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Smart and Poor, or Rich and Dull? A U.S. County-Level Analysis of the Relationship between IQ and Presidential-Election Voting Behavior

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A small research stream exists which focuses on relationships between political ideology (inferred from voting behavior) and the intelligence of geopolitical sub-divisions such as the 50 U.S. states. With U.S. state-level data, IQ scores positively predict votes cast for Democrats, but only when controlling for state racial composition. Here, however, we explore the relationship between IQ and voting behavior at the level of U.S. counties (approx. n = 3,100). We find that county-level IQ weakly predicts more votes cast for Republicans (r's .07 to .13) and less votes cast for Democrats (r's -.10 to -.14). These small relationships are also found in multiple regression analyses, even when demographic data, social status, and population density appear as covariates (3 - 4% points more votes cast for Republicans per standard deviation of IQ). The effect of general social status was opposite that of intelligence (6 - 9% points less votes cast for Republicans per standard deviation of social status), which is surprising considering the very strong positive correlation (r = .77) between IQ and social status. Additionally, racial homogeneity by itself predicts voting Republican; however, when other variables are present in the regression model, homogeneity predicts voting Democrat. Results indicate that aggregate-level relationships between intelligence and voting outcomes are more complex than previously thought.

Key Words: USA, Voting, Counties, Democrat, Republican, Intelligence

The relationship between cognitive ability and political opinion has received increased research attention in recent years. Perhaps unsurprisingly, most of this work has focused on voting behavior within the United States, examining mean cognitive ability levels of Republican versus Democrat voters, and self-identified liberals versus conservatives (Caplan & Miller, 2010; Carl, 2014a,b, 2015a,b; Ganzach, 2016, 2017, 2018; Ganzach, Hanoch & Choma, 2019; Kemmelmeier, 2008; Kirkegaard, Bjerrekær & Carl, 2017; Lewis & Bates, 2018; Ludeke & Rasmussen, 2018; Meisenberg, 2015; Onraet et al., 2015; Oskarsson et al., 2015). In this literature, usually no large gaps exist between the mean IQs of supporters of different parties. When smaller gaps are found, however, the center parties are somewhat favored by those with higher IQs. In the United States, only very small differences exist between the mean IQs of Republican versus Democrat voters. The direction of this effect depends both on which covariates (race, education, income, etc.) appear in the models, and on which time period the data are from.

When studies use one-dimensional scales with self-placement, sometimes small IQ advantages (about 2-3 IQ points) are seen for "liberals" (in the left-wing, U.S. sense) over conservatives. Moderates, independents, and centrists usually score lower than both liberals and conservatives by about four to five IQ points. This finding could be related to the fact that moderates are generally not strongly interested in politics, and IQ correlates with political interest and participation (r = .20 to .30; Deary, Batty & Gale, 2008; Kirkegaard & Bjerrekær, 2016). In the case of voters and nonvoters, the gap is about 5-10 IQ points (Carl, 2019).

If one instead opts for more fine-grained measures of political ideology, then more complex patterns emerge. One common approach splits political opinions into two scales that are theoretically independent, though not necessarily empirically uncorrelated: economic liberalism / freedom, and social liberalism / freedom (Nolan chart). The former is concerned with the role of the state in the economy (e.g., how much tax, which tax forms, government interventions, regulations, etc.). The latter is concerned with various social and cultural freedoms (e.g., gay marriage, drug legalization/regulation, prostitution, etc.). The two scales, though, are usually found to be somewhat correlated. For example, Carl (2015a) reported a positive correlation of r = .36 between the two scales in a large U.S. sample, but Kirkegaard, Bjerrekær and Carl (2017) found only a correlation of .07 in a smaller sample of approximately 250 Danes. This is somewhat unexpected because at the party level, the two dimensions are often negatively correlated in Western countries, such that parties favoring less government influence in the economy also favor many limits on social behavior, and vice versa. However, this finding seems to depend on political context

because the pattern is apparently reversed in China and many ex-communist, Eastern European countries (de Regt, Mortelmans & Smits, 2011; Malka et al., 2014, 2019; Pan & Xu, 2017).

Aside from individual-level analyses, some studies look at voting behaviors across geo-political divisions of nations. Carl (2018) analyzed data from the United Kingdom at two levels: 11 regions and 372 local authorities. He found that economic liberalism was positively related to the mean IQs of the units (r = .70 and .33 for regions and local authorities, respectively). However, Carl (2018) also found that IQ's relationship to social liberalism was only weakly positive (r = .21 and .12, for regions and local authorities, respectively). Thus, it appears that the strength but not the direction of the association strongly depends on the level of analysis.

For the United States, both Pesta (2017), and Pesta and McDaniel (2014) explored state-level relationships between "well-being", IQ, and voting behaviors for all presidential elections held this century. They found in all elections nonsignificant, bivariate correlations between state IQ and votes cast for either Republicans or Democrats. However, when race variables (i.e., percent White, Black, or Hispanic) also appeared in the regression equations, state IQ moderately-to-strongly predicted votes cast for Democrats.

For the USA, data also exist for voting behaviors at the county level (N = approximately 3,100 counties). However, no published studies have looked at U.S. county-level relationships between IQ and voter behavior. Hence, the purpose of the present study is to close the gap in this literature by conducting such a study.

Data and methods

Intelligence

We coded data from the Stanford Education Data Archive (SEDA; Reardon et al., 2018), available at https://cepa.stanford.edu/seda/overview. SEDA comprises a massive amount of cognitive testing data from many sources, including NAEP and state tests that have been normed to the same scale. Data are available at the county level for the years 2009-2015. The scores correlated .77 on average between these years. We therefore averaged the scores across years and subjects tested (language and math) to produce a single best estimate for each county. Note that our measure correlated .86 with IQ estimates from a previous study (Kirkegaard, 2016), which was based on partially overlapping data. The IQ variable was standardized to a 0/1 scale (mean/SD). Figure 1 shows a map of the distribution of average intelligence across counties in the United States.

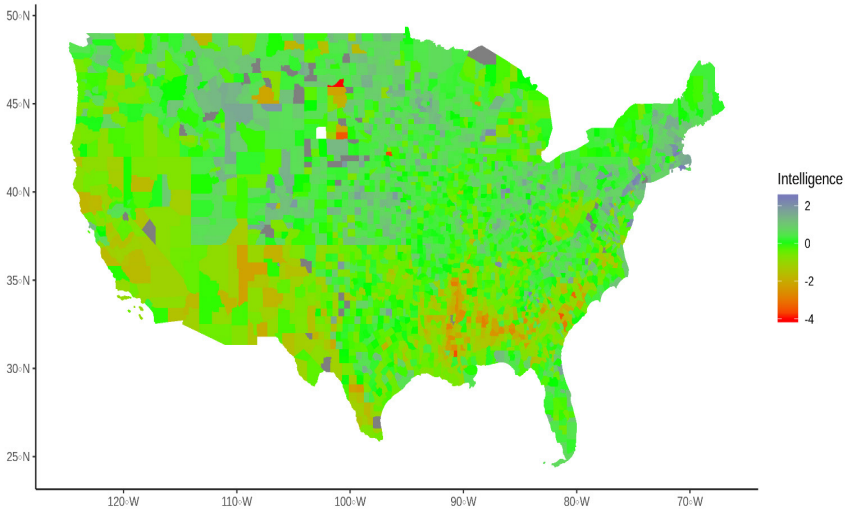

Figure 1. *Map of average county intelligence in the United States (Hawaii and Alaska not shown but included in all analyses), n = 3,085. The holes represent missing data.*

Political outcomes

The New York Times (2016) published voting results by U.S. county for the 2008, 2012, and 2016 presidential elections. They reported the percent of votes cast in each county for the Democrat, Republican, Libertarian and Green Party candidates. The Green Party, however, had missing data for about 500 counties where the Green Party candidate did not run. Figure 2 shows the distribution of percent Democrat votes by U.S. county.

Covariates

We used the extensive set of covariates compiled by Kirkegaard (2016). These were compiled by merging various public U.S. surveys, with the majority of the data coming from the American Community Survey (ACS, https://www.census.gov/programs-surveys/acs). We also used Kirkegaard's (2016) scores for the general socioeconomic status (SES) factor (S factor). This variable is a composite formed by factor analyzing 27 diverse indicators of well-

being (e.g. teen birth rate, proportion with at least a bachelor's degree, smoking rate, income Gini coefficient). The variable was standardized to a 0/1 scale (mean/SD). Finally, we computed a racial homogeneity score for each county based on the probability that two randomly chosen persons will be from the same race or ethnic group (known as the Simpson or Herfindahl index).

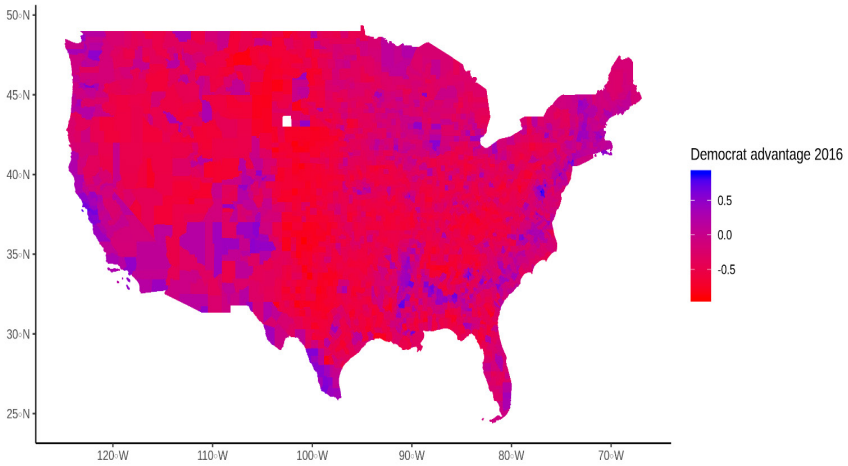

Figure 2. *Map of the percent Democrat vote in the 2016 election by U.S. county (Hawaii and Alaska not shown but included in all analyses), n = 3,111. The holes represent missing data.*

Spatial data

As an additional control variable, we used publicly-available spatial data (shapefile) from https://catalog.data.gov/dataset/tiger-line-shapefile-2017-nation-u-s-current-county-and-equivalent-national-shapefile. This file contains the borders of all US counties. We computed population density using the spatial data and the population counts in the covariate datafile. The density variable was extremely skewed, so the log10 value was taken and normality was achieved.

The study was analyzed in R (3.6.1). All code and data are available for reuse in the supplementary materials file. The R notebook is available at

https://rpubs.com/EmilOWK/248961. We used the square root of population size as weights in line with previous research (Fuerst & Kirkegaard, 2016). We also outputted the unweighted versions, which are available in the supplementary materials file. Results here were very similar to those found when using weights.

Analysis

Table 1 shows bivariate correlations between all study variables. It can be seen that there are strong correlations between many of them. Of particular interest are moderate negative correlations between intelligence and percent Democrat voting, and the reverse for percent Republican voting. Third party data were not available for 2008 and 2012 (and these were normalized too for Democrat/Republican vote share), but in 2016 the correlations between vote share for these and IQ were positive as well.

Table 1. *Correlation matrix of main variables for ~3100 US counties. Weighted by square root of population size.*

	IQ	S	White	Black	Hisp.	Asian	Amer.	Other	Homog.
S	0.77	1.00							
White	0.53	0.37	1.00						
Black	-0.46	-0.52	-0.58	1.00					
Hispanic	-0.25	-0.08	-0.67	-0.09	1.00				
Asian	0.13	0.32	-0.41	0.01	0.25	1.00			
Amerindian	-0.23	-0.17	-0.18	-0.10	-0.03	-0.06	1.00		
Other	-0.02	0.12	-0.20	-0.08	0.02	0.52	0.18	1.00	
Homogeneity	0.37	0.20	0.86	-0.56	-0.49	-0.49	-0.08	-0.28	1.00
Dem16 frac	-0.11	0.07	-0.65	0.45	0.33	0.53	-0.01	0.19	-0.58
Dem12 frac	-0.14	0.02	-0.54	0.39	0.23	0.44	0.03	0.18	-0.43
Dem08 frac	-0.10	0.06	-0.47	0.33	0.20	0.43	0.03	0.18	-0.37
Rep16 frac	0.07	-0.14	0.61	-0.38	-0.33	-0.53	-0.01	-0.22	0.55
Rep12 frac	0.13	-0.04	0.52	-0.37	-0.23	-0.45	-0.03	-0.19	0.42
Rep08 frac	0.09	-0.08	0.45	-0.31	-0.20	-0.43	-0.03	-0.18	0.34
Green16 frac	0.09	0.35	-0.07	-0.25	0.13	0.38	0.16	0.44	-0.11
Libert16 frac	0.29	0.46	0.23	-0.48	0.05	0.03	0.18	0.19	0.18
Pop. density	0.18	0.23	-0.34	0.28	0.16	0.49	-0.25	0.10	-0.45

	Dem16 frac.	Dem12 frac.	Dem08 frac.	Rep16 frac.	Rep12 frac.	Rep08 frac.	Green16 frac.	Libert16 frac.
S								
White								
Black								
Hispanic								
Asian								
Amerindian								
Other								
Homogeneity								
Dem16 frac	1.00							
Dem12 frac	0.96	1.00						
Dem08 frac	0.93	0.98	1.00					
Rep16 frac	-0.99	-0.94	-0.92	1.00				
Rep12 frac	-0.95	-1.00	-0.99	0.94	1.00			
Rep08 frac	-0.92	-0.98	-1.00	0.92	0.98	1.00		
Green16 frac	0.45	0.47	0.49	-0.51	-0.50	-0.51	1.00	
Libert16 frac	-0.01	0.00	0.06	-0.08	-0.03	-0.07	0.47	1.00
Pop. density	0.64	0.54	0.52	-0.62	-0.53	-0.51	0.17	-0.07

Results from bivariate analysis are of course possibly confounded with other factors, and we see strong correlations between intelligence and other variables in the table, especially general social status (S), and many of the demographic variables. Thus, multivariate analysis is warranted to clarify possibly causal relationships. Table 2 shows the regression results.

The results show multiple things of interest. First, despite the very strong correlation between intelligence and general social status ($r = .77$, cf. Table 1), we see that they have *opposite* signs in the regression models. Furthermore, IQ is a positive predictor for Republicans, but negative for others, including third parties, though the effect size for them is quite small. The effect size for Republicans against Democrats is sizable at 2.5 to 4.3% points gain / loss per standard deviation increase in county IQ. Moreover, social status is a quite potent predictor of votes cast for Democrats, with an effect size of about 6 to 7% points, and -6 to -9% points for Republicans. The effects of demographic variables are also substantial. The percent of Blacks within a county predicts more Democrat votes which is unsurprising because Blacks generally vote about 90% Democrat (www.ropercenter.cornell.edu/how-groups-voted-2016). The effect size is approaching ±1% point, meaning that a 1% point increase in the Black population results in about a 1% point increase in the percent of votes cast for Democrats.

Table 2. *Regression model results for U.S. county-level presidential elections. N = 3,058-3,059. Intelligence and S are standardized (0/1 mean/SD), demographic memberships are proportions (i.e. 0-1 range). S = general social status based on up to 27 indicators. Weighted by the square root of population size. Values in parentheses are standard errors. * = p < .01.*

		Outcome							
		Dem16	**Dem12**	**Dem08**	**Rep16**	**Rep12**	**Rep08**	**Green16**	**Lib16**
Predictor	IQ	-0.025 (0.004)*	-0.039 (0.004)*	-0.038 (0.004)*	0.033 (0.004)*	0.042 (0.004)*	0.041 (0.004)*	-0.003 (0.000)*	-0.002 (0.000)*
	S	0.072 (0.003)*	0.061 (0.004)*	0.058 (0.004)*	-0.091 (0.004)*	-0.064 (0.004)*	-0.060 (0.004)*	0.003 (0.000)*	0.009 (0.000)*
	Black	0.978 (0.025)*	0.878 (0.028)*	0.768 (0.028)*	-0.956 (0.027)*	-0.855 (0.029)*	-0.747 (0.028)*	-0.004 (0.001)*	-0.018 (0.003)*
	Hisp.	0.579 (0.019)*	0.485 (0.022)*	0.432 (0.021)*	-0.600 (0.021)*	-0.480 (0.022)*	-0.421 (0.022)*	0.004 (0.001)*	0.015 (0.002)*
	Asian	1.221 (0.067)*	1.154 (0.075)*	1.129 (0.074)*	-1.115 (0.072)*	-1.200 (0.077)*	-1.180 (0.075)*	0.009 (0.004)	-0.097 (0.008)*
	Amer.	0.912 (0.043)*	0.906 (0.049)*	0.847 (0.048)*	-0.979 (0.046)*	-0.898 (0.050)*	-0.835 (0.049)*	0.027 (0.003)*	0.052 (0.005)*
	Other	0.603 (0.154)*	0.802 (0.172)*	0.623 (0.169)*	-0.958 (0.163)*	-0.758 (0.176)*	-0.573 (0.172)*	0.119 (0.010)*	0.260 (0.018)*
	Homog.	0.365 (0.019)*	0.480 (0.022)*	0.479 (0.021)*	-0.377 (0.021)*	-0.482 (0.022)*	-0.486 (0.022)*	0.005 (0.001)*	0.003 (0.002)
	Dens.	0.085 (0.003)*	0.077 (0.003)*	0.074 (0.003)*	-0.084 (0.003)*	-0.075 (0.004)*	-0.072 (0.003)*	0.001 (0.000)*	0.000 (0.000)
	R^2 adj.	0.70	0.53	0.48	0.67	0.51	0.46	0.34	0.39

Hisp., Hispanic; Amer., Amerindian; Homog., homogeneity; Dens., density.

For Hispanics, Amerindians (Native Americans), and Others, it works about the same way despite the fact that these groups have sizable proportions who vote Republican. Curiously, the percent of Asians in a county has an effect size *above* the ±1% point, which may seem impossible. This suggests that Asians convert nearby voters to Democrats away from Republicans. We currently have no non-speculative explanation for this effect.

Next, homogeneity, defined as the chance that two randomly picked persons are from the same racial group, strongly predicts votes cast for Democrats. Thus, it appears that (assuming causality), holding the other covariates constant, increasing the diversity share of a county leads to fewer Democrat votes and more Republican votes. This is surprising because the correlation between homogeneity and Democrat votes is strongly negative at r = -.37 to -.58 (cf. Table

1). There is also a very strong suppression effect at play here, which has been found previously for these kind of data (Pesta, 2017; Pesta & McDaniel, 2014). Suppression probably results from opposite-signed direct and indirect paths, where some of the indirect effect is mediated by another predictor in the model. Finally, the results for third parties were quite weak in comparison and have only limited interest, so are not discussed further.

Discussion

Intelligence is indeed related to voting outcomes at the U.S. county level. Specifically, we found that higher intelligence predicts support for non-Democrat parties in bivariate analysis. When covariates are introduced, this relationship is still found but only for the Republicans versus third parties. These results are interesting considering that previous studies, using state-level data, found that higher IQ predicted more votes for Democrats (Pesta, 2017; Pesta & McDaniel, 2014), whereas we find the opposite here. Furthermore, individual level results generally find little relationship between intelligence and voting for either Democrats or Republicans, especially when covariates are present (Ganzach, 2016; Meisenberg, 2015). Conversely, here, the effect size for votes cast for Republicans was not trivial. Specifically, a one standard deviation increase in intelligence was associated with 3-4% points more support for the Republican candidate. On the other hand, general social status (S) predicted support for the Democrat candidate at an even greater magnitude, 6-7% points. The opposite signs of the two predictors is surprising considering that they are very strongly positively correlated (r = .77). Also of interest was that racial homogeneity predicted Republican support in bivariate analysis (r = .34 to .55), but predicted Democrat support in multiple regression (betas -0.38 to -0.48). The reversal of direction of predictors and the contrast to prior studies are curious and perhaps alarming since they seem to suggest that suppression effects are particularly strong in this area of research, and that aggregation paradoxes (Simpson's paradox) — where results at one level of analysis are inconsistent in direction with those at a different level — are perhaps common.

An interesting trend seen in the model comparisons is that the model fits seemingly increased over time, from about .46-.48 in 2008 to .67-.70 in 2016. This indicates that voting behavior has become more predictable from county-level data, which suggests that political polarization of demographic groups is increasing. There is in fact good evidence for such increased polarization, which mainly results from the left moving further left, while the right remaining approximately the same (Goldberg, 2019a, 2019b; Kaufman, 2019). However, caution is advised because we only have three elections in the dataset, and

because some of the covariate data are closer to 2016 than to 2008 in age. While the social variables are available for many decades, the currently available intelligence data only span 2009 to 2015, so it is not now possible to go back further in time to cover additional elections at the U.S. county level.

Limitations and Conclusion

First, we did not have data disaggregated by race for voting behavior, so it was not possible to see how effects might differ specifically by the race of the voter. Second, the study was cross-sectional, so causality can be backwards for the variables we considered. Longitudinal data are available for some of the variables, so they could be used in a future study to better answer causality questions. Of course, studies of this kind suffer from potential omitted variable bias, and this may have affected our findings. Finally, we must be careful not to commit the ecological fallacy here. The effects we observed using aggregate-level data may not also be found at the level of the individual voter. Aggregate-level results often differ from individual-level results (see, e.g., Robinson, 1950)

Nonetheless, we found that at the U.S. county level, intelligence predicts votes cast for Republicans, and this effect persists even when various controls are added in regression models. The pattern we report here is exactly opposite that reported by both Pesta (2017), and Pesta and McDaniel (2014), who found that intelligence predicted votes cast for Democrats (after controlling for race), albeit using U.S. state-level data. These authors also reported very strong suppression effects, which we found here as well. Why results differ for U.S. counties versus states is a puzzle that future research should seek to solve.

Supplementary materials

See https://osf.io/rh4da/, and for code output, see https://rpubs.com/EmilOWK/248961.

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