same ancestry. The country of origin of the observation is defined by the country of birth of the father in columns 1 and 3 and the country of birth of the mother in column 2 and 4. The following controls are included in all specifications: a quadratic in age, two indicator variables for educational attainment (less than high school and high school), metropolitan-area fixed effects, and survey-year fixed effects. The mean and standard deviation of climatic instability is 0.29 (0.09). *, ** and *** indicate significance at the 10, 5 and 1% levels.

8. Treatment of immigrants in the World Value Survey regressions

The authors raise questions about the language variable used in our analysis of Section 4.1.2 where we study the importance of tradition within countries using evidence from the World Value Survey. We use a variable measuring the language spoken at home [G016] to identify the ancestry of a respondent, which is used to measure ancestral weather variability. The analysis then studies the relationship between the self-reported importance of tradition and ancestral climatic instability across individuals in a regression that accounts for country fixed effects.

The authors point out that we used imprecise wording in the original paper. In the text, we described the variable as measuring the "mother tongue." We should have more correctly written "language spoken at home" as our description of the variable. There is no variable that asks about "mother tongue" in the WVS and only a variable that asks about "language spoken at home." We have noted this in the paper's corrigendum (Giuliano and Nunn, 2024). In an updated data appendix, we now report the variable number so that there is no possibility for confusion (Giuliano and Nunn, 2023).

One of our analyses looks within countries and examines cross-individual variation in the importance placed on following tradition. We show that individuals from ancestral groups with greater climatic instability place less importance on tradition today. The authors argue that this analysis should drop "respondents of immigrant origin." They specifically identify as troublesome "respondents with a mother born in a country other than where they are surveyed" – i.e., individuals with an immigrant mother.

Although the exact motivation for this isn't clear, it is apparent that this is counterproductive given the strategy of the exercise. The within-country variation in the WVS sample can come either from different ethnic groups who speak a different language or from immigrants (either first or second-generation) who speak their origin language at home. Immigrants and the children of immigrants are, therefore, valuable observations that provide part of the variation in ancestral background that allows us to estimate effects when looking across individuals living in the same country. Using this strategy, one can check whether there is a relationship between ancestral climate instability and the importance placed on tradition conditional on the current external environment. Thus, one omits an important part of the necessary variation if "respondents of immigrant origin" are removed.

Despite this, for transparency, we pursue the authors' line of inquiry and check to see how robust our estimates are to removing individuals with immigrant ancestry. The authors propose excluding individuals whose mother was born abroad. If one wants to assess the sensitivity of the results to the omission of those with immigrant ancestry from the sample, best practice suggests doing this in a logical and systematic manner. The decision to only exclude respondents if their mother was born in another country (and not if their father was born in another country or if they were born in another country) is ad hoc and strategically selective. Here, we undertake a complete analysis of the robustness of the estimates to the omission of first and second-generation immigrants.

The first complication that arises is that the immigrant status of the respondent (from variable G027A) or of their mother and father (variables G026 and G027, respectively) is not asked in all surveys. Thus, as a baseline for comparison, we'd like to know our baseline estimates for the subsample of individuals who are from survey waves that have these data. We report this in Table R28, where we reproduce a version of Table 2 from the paper that only includes individuals for which the question about the immigrant status of the person and their parents was recorded in the WVS. As reported, this alone decreases the sample size dramatically – e.g., from 140,629 to 66,129 (in column 1). Further, the number of countries represented in the sample declines from 75 to 50. Despite this, the estimates remain very similar, increasing slightly in magnitude.

The first exercise that we undertake is to omit individuals who have themselves immigrated – i.e., were born in another country – from the sample. With this omission, second-generation immigrants remain in the sample. The logic used in literature is that, since second-generation immigrants are born in the destination country, language differences more cleanly reflect cultural differences only (e.g., rather than different environments experienced during their lifetime). The estimates with this group omitted, which are reported in Table R29, show that the finding of interest remains robust. The estimated coefficients are very similar to the baseline estimates, either the original estimates reported in Table 2 of the paper or the estimates that only use WVS waves for which immigration ancestry is available (R28 in this note). The estimates continue to be negative, are very similar in magnitude, and are statistically significant.

Lastly, we also drop respondents who are immigrants or who have a father or mother who was born abroad (i.e., second-generation immigrants). In this specification, the sample is further reduced to about 59,000 observations. Although this is a very non-standard exercise and removes

a big part of the key identifying variation, the estimates are very similar (see Table R30). From the estimates, it is clear that omitting first or second-generation immigrants has no effect on the conclusions that emerge from the analysis.

Table R28: Importance of tradition in the World Value Survey, dropping observations for which the immigrant question is not asked

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Importance of tradition, 1-6					
	Ancestral characteristics measures					
	Original EA		With Eastern Europe & Siberia extensions		Also with the World Ethnographic Sample extension	
Climatic instability	**-0.855****	**-0.759****	**-0.939****	**-0.867*****	**-0.965*****	**-0.864*****
	(0.358)	**(0.365)**	**(0.365)**	**(0.303)**	**(0.366)**	**(0.328)**
Historical ethnicity-level controls:						
Distance from equator		-0.001		-0.002		-0.001
		(0.004)		(0.003)		(0.003)
Economic complexity		-0.033*		-0.047***		-0.035**
		(0.017)		(0.016)		(0.016)
Political hierarchies		-0.003		0.032		0.002
		(0.047)		(0.046)		(0.042)
Gender, age, age squared	yes	yes	yes	yes	yes	yes
Survey-wave fixed effects	yes	yes	yes	yes	yes	yes
Other individual controls	no	yes	no	yes	no	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Number of countries	50	50	50	50	50	50
Number of ethnic groups	131	119	136	124	137	125
Mean (st. dev.) of dep var	4.57 (1.37)	4.54 (1.37)	4.57 (1.37)	4.54 (1.37)	4.57 (1.37)	4.54 (1.37)
Observations	66,129	55,518	66,128	55,518	66,125	55,515
R-squared	0.148	0.148	0.148	0.148	0.148	0.148

Notes: The unit of observation is an individual. The dependent variable is a measure of the self-reported importance of tradition, which ranges from 1 to 6 and is increasing in the reported importance of tradition. Columns 1, 3 and 5 include a quadratic in age, a gender indicator variable, and survey wave fixed effects. Columns 2, 4 and 6 additionally include eight education fixed effects, labor force participation fixed effects, an indicator variable that equals one if the person is married, and ten income category fixed effects. Standard errors are clustered at the ethnicity level. The mean (and standard deviation) of Climatic instability is 0.28 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R29: Importance of tradition in the World Value Survey, dropping first-generation immigrants

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Importance of tradition, 1-6					
	Ancestral characteristics measures					
	Original EA		With Eastern Europe & Siberia extensions		Also with the World Ethnographic Sample extension	
Climatic instability	**-0.765***	**-0.708***	**-0.832****	**-0.805****	**-0.857****	**-0.792****
	(0.396)	**(0.397)**	**(0.401)**	**(0.314)**	**(0.404)**	**(0.345)**
Historical ethnicity-level controls:						
Distance from equator		-0.000		-0.001		-0.001
		(0.004)		(0.003)		(0.003)
Economic complexity		-0.033*		-0.048***		-0.036**
		(0.017)		(0.017)		(0.017)
Political hierarchies		-0.005		0.030		-0.000
		(0.049)		(0.047)		(0.042)
Gender, age, age squared	yes	yes	yes	yes	yes	yes
Survey-wave fixed effects	yes	yes	yes	yes	yes	yes
Other individual controls	no	yes	no	yes	no	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Number of countries	50	50	50	50	50	50
Number of ethnic groups	126	115	131	120	132	121
Mean (st. dev.) of dep var	4.57 (1.37)	4.54 (1.37)	4.57 (1.37)	4.54 (1.37)	4.57 (1.37)	4.54 (1.37)
Observations	63,211	52,916	63,211	52,916	63,210	52,915
R-squared	0.150	0.150	0.150	0.150	0.150	0.150

Notes: The unit of observation is an individual. The dependent variable is a measure of the self-reported importance of tradition, which ranges from 1 to 6 and is increasing in the reported importance of tradition. Columns 1, 3 and 5 include a quadratic in age, a gender indicator variable, and survey wave fixed effects. Columns 2, 4 and 6 additionally include eight education fixed effects, labor force participation fixed effects, an indicator variable that equals one if the person is married, and ten income category fixed effects. Standard errors are clustered at the ethnicity level. The mean (and standard deviation) of Climatic instability is 0.27 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R30: Importance of tradition in the World Value Survey, dropping first- and second-generation immigrants

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Importance of tradition, 1-6					
	Ancestral characteristics measures					
	Original EA		With Eastern Europe & Siberia extensions		Also with the World Ethnographic Sample extension	
Climatic instability	**-0.670***	**-0.665***	**-0.725***	**-0.752****	**-0.748***	**-0.728****
	(0.386)	**(0.395)**	**(0.395)**	**(0.316)**	**(0.400)**	**(0.350)**
Historical ethnicity-level controls:						
Distance from equator		-0.000		-0.001		-0.001
		(0.004)		(0.003)		(0.003)
Economic complexity		-0.030*		-0.041**		-0.029*
		(0.017)		(0.016)		(0.017)
Political hierarchies		0.013		0.042		0.010
		(0.046)		(0.044)		(0.041)
Gender, age, age squared	yes	yes	yes	yes	yes	yes
Survey-wave fixed effects	yes	yes	yes	yes	yes	yes
Other individual controls	no	yes	no	yes	no	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Number of countries	49	49	49	49	49	49
Number of ethnic groups	122	112	127	117	128	118
Mean (st. dev.) of dep var	4.58 (1.36)	4.55 (1.37)	4.58 (1.36)	4.55 (1.37)	4.58 (1.36)	4.55 (1.37)
Observations	58,315	48,698	58,315	48,698	58,314	48,697
R-squared	0.149	0.148	0.149	0.149	0.149	0.149

Notes: The unit of observation is an individual. The dependent variable is a measure of the self-reported importance of tradition, which ranges from 1 to 6 and is increasing in the reported importance of tradition. Columns 1, 3 and 5 include a quadratic in age, a gender indicator variable, and survey wave fixed effects. Columns 2, 4 and 6 additionally include eight education fixed effects, labor force participation fixed effects, an indicator variable that equals one if the person is married, and ten income category fixed effects. Standard errors are clustered at the ethnicity level. The mean (and standard deviation) of Climatic instability is 0.27 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

9. Identifying individuals living with their parents: Including grandparents and grandchildren of three-generation households

The authors also have a comment that is relevant to our analyses that examines whether a foreign language is spoken at home (Table 5) and whether an indigenous language is spoken by Native Americans in the United States (Tables 7 and 9). As we have described, the analysis examines the extent to which these outcomes are affected by the instability of a group's ancestral environment.

In the analyses, we separately report estimates for individuals who do and do not live at home with their parents. To create the living-at-home measure, we used a variable [RELATE] available in the Censuses. The variable reports the status of a respondent to the household head.

If a respondent was reported as being the "Child" of the household head or the spouse, then we recorded the person as living with their parents. If they were, for example, the "Head" themselves, the "Spouse" of the head, the "Sibling" of the head, "Partner," "Sibling," "Friend," etc., then the person was not identified as living with their parents. The estimates we report and the code in the replication files do exactly this, which is what we intended.

The authors argue that our procedure will misclassify cases where the composition of people in the household is exceptional or non-typical. They write that: "for three generation households, the split is incorrect when, for instance, a grandchild of the household head co-resides with at least one of her parents, or when the household also includes a parent of the household head; in these two cases, the grandchild and the household head are incorrectly classified by GN as "Not living with parents"."

As far as we understand, their logic is as follows. If a household head has a child, we identify this child and the fact that they are living with their parents. However, if the head's child also has a child, then there is a parent-child relationship between the child of the household head and the child of the child of the household head (i.e., a grandchild of the household head). They argue that we do explicitly look for these relationships when doing our division of observations into those who live at home and those who do not. Similarly, if the household head's parent is living with the household head, our procedure does not identify the household head as living with their parents.

There are some conceptual issues that arise if one extends the definition in the way proposed by the authors. The first is how clean an analysis is that looks at the grandchild of a household. Our

specification only considers whether the child of a household head speaks a foreign language at home given that the household head does. In cases where the grandchild is present in the home, we do not consider the grandchild in the analysis. If one were to include the grandchild, it is not conceptually clear whether it's their parent (the child of the household) or the household head (grandparent) that would have influence over the grandchild. In many cases, depending on the age of the child, it may be the grandparents. Thus, examining the transmission of tradition from one generation to the next is much less clean when multiple generations live in the same household.

The second issue, which is related, is that a slight complication arises due to the mechanical relationship this induces between an observation (which is a parent-child relationship). For example, in a household that comprises a household head, a child, and a grandchild, there is a mechanical relationship between the household head and child observation and the child and grandchild observation. Given how the data are structured in the analysis, where the dependent variable is whether the child speaks a foreign language at home and a key independent variable is whether the parent speaks a foreign language at home, the same individual will appear in both the dependent and independent variables in the same regression. Clearly, these two observations are mechanically related.

Thus, it is unclear that we will be improving the precision of our estimates if we include grandchildren in our analysis in cases where children in a household have their own children. In any event, cases where there are three generations living in a household are extremely rare, and we don't expect our findings to depend on this decision. To ensure that this is the case, we estimated versions of our estimates that include the third generation in three-generation households. This is done using the additional variables [POPLOC] and [MOMLOC], which report whether the respondent's father or mother (respectively) is living in the household, to determine not only their status relative to the household head but also whether the father or mother was in the same household as the respondent. This is needed to determine, for example, whether a grandchild of the household head was, in fact, the child of a child of the household head.

As noted, because the cases the authors emphasize are quite exceptional, we do not expect that this will qualitatively affect the estimates. To give a sense of the importance of these issues, note that in the sample of the individuals who (via the [POPLOC] variable) report having a father in the household, for 94.76% the father is either the head of the household or the spouse of the

head. Thus, typically structured families are by far the most common in the data. For 2.24%, the father is the parent of the household head. For 1.45%, the father is a partner, friend, or visitor of the household head. For 0.59%, the parent-in-law of the household head; for 0.51%, the child of the household head; for 0.23%, a child-in-law; for 0.08%, the sibling of the household head; for 0.06%, another non-relative, for 0.04% a sibling in law of the household head, for 0.03%, another relative of the household head, for less than 0.00% the grandchild of the household head. The figures for mothers are similar, as well as the figures for the sample from the analysis of Native Americans.[4]

As anticipated, we find that identifying individuals who do and do not live at home using the [POPLOC] and [MOMLOC] variables yields estimates that are nearly identical to those using our procedure. These estimates are reported in Table R31, which reproduces the estimates of Table 5 in the paper.

We also undertake the same exercise of our analysis of whether indigenous populations speak their traditional language at home. These estimates were originally reported in Tables 7 and 9 of the paper. The results using the revised definition of children are reported in Tables R32 and R33 below. As is clear, for all cases, the estimates are very similar and essentially identical in significance and magnitude to our specification. In no case do our conclusions change.

[4]On the mother side, in the sample of the individuals who (via the [MOMLOC] variable) report having a mother in the household, for 90.86% the mother is either the head or spouse, for 5.18% a parent, for 1.61% a parent-in-law, for 1.07% a partner, friend or visitor, for 0.87% the mother is a child, for 0.14% a sibling, for 0.11% a child-in-law, for 0.08% some other non-relative, for 0.05% a sibling in law, for 0.04% another relative, and for less than 0.00% a grandchild. For the Indigenous sample, for 90.29%, the father is either the head or the spouse; for 4.28%, a partner, friend or visitor; for 2.94%, a child; for 0.88%, a child-in-law; for 0.68%, a parent; for 0.25%, a sibling; for 0.22%, some other relative; for 0.16%, a parent-in-law; for 0.15%, a sibling in law; for 0.12%, some other non-relative; and for 0.03%, a grandchild.

Table R31: Speaking a foreign language at home, from Census 2000, broader definition for individuals with fathers or mothers in the household

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking a foreign language at home						
	All 2nd gen+ individuals	Without a father or mother in the household	With a father and/or mother in the household				
Climatic instability	**-0.447*** (0.168)**	**-0.376** (0.170)**	**-0.768*** (0.185)**	**-0.330*** (0.085)**	**-0.337*** (0.092)**	-0.161 (0.124)	-0.144 (0.120)
Father speaks a foreign language				0.505*** (0.029)		0.730*** (0.085)	
Father speaks foreign lang.* Climatic instability						**-0.826*** (0.306)**	
Mother speaks a foreign language					0.513*** (0.033)		0.769*** (0.080)
Mother speaks foreign lang.* Climatic instability							**-0.931*** (0.283)**
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of countries	84	84	84	84	84	84	84
Mean (st. dev.) of dependent variable	0.12 (0.33)	0.11 (0.31)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)	0.23 (0.42)
Observations	3,343,097	2,870,561	472,536	349,959	440,580	349,959	440,580
R-squared	0.294	0.264	0.370	0.547	0.566	0.550	0.569

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person speaks a foreign language at home. All specifications include the following control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean (and standard deviation) of Climatic instability is: 0.32 (0.07). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R32: Indigenous populations speaking their traditional language at home, broader definitions for individuals with mother or father in the household

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Without a mother or father in the household	With a mother or father in the household				
Climatic instability	**-1.097*** (0.358)**	**-1.232*** (0.412)**	**-0.920*** (0.293)**	**-0.299** (0.130)**	**-0.255** (0.109)**	-0.110 (0.084)	-0.090 (0.071)
Father speaks an Indigenous language				0.424*** (0.034)		0.594*** (0.050)	
Father speaks an Indigenous lang. * Climatic instability						**-0.744*** (0.198)**	
Mother speaks an Indigenous language					0.436*** (0.025)		0.585*** (0.038)
Mother speaks an Indigenous lang. * Climatic instability							**-0.657*** (0.180)**
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	79	76	78	76	78
Number of clusters (grid cells)	40	40	40	40	40	40	40
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.20 (0.40)	0.19 (0.39)	0.20 (0.40)	0.19 (0.39)
Observations	127,996	73,774	54,222	28,597	40,309	28,597	40,309
R-squared	0.334	0.390	0.283	0.452	0.465	0.457	0.469

Notes: OLS estimates are reported with standard errors clustered at the climatic grid cell level in parentheses. The unit of observation is a person who identifies as Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11). *, ** and *** indicate significance at the 10, 5 and 1% levels.

Table R33: Drought severity and speaking an indigenous language at home, broader definition for individuals with mother or father in the household

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dep variable: Indicator for speaking an Indigenous language at home						
	All individuals	Without a mother or father in the household	With a mother or father in the household				
	Panel A. Ancestral instability of the first moment of PDSI						
Climatic instability (PDSI)	**-0.789*** **	**-0.891*** **	**-0.656*** **	**-0.255*** **	**-0.214*** **	-0.067	-0.073
	(0.281)	**(0.333)**	**(0.217)**	**(0.071)**	**(0.063)**	(0.051)	(0.049)
Annual standard deviation (PDSI)	0.595***	0.658**	0.511***	0.236***	0.208***	0.091	0.092*
	(0.225)	(0.259)	(0.183)	(0.071)	(0.059)	(0.054)	(0.048)
Father speaks an Indigenous language				0.416***		-0.138	
				(0.032)		(0.126)	
Father speaks Indigenous lang. * Climatic instability (PDSI)						**-0.576** **	
						(0.215)	
Father speaks Indigenous lang. * Annual st. dev. (PDSI)						0.416***	
						(0.061)	
Mother speaks an Indigenous language					0.430***		-0.062
					(0.022)		(0.106)
Mother speaks Indigenous lang. * Climatic instability (PDSI)							**-0.497** **
							(0.210)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.363***
							(0.059)
R-squared	0.334	0.388	0.285	0.456	0.469	0.472	0.480
	Panel B. Ancestral instability of the second moment of PDSI						
Climatic instability of annual standard deviation (PDSI)	**-2.294** **	**-2.540** **	**-1.969** **	**-0.802** **	**-0.689** **	-0.230	-0.261
	(1.084)	**(1.222)**	**(0.907)**	**(0.391)**	**(0.326)**	(0.222)	(0.196)
Annual standard deviation (PDSI)	0.808***	0.897**	0.693***	0.309***	0.275***	0.106	0.112*
	(0.296)	(0.340)	(0.241)	(0.104)	(0.086)	(0.069)	(0.060)
Father speaks an Indigenous language				0.413***		-0.197**	
				(0.031)		(0.080)	
Father speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)						**-2.518*** **	
						(0.775)	
Father speaks an Indigenous lang. * Annual st. dev. (PDSI)						0.727***	
						(0.140)	
Mother speaks an Indigenous language					0.428***		-0.106
					(0.022)		(0.064)
Mother speaks Indigenous lang. * Climatic instability of annual st. dev. (PDSI)							**-2.376*** **
							(0.642)
Mother speaks an Indigenous lang. * Annual st. dev. (PDSI)							0.664***
							(0.120)
R-squared	0.336	0.389	0.288	0.457	0.469	0.473	0.481
	Both Panels						
Ethnicity-level controls	yes	yes	yes	yes	yes	yes	yes
Individual controls	yes	yes	yes	yes	yes	yes	yes
Number of ethnic groups	82	82	78	75	77	75	77
Number of clusters (grid cells)	80	80	76	73	75	73	75
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.20 (0.40)	0.19 (0.39)	0.20 (0.40)	0.19 (0.39)
Observations	127,977	73,767	54,210	28,593	40,300	28,593	40,300

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specifications include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. For panel A, the mean (and standard deviation) of Climatic instability is 0.58 (0.20). For panel B, the mean (and standard deviation) of Climatic instability of the annual standard deviation is 0.35 (0.12). *, ** and *** indicate significance at the 10, 5 and 1% levels.

10. Conclusions

The final paragraph of Bertoli et al. (n.d.) asserts that for some of the individual-level analysis of Giuliano and Nunn (2021): "Correcting the various coding and factual mistakes considerably weakens the evidence of a negative association between ancestral climatic variability and the importance of tradition." This statement is not correct. None of the results reported in the paper, nor the replication files contain coding mistakes. The replication files are complete. All of the data needed to produce the estimates are provided, and they reproduce the estimates of the tables.

Although framed differently by the authors, their comments amount to suggestions of alternative specifications – primarily, different inclusion criteria for observations – in our baseline analysis. These include: omitting rural areas, omitting individuals under five, omitting individuals under 16, omitting the 1930 Census, omitting unmarried partners, omitting individuals of immigrant origin, and adding grandchildren or grandparents living in three-generation households when looking at parents and their children.

We have taken the opportunity in this note to explain the extent to which each proposed alternative is misguided and/or specious compared to our baseline specification. Beyond this, even in cases where the alternative specifications are clearly wrong, for transparency, we also reproduce all relevant tables, in full, after implementing the proposed changes of the authors. For all changes, the conclusions from the original paper still hold. Overall, we find that the conclusions derived from the estimates remain robust and the findings from the paper unaltered. The body of evidence shows that greater ancestral climatic instability is associated with less importance placed on tradition and less cultural persistence today.

References

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