More than g: Verbal and performance IQ as predictors of socio-political attitudes

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Abstract

Measures of intelligence predict socio-political attitudes and behaviors, such as liberalism, religiosity, and voter turnout. Little, however, is known about which cognitive abilities are responsible for these relationships. Employing several cohorts from the Minnesota Center for Twin and Family Research, we test the predictive performance of different broad abilities. Using multiple regression to compare verbal and performance IQ from Wechsler intelligence tests, we find verbal IQ more strongly predicts voter turnout, civic engagement, traditionalism, and measures of ideology. On average, the correlation between verbal IQ and our socio-political attitudes is twice as large as that of performance IQ. The same pattern appears after controlling for education and after performing the analysis within sibling pairs. This implies that the relationship cannot be entirely mediated through education, nor entirely confounded by upbringing. Positive and negative controls are employed to test the validity of our methodology. Importantly, we find verbal and performance IQ to be equally predictive of the ICAR-16, a distinct measure of general intelligence. The results are consistent with verbal ability being as important as general intelligence in the relationship between test scores and socio-political attitudes. The role of verbal ability in influencing attitudes may help to explain the ideological leanings of specific occupations. Its association with turnout and civic engagement suggests that those with a verbal tilt may, for better or worse, have greater influence over politics and society.

Keywords:
Group factors, Verbal ability, Religiosity, Ideology, Voter turnout

For at least a century, research has found intelligence to correlate with a vast range of socio-political attitudes. Meta-analyses have indicated that intelligence is associated with left-wing political attitudes (Onraet et al., 2015), that it may have a small correlation with right-wing economic attitudes (Jedinger and Burger, 2022), and that it predicts less religiosity (Zuckerman et al., 2013, 2020; Dürlinger and Pietschnig, 2022). Many other attitudes have been correlated with intelligence, but not yet meta-analyzed, such as vote choice (Ludeke and Rasmussen, 2018), voter turnout (Deary et al., 2008b; Hauser, 2000), civic engagement (Dawes et al., 2015; Hauser, 2000), and more narrow aspects of ideological belief such as attitudes towards tolerance (Lasker and McNaughton, 2022), free speech (De keersmaecker et al., 2021), and anti-racism (Deary et al., 2008a). Voting could be considered a behavior, rather than an attitude. Likewise, religiosity often includes the behavior of attending religious services. For simplicity, we refer to behaviors, beliefs and opinions as socio-political attitudes.

Whilst there is no consensus for why any of these relationships exist, causally informative designs suggest that intelligence influences socio-political attitudes. The relationships have proven robust to controls for putative confounds and mediators, with education being frequently controlled for. Intelligence measured in childhood predicts socio-political attitudes later expressed in adulthood (Deary et al., 2008a). Within-family designs indicate that the correlations are not due to confounding with upbringing (Ganzach and Gotlibovski, 2013; Ahlskog and Oskarsson, 2022). Behavioral-genetic methods, such as twin models (Dawes et al., 2014, 2015; Oskarsson et al., 2014; Bell et al., 2020) and the use of polygenic scores (Aarøe et al., 2020; Ahlskog et al., 2022; Ahlskog, 2022, 2023; Dawes et al., 2021; Edwards et al., 2024), indicate that the correlations cannot be solely explained by environmental confounding. The relationships hold at the genetic level.

The missing gap in our knowledge is an understanding of how and why intelligence shapes attitudes. An appreciation of which cognitive abilities drive the association might shed light on the mechanisms by which intelligence influences social attitudes.

Spearman (1904) discovered that different measures of cognitive abilities all correlated positively, the latent factor of which psychologists call general intelligence, g. Broad factors other than g are often called "group factors" because each one is measured by a limited group or cluster of

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tests rather than all tests in general[1]. There is no consensus about the correct structure of intelligence, including general and group factors at various levels. However, all taxonomies, to some degree, feature abilities corresponding to verbal ability and a spatial or "performance" ability (Carroll, 1993; Johnson and Bouchard, 2005).

The positive correlation among intelligence tests means that any measurement of cognitive ability will capture g, a phenomenon known as Spearman's indifference of the indicator (Spearman, 1927, pp. 197–198). However, this does not mean that all measures of broad abilities will have the same effect on socio-political attitudes; group factors may have a role to play.

A few social commentators have stereotyped verbal ability as being especially correlated with socio-political attitudes, such as left-wing views and political participation. In general, these are right-wing thinkers protesting the influence of verbally skilled individuals whom they believe to be disproportionately left-wing. The most articulate example might be the philosopher Robert Nozick.

Nozick (1998) argued that "intellectuals" tend to hold more anti-capitalist beliefs. He defined intellectual not as "all people of intelligence or of a certain level of education, but those who, in their vocation, deal with ideas as expressed in words, shaping the word flow others receive," whom he dubbed "wordsmiths." By contrast, those who communicate their work quantitatively, "the numbersmiths," and those whose work relied on visuospatial ability, such as "painters, sculptors, [and] cameramen," Nozick did not suppose to be particularly left-wing.

Among other reasons, Nozick's primary explanation for this association was that the wordsmiths feel entitled to success given their performance at school, and become envious when seeing the greater successes of those with different cognitive abilities. For example, an English professor who performed well in school might feel entitled and envious of his old classmates who find great social and economic successes in finance or software engineering. Explicitly, Nozick declared that verbal ability was more important in the school than in the economy: "the wider market society, however, taught a different lesson. There the greatest rewards did not go to the verbally brightest." This entitlement and envy may foster resentment against society.

Regardless of whether Nozick's theory is correct, his stereotype does appear to be accurate. Occupations that deal with the verbal discussion and transmission of socio-political attitudes, such as journalists (Weaver et al., 2019) and academics (Langbert, 2018), do seem to be more left-wing than the general population. Among academics, those who study a field relying more on verbal ability than mathematical ability tend to lean more left-wing (Bronski and Kirkegaard, 2024). This stereotype poses the question of whether verbal ability influences socio-political attitudes over and above g.

To our knowledge, Ludeke et al. (2017) provide the most serious analysis of which cognitive abilities are responsible for the correlation between scores on intelligence tests and socio-political attitudes. In two cohorts, with a combined sample size of 1124 individuals, the authors predict attitudes on a liberalism scale and support for a liberal political candidate with verbal and performance IQ. When employing both IQ measures in the same model, they found the verbal IQ was a significant predictor of liberalism, but performance IQ was not, suggesting it may be verbal abilities that are responsible for the link between intelligence and liberalism.

Results from Heaven et al. (2011) were similar to those of Ludeke et al. (2017). The researchers had the scores of 375 Australian students on curriculum based verbal and numerical tests, taken when they were approximately 12 years old. At around 17, the students were given questionnaires measuring right-wing authoritarianism, social dominance orientation and religious values. Sum scores of the verbal and numerical tests equally correlated with religious values. However, verbal ability was more strongly correlated with social dominance orientation ($r = -.15$), compared to numerical ability ($r = -.03$). Likewise, it was more strongly correlated with right-wing authoritarianism ($r = -.26$), compared to numerical ability ($r = -.19$).

The Onraet et al. (2015) meta-analysis of right-wing political attitudes found that studies using the broad ability of comprehension-knowledge have a moderate effect size ($r = -.26$), whilst fluid ability ($r = -.15$), short-term memory ($r = -.13$), and processing speed ($r = -.13$) have smaller effect sizes. This appears congruent with the findings of Ludeke et al. (2017), but must be interpreted with some caution. Moderators in meta-analyses can be confounded with other study-specific factors.

Among political scientists, there is some suggestion that verbal ability might be especially related to voting. The popular "resource model" (Holbein and Hillygus, 2020, pp. 30) assumes that civic engagement is a costly activity. For example, volunteering requires time and donating to political parties requires wealth. Given the strong predictive role of intelligence and education (Nie et al., 1996; Verba et al., 1996), the key cost to voting is thought to be cognitive. Qualitative interviews with young people Holbein and Hillygus (2020), suggest registering to vote, knowing what form of ID to use, and making time available on election day can all be difficult challenges. Political scientists have characterized these challenges as requiring verbal abilities (Verba et al., 1996; Holbein and Hillygus, 2020), but statistical evidence for this claim has often been more suggestive than definitive.

Hillygus (2005) found that scores on the verbal SAT predicted more voting ($p < .05$), whilst scores on the math SAT predicted less voting ($p < .05$). She suggested this was because verbal ability makes it easier for individuals to

[1] In this paper we use the term *group factor* to mean a factor orthogonal to g. In the context of the hierarchical factor model with g at the top level, this means the residual of a factor at the immediately lower level.

engage in political activity and debate. Denny and Doyle (2008), using multiple regression, found a verbal comprehension task significantly predicted voting ($p < .05$), whilst non-verbal, mathematical, and a measure of "verbal ability" were not significant. Their verbal ability task involved matching words which were linked semantically, logically, or phonologically. Weinschenk and Dawes (2020) analyzed the effects of general intelligence on voting, but in a footnote they mentioned verbal and mathematical subtests appeared to affect voting in different directions. Dawes et al. (2015), using the Minnesota Twin and Family Study, find verbal IQ correlates with self-reported voting ($r = .23$) much more highly than performance IQ ($r = .06$).

In our study, we use Wechsler intelligence tests to examine whether group factors matter for socio-political attitudes. The goals of our study are fourfold. Firstly, we wish to see if the importance of verbal over performance IQ for left-right views found by Ludeke et al. (2017) replicates. Secondly, we employ many subtests to examine whether more narrow abilities drive the relationship between intelligence and socio-political attitudes. Thirdly, we test whether group factors matter for a wide range of attitudes, covering not only liberalism, but also religiosity, traditionalism, self-reported and validated voter turnout, civic engagement, and a range of ideological beliefs. Finally, we rerun our analyses with causally informative designs, such as controls for education and family fixed effects, to discern more clearly whether group factors play a causal role in influencing socio-political attitudes.

Data

We used data from two cohorts collected by the Minnesota Center for Twin and Family Research as (Iacono et al., 2006; Wilson et al., 2019). These were the Minnesota Twin and Family Study (MTFS) and the Sibling Interaction and Behavior Study (SIBS). The MTFS sample was initiated in 1990 and sought to recruits same-sex twins born in Minnesota who were either 11 or 17 years old. The research center used state birth records to identify these siblings. They were able to identify over 90% of the twins and recruited 83% of them, yielding 1383 families. In 2000 the MCTFR increased the sample size of MTFS by recruiting an additional 500 twin families, for which the twins were then 11 years old.

The SIBS study recruited biological families and adoptive families, where one or more children were adopted, between 1998 and 2003 (McGue et al., 2007). The MCTFR worked with adoption agencies to find adoptive families and recruit them to the study. Eligibility requirements for the adoptive families included having at least one adopted child between the ages of 11 and 21 and having one other child who was unrelated to the adoptee, although they may also be adopted themselves. All adoptees were placed with their foster parents before the age of two. Birth records were used to recruit biological families, chosen to be representative of Minnesota and to be of similar age to the siblings in the adoptive families. In total, 409 adoptive and 208 biological families were recruited into the sample.

Many of the variables used in this study were taken at different follow-ups of the cohorts, and some are only given in the SIBS sample. This makes it difficult to provide a simple description of the sample. In Table 1 we give basic summary statistics, corresponding to the regression analyses of a few key dependent variables. Self-reported ethnicity is recorded in the MCTFR. The samples predominantly identify as European, but there are many Korean adoptees in the SIBS sample. For simplicity, we code ethnicity as European, Asian, and other. The same summary statistics are given for all the main regression models in the supplementary materials held in this study's OSF page.

Table 1: Demographics

Cohort	Age (SD)	Female %	European N	Asian N	Other N
Dependent Variable: Voted in Presidential Elections					
MTFS Twin	27.6 (3.3)	51.7	1108	5	28
MTFS Parent	53.1 (7.0)	54.7	2080	5	38
SIBS	22.3 (1.7)	60.3	119	102	9
SIBS Parent	51.9 (4.8)	91.0	380	2	6
Dependent Variable: Religiosity					
MTFS Twin	29.2 (0.6)	52.4	1020	10	29
MTFS Parent	—	—	—	—	—
SIBS	31.9 (2.7)	61.3	347	242	30
SIBS Parent	64.4 (4.7)	92.7	270	1	4
Dependent Variable: Social Liberalism					
MTFS Twin	—	—	—	—	—
MTFS Parent	—	—	—	—	—
SIBS	32.0 (2.8)	60.7	410	290	33
SIBS Parent	64.5 (4.7)	92.4	323	2	4

Note: Age for presidential voting is taken from participants' age on the date of the 2004 presidential election.

Measures of Cognitive Abilities

At intake, siblings in MTFS and SIBS were assessed for their intelligence. The siblings were given subtests from the Wechsler Intelligence Scale for Children Revised (WISC-R; Wechsler, 1974) or the Wechsler Adult Intelligence Scale Revised (WAIS-R; Wechsler, 1981), depending upon whether they were below 16 years of age or not. At intake, 27% of SIBS and 66% of MTFS siblings took the WAIS. Parents in MTFS were also given the WAIS-R at intake, while parents in the SIBS sample were given the WAIS-R at follow-up one.

For brevity only the Vocabulary, Information, Picture Arrangement, and Block Design subtests were administered. The factor loadings calculated by Gignac (2005) imply that the loading of Vocabulary and Information ("verbal IQ") on g is .84, whereas that of Picture Arrangement and Block Design ("performance IQ") on g is .76. Thus, our measures of verbal and performance IQ should be about equally good as indicators of g. Similarly, the Gignac factor loadings imply that the loading of verbal IQ on its group factor of verbal ability is .44, whereas that of performance IQ on its group factor is .31. Note that

the observed correlation between verbal and performance IQ in our sample (.47) fell short of the $.84 \times .76 = .64$ implied by the Gignac calculations based on the WAIS-R standardization data. Nevertheless, we continue to be confident that verbal and performance IQ were about equally g loaded in our sample because each was about equally correlated with head circumference within families (Lee et al., 2019).

In the Vocabulary subtest, subjects are asked to define a set of words. The Information subtest is a series of general knowledge questions. It should be noted that out of the 29 Information questions on the WAIS-R, two are explicitly religious and five are political. The religious questions are: "what is the main theme of the book of Genesis?" and "what is the Koran?" The political questions involve naming four United States presidents, naming the president during the Civil War, knowing the number of senators, specifying the month in which Labor Day occurs, and explaining who Martin Luther King is.

For each item in the Picture Arrangement subtest, subjects have to arrange a set of pictures in order to tell a coherent story, akin to a comic strip or a storyboard. In the Block Design subtest, participants have to arrange color-patterned cubes to produce a larger pattern, akin to arranging puzzle pieces to produce a picture. The Picture Arrangement and Block Design subtests are combined to create an index of performance IQ, whilst the Information and Vocabulary subtests are combined to create an index of verbal IQ. Performance on individual items have not been digitally recorded, making it only feasible to use performance IQ, verbal IQ and the subtests in our analyses. The group factor measured by performance IQ is similar to the spatial factor (Lohman, 1988); Picture Arrangement does not load on this factor very strongly.

Measures of Socio-Political Attitudes

The SIBS and MTFS samples have been followed up every three to four years. In most follow-ups religiosity has been assessed using the nine items described in Koenig et al. (2005). Question items include asking respondents to rate "importance of religious faith in daily life" and "frequency of attending religious services." Items had four or five different options to choose from, except one item "membership in religious youth or study groups" which was binary coded as being a member or not of a religious group. Some items had a "don't know" option and these were treated as missing. Before leaving home, religious behavior is partly determined by the choices of the parents; the heritability of religiosity increases with time and the role of the shared environment diminishes (Koenig et al., 2005). Thus, to detect an effect of respondent's intelligence on their own religiosity, we only use the most recent measurements available, which are from follow-up three for SIBS and follow-up five for MTFS.

Measures of self-reported voter turnout and civic engagement are derived from the most recent follow-ups in the SIBS and MTFS samples, which are the third and sixth follow-ups respectively. The 18 items used were designed and first used by Dawes et al. (2015). The authors performed a bivariate twin model of verbal IQ and civic engagement in the MTFS sample, finding a significant genetic correlation. Half of the items measure attitudes on a 1–5 Likert scale, from strongly disagree to strongly agree. The other half of the items ask respondents to rate the frequency with which they perform civic behavior as "never," "rarely," "occasionally," "frequently," and "always." Some of the items explicitly measure engagement in the political process, such as "I voted in local and national elections" and "I have contacted a local or national politician to encourage their support on an issue of importance to me." Other items measure apolitical aspects of civic engagement, such as "I believe I should make a difference in my community" and "I contribute to charitable organizations within the community." We use the item asking for voting frequency to measure self-reported voting and all other items to create a measure of civic engagement which does not explicitly measure voting.

In addition to measuring voting via self-report, we were also able to use government records of whether participants actually did vote in specific elections. SIBS and MTFS participants were matched to voter records, using first name, middle initial, last name, birth year, phone number, house number, street name, and zip code, where these pieces of information were available. Dawes et al. (2021) employed this data for the MTFS sample and reported that 85% of MTFS participants with an address and birth year could be matched to the voter records. Their paper gives additional information on the data. The matching was performed for the purpose of performing studies using genetic data, so the validated measures are only available for a subset of participants consenting to be genetically sequenced.

The government records only identify whether registered individuals chose to vote. Unregistered individuals are treated as missing, since it is unclear whether they had not voted or were living outside Minnesota. As such, the self-reported measure of voting is not necessarily less accurate or reliable, even though individuals can lie or misremember whether they really voted. In a supplementary test, we operationalize voting differently by treating all individuals with missing observations as missing.

We aggregate the binary decisions to vote into two validated voting measures. Voting in 2016, 2012, 2008 and 2004 are summed to create a measure of presidential voting. Voting in 2018, 2014, 2010 and 2006 are summed to create a measure of midterm voting. We choose these elections because we have many observations for these years. Presidential and midterm elections are analyzed separately, since political scientists have argued that the decision to vote is different for so-called "first-order" and "second-order" elections (Dawes et al., 2021; Reif and Schmitt, 1980), since it likely requires greater engagement in politics to vote in less important elections.

Thirty-seven items measuring political attitudes were

Table 2: Socio-Political Scales

Scale	α	ω_h	ω_t	*N* items	Example item
Category: Civic Participation					
Voted in presidential elections	.21	-	-	4	Participant voted in 2016.
Voted in midterm elections	.60	-	-	4	Participant voted in 2018.
Self-reported voter turnout	-	-	-	1	I voted in local and national elections.
Civic Engagement	.93	.76	.95	17	I believe it is important to volunteer.
Category: Moral Attitudes					
Religiosity	.91	.81	.95	9	How important is your religious faith in your daily life?
Traditionalism	.59	.39	.65	12	I am disgusted by foul language.
Category: Political Attitudes					
Authoritarianism	.85	.72	.89	12	Obedience and respect for authority are the most important virtues children should learn.
Egalitarianism	.89	.78	.91	8	If wealth were more equal in this country, we would have many fewer problems.
Social liberalism	.81	.62	.85	11	The use of marijuana should be legal.
Fiscal conservatism	.83	-	-	6	The government is spending too little money on Social Security.
Retribution	.73	-	-	5	The punishment should fit the crime.

Note: α represents Cronbach's alpha, ω_h represents McDonald's hierarchical omega and ω_t represents McDonald's total omega. Reliability statistics are not estimated when there are insufficient degrees of freedom.

given to the SIBS sample in follow-up three. Twelve items were selected from the right-wing authoritarianism scale designed by Duckitt et al. (2010), encompassing four items measuring each of three facets: authoritarian submission, authoritarian aggression, and authoritarian traditionalism. For brevity we refer to the scale as authoritarianism, without denying the existence of left-wing authoritarianism (Conway et al., 2018). Social liberalism and fiscal conservatism were measured with 11 items and six items, respectively, adapted from similar items in the General Social Survey (Smith et al., 2018). Egalitarianism was measured with eight items, as used by Feldman and Steenbergen (2001).

For simplicity, all scales are constructed as raw sum scores of items and then Z-score transformed to have a mean of zero and a standard deviation of one. Example items from each scale and reliability metrics are given in Table 2. A full list of items used can be found on the study's OSF page. Reliability metrics were estimated using the *omega* function in the *R* package *Psych* (Revelle, 2024). ω was estimated assuming three sub-factors. An ultra-Heywood case was found for authoritarianism. As an ad hoc solution, we assumed four sub-factors for this trait.

The reliability of voting in presidential elections is extremely low, suggesting most of the variation in presidential voting is not caused by enduring individual differences. This is likely due to range restriction, since we measure only whether registered individuals choose to vote or not. In this group 92.3% voted in 2016. In a supplementary test we classify all individuals who are unregistered, or otherwise have missing values, as having not voted. With this alternative operationalization, 65.3% of participants are considered to have voted. This is below turnout for the state of Minnesota (74.7%; Election Lab, 2024), implying many people are incorrectly coded as non-voters under the alternative operationalization. The reliabilities of the alternative operationalization are much higher for both voting in presidential elections (α = .83) and voting in midterm elections (α = .82). The very low ω_h for traditionalism implies that the scale is poorly capturing a unidimensional construct.

Additional Variables

In supplementary analyses, we include additional variables. In the most recent follow-ups, twins and siblings were asked for the highest educational qualification they have attained, such as a high school diploma or a bachelor's degree. These responses are transformed into years of education, following the same coding practice used for the sample in the GWAS of educational attainment, described in the supplementary materials of Okbay et al. (2016). Among subjects who have this information, the mean years of education is 18.1 and the standard deviation is 2.3.

Income was measured differently in the most recent follow-ups of the SIBS and MTFS samples. In SIBS, individuals were asked for their own gross labor income before tax, which they answered in free format in the units of thousands of US dollars. In MTFS, twins were asked to report their gross income, choosing one of 16 binned categories. For example, no income was coded as 1, income less than $\$10,000$ was coded as 2. The bins increased by $\$10,000$, until after $\$100,000$ they increased by $\$25,000$ per bin. Anyone with over $\$200,000$ was asked to choose bin 16. We operationalized these different measures by adding 1 to the variable, then applying the natural logarithm before Z-score standardizing income within each sample. In SIBS the mean income is $\$59,540$ and the standard deviation is $\$41,506$. In MTFS, the median bin corresponds to an income of $\$50,000$–$\$59,999$ and the 25th and 75th percentile corresponds to incomes of $\$30,000$–$\$39,999$ and $\$80,000$–$\$89,999$ respectively.

In the SIBS sample, subjects were asked to give their bachelor's major, if they had one. From written responses, we manually coded whether the individual has an engineering degree as a binary variable. We coded individuals as having a degree in a "high spatial discipline" if their major was in mathematics, computer science, engineering or physics. This was because individuals with these bachelors degrees have elevated spatial ability (Wai et al., 2009). In our regression models using these variables, we have only 23 individuals classed as engineers and 58 have a degree in a high spatial discipline.

In the most recent follow-ups of SIBS and MTFS, both cohorts were administered the International Cognitive Ability Resource 16 (ICAR-16) intelligence test (Condon and Revelle, 2014). The test involves four items from each of the following types of problems: letter and number series, verbal reasoning, three-dimensional rotation and matrix reasoning. The test is scored by counting the number of items answered correctly. This test is suitable as an additional measure of general intelligence.

Method

Verbal and performance IQ are our two measures of cognitive abilities, but they capture at least three different sources of variation; g and two group factors. Our two measures therefore cannot identify the effects of all three sources of variation. The simplest evidence we report regarding the importance of group factors are the correlations between verbal IQ, performance IQ, and socio-political attitudes. If verbal IQ has a greater correlation than performance IQ, then that would imply the constituents of verbal IQ have a stronger relation to socio-political attitudes than the constituents of performance IQ. We test whether the correlations significantly differ from each other using Williams's test (Steiger, 1980; Williams, 1959) implemented in the *Pysch* package (Revelle, 2024).

Our main approach is similar to that of Ludeke et al. (2017), who control for verbal IQ and performance IQ in the same model and then report whether the effects of each of the variables are statistically significant. Likewise, we control for verbal and performance IQ in the same regression models of socio-political attitudes. Additional controls include sex, age when the socio-political attitude was measured, self-identified ethnicity and a cohort categorical variable determining whether the subject is a twin, a parent of a twin, a sibling in the SIBS sample or a parent in the SIBS sample.

We introduce a formal test for whether group factors affect socio-political attitudes. Our null hypothesis is that verbal and performance IQ have equal regression slopes[2].

$$H_0 : \beta_V - \beta_P = 0$$

The null hypothesis is true, at least under the following assumptions:

1. Verbal and performance IQ equally correlate with g.
2. Only the g variance in verbal and performance IQ is correlated with socio-political attitudes.

This is intuitive. If group factors do not matter for socio-political attitudes, then two measures equally predictive of g will in turn be equally predictive of socio-political attitudes. If the regression slope of one IQ measure is larger than another, then tilt towards one type of ability is associated with socio-political attitudes.

Some caveats need to be made regarding the null hypothesis. If one test is a better measure of g than another, then that would cause their regression slopes to differ. Presumably, the tests correlate with g similarly enough for this effect to be small. There are situations in which group factors matter, but the null hypothesis is true. If the group factors have exactly the same effect on socio-political attitudes, then verbal and performance IQ will have the same slopes. The null is not true when the group factors have different sized effects, or even opposite signed effects.

In all models, socio-political attitudes and intelligence measures are Z-score standardized to have a mean of zero and a standard deviation of one. Standard errors and hypothesis tests of the regression slopes employ a cluster-robust variance-covariance matrix. A significance threshold of $p < .005$ is used (Benjamin et al., 2018). We apply our tests to 11 different socio-political attitudes, so our threshold is slightly less conservative than using $p < .05$ with a Bonferroni correction. For every model run, additional statistics such as sample size, degrees of freedom and standard errors are provided in the study's OSF page.

[2]The difference of the two regression slopes is assessed with a Wald test, where $Z = \frac{\beta_V - \beta_P}{SE(\beta_V - \beta_P)}$. The standard error is the square root of the variance of the difference of the regression slopes. The variance of the difference is given as $Var(\beta_V - \beta_P) = Var(\beta_V) + Var(\beta_P) - 2 \times Cov(\beta_V, \beta_P)$

Table 3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Verbal IQ												
(2) Performance IQ	0.47											
(3) Voter in presidential elections	0.10	0.04										
(4) Voter in midterm elections	0.24	0.08	0.21									
(5) Self-reported voter turnout	0.24	0.11	0.22	0.35								
(6) Civic engagement	0.30	0.14	0.17	0.29	0.47							
(7) Religiosity	0.01	−0.03	0.07	0.12	0.13	0.28						
(8) Traditionalism	−0.27	−0.12	−0.06	0.06	−0.02	0.02	0.56					
(9) Authoritarianism	−0.39	−0.21	−0.07	−0.09	−0.12	−0.17	0.45	0.63				
(10) Egalitarianism	0.20	0.05	0.03	0.08	0.15	0.26	−0.33	−0.39	−0.61			
(11) Social liberalism	0.31	0.21	0.00	0.03	0.10	0.15	−0.56	−0.62	−0.77	0.66		
(12) Fiscal conservatism	−0.17	−0.08	0.00	−0.07	−0.13	−0.21	0.36	0.39	0.56	−0.78	−0.62	
(13) Retribution	−0.19	−0.08	0.06	−0.03	−0.13	−0.21	0.07	0.27	0.46	−0.43	−0.40	0.40

Additional Analyses

We perform a number of supplementary analyses. Firstly, after testing whether verbal or performance IQ has a larger effect, we then analyze which of their two constituent subtests has a larger effect. In verbal IQ, does the Information subtest or the Vocabulary subtest have a larger effect size? Likewise, for performance IQ, does the Block Design or the Picture Arrangement subtest have a larger effect? We control for all the subtests in the same regressions, with the other control variables used in the main analysis.

Our sample is genetically informative, including siblings, parents, and twins of both zygotic types. To utilize the structure of the data, we re-run our analyses, dropping the parents from the sample and controlling for family fixed effects. This method tests whether our results are true between siblings, which is known as a within-family approach. This means we test if the sibling with a greater tilt towards verbal IQ differs politically from their sibling who tilts towards performance IQ. The advantage of this within-family approach is that it excludes confounding with the environment shared between siblings, since their differences cannot come from the equal aspects of their upbringing. We also re-run our analyses within pairs of monozygotic twins, which is known as the co-twin control approach (McGue et al., 2010). The twins are genetically identical, meaning their differences can only arise from environmental factors that are idiosyncratic to the individual. In the jargon of behavioral genetics, a significant result suggests there is a non-shared environmental correlation between a group factor and a socio-political attitude. Genetic confounding is thus ruled out. We also re-run our analyses controlling for education, since this could function as a confound or mediator.

Our method assumes verbal IQ and performance IQ are equally correlated with g. To test the appropriateness of our assumptions and approach, we use positive and negative controls. A negative control is a test for which, under the assumptions of our methodology, we should expect to find a null result. Likewise, a positive control is a test for which we should expect a positive result. Our negative control tests whether verbal and performance IQ are equally predictive of g as proxied with the ICAR-16. If they are not equally predictive, that would imply our measures are not equally g loaded.

Our positive control tests whether we are able to predict outcomes expected to be associated with group factors. In particular, we would like to know that we can predict outcomes caused by both group factors for verbal and performance ability. Gohm et al. (1998) compared individuals with high mathematical ability to those with high spatial ability, which is similar to our measure of performance IQ. The authors found that the high-spatial group tended to have lower incomes and fewer educational credentials. In a study of English people, Aucejo and James (2021) found verbal skills were more predictive of future college enrollment than mathematical skills. As such, we have some reason to believe verbal IQ should be more predictive of years of education and possibly also income in our sample. Individuals who graduate with degrees in STEM disciplines, such as mathematics, computer science, physics, and—especially—engineering, tend to have a high level of spatial ability (Wai et al., 2009). As such, we test whether tilt towards performance IQ predicts having a bachelor's degree in engineering or another spatial discipline.

Results

Verbal IQ shows a larger correlation than performance IQ with socio-political attitudes in all cases except for religiosity. The correlations are presented in Table 3. The difference is not significant for voting in presidential elections ($p = .008$), religiosity ($p = .223$), economic conservatism ($p = .037$), social liberalism ($p = .013$), and retribution ($p = .007$), while the rest of the differences are significant at our chosen threshold ($p < .005$). It is re-

markable how much larger the verbal IQ correlations are relative to the correlations of performance IQ; on average, the correlations for verbal IQ are around twice as large as those of performance IQ. If only the variation in g caused socio-political attitudes, that would imply verbal IQ loads substantially more on g compared to performance IQ. This interpretation is implausible.

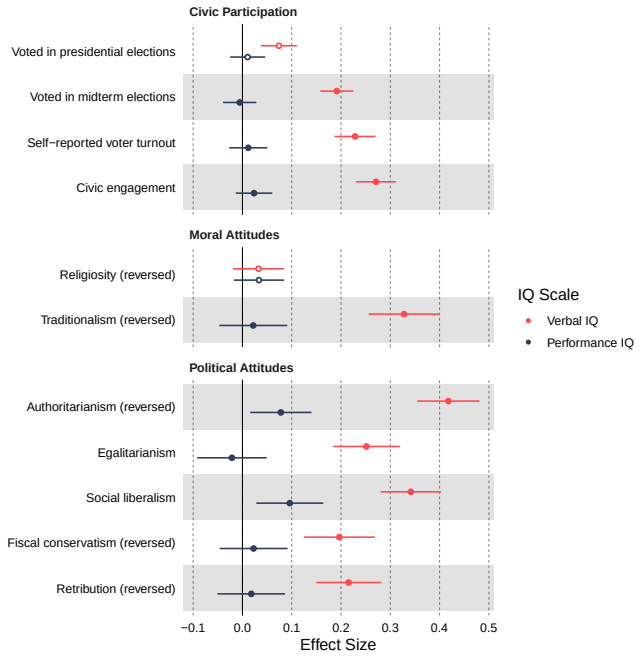

Figure 1: The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

The effects of verbal and performance IQ are compared in multiple regression (Figure 1). Control variables include age, sex, self-reported ethnicity and a categorical variable determining whether the participant is a twin, a parent of a twin, a sibling in the SIBS sample or a parent in the SIBS sample. Religiosity is the only socio-political trait for which verbal IQ did not have a larger regression slope than performance IQ ($\beta_V - \beta_P = -0.001, p = .984$). In this case, neither verbal nor performance IQ significantly predicts the outcome. The difference for presidential elections was not significant either ($\beta_V - \beta_P = 0.064$, $p = .038$). For the rest of the socio-political attitudes, verbal IQ has a larger effect and the difference is significant ($p < .005$).

That there is a difference in the effect sizes of verbal and performance IQ is not the only aspect of the results that is interesting; there is also the magnitude of the gap and individual effect sizes of performance and verbal IQ. In general, it is not the case that verbal and performance IQ both have effects which differ in magnitude, rather performance IQ has negligible effects, if any at all, and the difference in the effect sizes are substantial.

Verbal IQ significantly predicts all attitudes except for religiosity, whilst performance IQ significantly predicts only authoritarianism ($\beta_P = 0.078$, $p = .014$) and social liberalism ($\beta_P = 0.096$, $p = .006$) at a relaxed significance threshold ($p < .05$) and with small effect sizes. For the civic participation traits, performance IQ is not significant despite a high level of power. The sample size for civic engagement and self-reported voter turnout is 3275, whilst voting in midterm elections has a sample size of 3908. One possibility consistent with these results is that g and the verbal factor have roughly equal effects on socio-political attitudes even as the performance factor has none at all.

The magnitude of the differences between verbal and performance IQ are often substantial. The absolute difference is largest for authoritarianism ($\beta_V - \beta_P = -0.340, p < .001$). For this trait the effect of verbal IQ is 5.4 times larger than that of performance IQ. Apart from religiosity, the smallest absolute difference is for fiscal conservatism ($\beta_V - \beta_P = 0.064$, $p = .003$), yet the effect of verbal IQ is 7 times larger than that of performance IQ. The ratio of the effect sizes is largest for self-reported voter turnout, standing at 19.2.

Supplementary Tests

The general pattern of the results is robust to using different control variables. Figure S1 presents the results controlling for years of education. Verbal IQ has a larger effect size than performance IQ across all socio-political traits, although the differences between the effects are no longer significant for voting in midterm elections, social liberalism, fiscal conservatism and retribution. The point estimates, however, appear very similar.

The results in Figure S2 control for family fixed effects, where the observations are limited to the siblings. The pattern of verbal IQ having larger effects remains the same, but the estimates are noisier. The differences between the effects of verbal and performance IQ are only significant for self-reported voter turnout ($\beta_V - \beta_P = 0.228$, $p < .001$), authoritarianism ($\beta_V - \beta_P = 0.418$, $p < .001$) and egalitarianism ($\beta_V - \beta_P = 0.282$, $p = .004$).

We further try controlling for years of education and family fixed effects in the same model, with the results presented in Figure S3. Here the estimates are especially uncertain since parents are removed from the sample, family fixed effects substantially reduce the degrees of freedom, and the education control increases the standard errors through a reduced sample size and its covariance with the cognitive abilities. For example, the degrees of freedom for voter turnout is 919, down from 3264 without the additional control variables. Likewise, for authoritarianism, the degrees of freedom is 249 coming down from 1072 without the additional control variables. Nevertheless, the differences are still significant for self-reported voter turnout ($\beta_V - \beta_P = 0.227$, $p < .001$) and authoritarianism ($\beta_V - \beta_P = 0.448$, $p < .001$).

In Figure S4 we use only monozygotic twins and control for family fixed effects. For these individuals, only the socio-political attitudes of religiosity, civic engagement, and presidential, midterm and self-reported voter turnout, are available. The difference between the effects of verbal and performance IQ are considerable for some of these variables. For example, the difference in effect sizes are moderate for self-reported voter turnout ($\beta_V - \beta_P = .202$, $p = .024$), civic engagement ($\beta_V - \beta_P = .194$, $p = .022$) and religiosity ($\beta_V - \beta_P = -0.249$, $p = .022$). The p-values for these results, however, are only suggestive.

As discussed in the methods section, our measures of presidential and midterm voting are limited to participants who we could identify as being registered to vote in Minnesota. This reduces the variation in voting in the sample, which likely attenuates the regression coefficient of verbal IQ. This might explain why we do not find a significant difference in the effects of verbal and performance IQ in predicting presidential voting, even though we find strong results for self-reported voting. In Figure S5, we instead treat individuals with missing values for voting as having not voted. We find verbal IQ has a significantly larger regression coefficient than performance IQ for predicting midterm voting, with and without the control for years of education. The difference is not significant when family fixed effects are employed. In no model does verbal IQ have a larger coefficient for predicting presidential elections.

Effect sizes are small using this alternative operationalization of voting. If we compare the coefficient of verbal IQ with the original operationalization of midterm voting ($\beta_V = 0.191, p < .001$), compared to the alternate ($\beta_V = 0.116, p < .001$), we find that the effect size halves. This suggests the alternative operationalization is unlikely to be a more valid measure of voting.

In Figure S6 we employ the four Wechsler subtests available, instead of verbal and performance IQ. We test whether the effect sizes of the two verbal subtests differ (Vocabulary and Information) from each other, and then do the same for the two performance subtests (Block design and Picture Arrangement).

Vocabulary has a significantly larger effect than Information on egalitarianism ($\beta_{voc} - \beta_{info} = 0.228$, $p = .001$) and fiscal conservatism ($\beta_{voc} - \beta_{info} = 0.205$, $p = .004$). The Vocabulary subtest has a larger point estimate than the Information subtest for all the political attitudes. Information measures a group factor at a lower level in the hierarchy of abilities, influencing different subscales of knowledge, that is important in its own right (Lynn et al., 2001; Lynn and Irwing, 2002). Being more or less broadly knowledgeable than expected from level of verbal ability might have little impact on opinions regarding economic issues. For traditionalism, the effect of Picture Arrangement is larger than Block Design ($\beta_{pic} - \beta_{bloc} = 0.166, p = .001$).

In general the verbal subtests are more predictive and within the verbal and performance measures the subtests perform similarly, except perhaps that Vocabulary might have a larger relationship with political ideology than Information. The results imply that effects of verbal IQ are not being driven by a group factor captured by only one of the subtests. As previously mentioned, there was a concern that some of the items in the Information subtest of the WAIS-R might be capturing interest in religion and politics. The fact that Vocabulary performs as well as or even better than Information suggests the effects of verbal IQ are not due to the content of the items in the Information subtest. To further test this possibility, we rerun our main results in participants who only took the WISC-R in Figure S7 and those who took the WAIS-R in Figure S8. We also present the effects of the subtests in subjects who took the WISC-R in Figure S9 and those who took the WAIS-R in Figure S10. The results appear similar regardless of whether the subjects took the WISC-R or the WAIS-R.

Positive and Negative Controls

In Figure 2 we present our positive and negative controls. When predicting general intelligence, measured by the ICAR-16, verbal IQ ($\beta_V = 0.320, p < .001$) and performance IQ ($\beta_P = 0.293$, $p < .001$) have very similar effect sizes. These are not significantly different ($p = .405$), despite the regression betas being very precisely estimated with a sample size of 2667. This test provides reassurance that our measures of verbal and performance IQ are similarly g loaded in our sample.

To test whether performance IQ can predict outcomes better than verbal IQ, we model whether subjects have an undergraduate degree in a discipline requiring high levels of spatial ability, versus whether they majored in a different discipline. The outcome is binary, so we use logistic regression, yet we standardize the latent dependent variable to have a standard deviation of one. This makes the regression parameters more comparable to the linear regressions we perform. Compared to verbal IQ, performance IQ has a larger effect on becoming an engineer ($\beta_V - \beta_P = -0.336$, $p = .007$), however the significance is only suggestive. We also measured having a major in a spatial discipline as whether the subject studied engineering, physics, math or computer science. In this case, there was no significant difference ($\beta_V - \beta_P = -0.109, p = .364$).

Only 23 individuals had studied engineering and 58 had studied a high spatial discipline. Due to these case counts, the regression results should be interpreted with caution. A low case count not only leads to high standard errors, but also bias in the logistic model. As a robustness test, we redo the analysis using linear regression and Firth's bias reduced logistic regression (Firth, 1993; Heinze et al., 2023) although the latter does not use cluster robust standard errors. For linear regression, performance IQ has a larger coefficient, but the difference is not significant when predicting having an engineering degree ($p = .011$), or high spatial discipline ($p = .429$). For Firth's logistic regression, performance IQ has a significantly larger coefficient for having an engineering degree ($p < .001$), but not for

having a degree in a high-spatial discipline ($p = .009$). Regardless of these robustness tests, the result is only tentative given the low case count.

We find verbal IQ has a much larger effect on years of education than performance IQ ($\beta_V - \beta_P = 0.237$, $p < .001$). Verbal IQ did have a larger effect size than performance IQ for income, but it was not significant ($\beta_V - \beta_P = 0.054, p = .137$). To put this into context, the effect of verbal IQ was rather small ($\beta_V = 0.124$, $p < .001$). In an ad hoc test, we also estimated the effect size of full scale IQ, removing verbal and performance IQ from the model, also finding a small effect ($\beta = 0.170$, $p < .001$). The association between cognitive ability and income in our sample appears small. This might prevent us from detecting a significant difference that actually exists in the population.

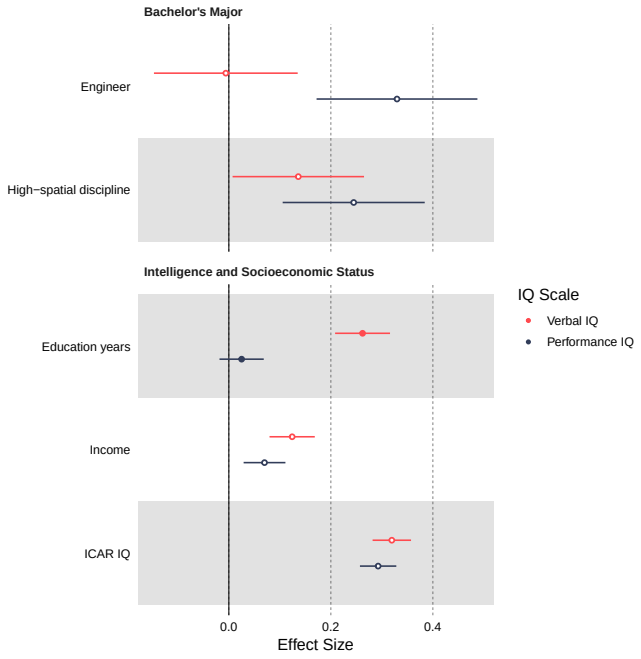

Figure 2: The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a dependent variable. For each dependent variable, verbal and performance IQ are controlled for in the same regression model. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

Discussion

We find verbal IQ to be a much stronger predictor of socio-political attitudes than performance IQ. Correlations for verbal IQ are around twice the size of those of performance and IQ. In multiple regression, performance IQ has effect sizes near zero, while verbal IQ shows substantial effects.

Our results replicate the finding of Ludeke et al. (2017) showing verbal IQ to be a better predictor of liberalism, but we extend this result in numerous ways. Primarily, we show the pattern holds for a number of socio-political attitudes. Not only does the relationship exist for various measures of ideological beliefs, including fiscal conservatism and authoritarianism, but it also exists for civic engagement and voter turnout. It may even hold for attitudes that are not explicitly political, since verbal IQ predicted lower levels of traditionalism. Notably, we did not find a significant difference for religiosity. This might be because the correlation between religiosity and intelligence is rather small ($r = -.14$; Dürlinger and Pietschnig, 2022).

We use causally informative designs to further pin down the relationship between group factors and socio-political attitudes. Like Ludeke et al. (2017), we find the pattern exists after controlling for education. But we also find it exists after controlling for family fixed effects and education. The sibling whose cognitive abilities are more verbally tilted is more likely to report voting and less likely to be authoritarian, over and above what we might expect from their level of education. This suggests the relationship is not entirely confounded by family factors, nor entirely mediated by years of education.

There are two key limitations to our study design. The first issue is that a given measure of cognitive ability might better predict socio-political attitudes because it is more g loaded, rather than because its group factor matters. We presented evidence suggesting this bias is negligible and unlikely to account for our results. The g loadings of verbal and performance IQ from the WAIS are predicted by its standardization data to be fairly close (Gignac, 2005). In our sample, verbal and performance IQ are equally predictive of intelligence measured by the ICAR-16, implying very similar g loadings. Finally, we find that verbal IQ predicts education better, whilst performance IQ seems to predict having an engineering degree better in our sample. This suggested our method and sample could accurately identify when group factors do matter. However, the number of individuals in our sample with an engineering degree was very small ($n = 23$) and verbal IQ was not a better predictor of income as expected, making these positive controls more tentative tests of our methodology.

A second limitation is that we are unable to identify the effects of individual group factors. Perhaps the verbal factor engenders left-wing attitudes, or perhaps the spatial factor engenders right-wing attitudes, or even both might be true. We mentioned the possibility of g and the verbal factor having substantial effects on socio-political attitudes and the performance factor having none, but this is only one possibility consistent with the empirical results.

To identify the exact effects of different group factors, it will be necessary to use more measures of intelligence. With many items or subtests, it will be possible to identify multiple factors with confirmatory factor analysis and attempt to estimate their effects on socio-political attitudes in a path model. We find verbal subtests perform similarly to each other and the same for performance subtests. For

two political attitudes, Vocabulary has a larger effect size than Information. This hints at the possible relevance of narrower distinctions between cognitive abilities to socio-political attitudes.

A limitation of all studies involving intelligence and socio-political attitudes is generalizability. Meta-analyses of the relationship between intelligence and political attitudes (Onraet et al., 2015; Jedinger and Burger, 2022) find more than 90% of the variation in effect sizes is due to between-study heterogeneity rather than measurement error. Needless to say, the difference in the effects of verbal and performance IQ in our sample may be dissimilar to those of future studies. Notably in the Sibling Interaction and Behavior Study which we use, intelligence is significantly associated with lower levels of fiscal conservatism (Edwards et al., 2024), in contradiction to the rest of the literature (Jedinger and Burger, 2022). That Ludeke et al. (2017) also found verbal ability to more strongly predict liberalism, in two American samples, gives some assurance that our core result will replicate. However, the issue of generalizability can only be resolved with constructive replication, using widely different measures and sample demographics (Lykken, 1968).

Theoretical and Social Implications

At face value, our results imply intelligence influences attitudes through pathways that are more psychological than sociological. Group factors have only moderate incremental validity in predicting outcomes (Schneider and Newman, 2015; Breit et al., 2024). This means it is unlikely that group factors affect sociological variables sufficiently to induce sizeable differences in socio-political opinions. By contrast, it is highly plausible that verbal abilities would directly affect our judgements of social issues. Arguments over beliefs involve verbal skill; spatial and quantitative ability do not seem so important in the domain of politics.

Various psychological theories have been proposed to account for intelligence's influence on attitudes. All of these theories are enriched by the importance of verbal abilities. Many similar theories have argued that liberal beliefs are complex, requiring greater cognitive effort, while conservative beliefs are simpler, acting as cheap heuristics, which appeal to our instincts (e.g. Jost et al., 2009; Onraet et al., 2015; Kanazawa, 2010). If these theories are correct, then our results would imply that the cognitive cost and effort of justifying liberal beliefs is lesser for those with a greater verbal IQ relative to their performance IQ. The resource model suggests voting or civic engagement is cognitively costly, requiring an individual to become informed before they are willing or able to engage. We note in the introduction that political scientists had mentioned verbal abilities as being the key resource (Nie et al., 1996; Verba et al., 1996), although empirical evidence has been tentative (Denny and Doyle, 2008; Hillygus, 2005). Nevertheless, our results provide strong support for the importance of verbal abilities to voting and civic engagement.

Woodley (2011) has proposed that intelligence enables individuals to identify prestigious beliefs and "the normative center of gravity of a group or society." Intelligent individuals then gravitate towards these beliefs, which may bring social status while avoiding antagonism or ostracism. He calls this the "cultural-mediation hypothesis". Under this theory, our results imply that having a greater verbal IQ relative to performance IQ helps individuals to identify prestigious beliefs.

Our results do, however, provide evidence for a particular sociological theory. We began the paper by noting that Nozick (1998) had stereotyped "wordsmiths" as being anti-capitalist. Although our sample is unusual in producing a negative association between intelligence and fiscal conservatism (Edwards et al., 2024), Nozick is generally correct to think that the wordsmiths lean to the left. In our sample, verbal ability is particularly associated with years of education, but it does not seem so important for income. It is plausible that wordsmiths may envy their educational and cognitive peers who go on to have greater social or economic success. This envy could in turn alter socio-political attitudes. However, as mentioned, the only other study relating group factors to income (Gohm et al., 1998) found that those who performed better on spatial tests than math test had a lower income. It is worth further analyzing the effect of group factors on socioeconomic success.

Although our results may be best understood with psychological explanations, they have sociological ramifications. That group factors influence attitudes may, in part, account for the moral and political leanings of different occupations, such as journalists. We also found tilt towards verbal ability was associated with voter turnout and civic engagement. Individuals with greater verbal ability may have more influence on politics and society. An apocryphal quote, often ascribed to the intelligence researcher Edward Thorndike, states "colors fade, temples crumble, empires fall, but wise words endure." The power of wise words is reassuring to those sympathetic to the wordsmiths, although others will wonder whether the gift of gab is all too easily confused with wisdom.

Additional materials

Code, question items used, and supplementary spreadsheets are available on the study's OSF page

Declaration of Conflicting Interests

The authors declare no conflicts of interest.

Funding

Collection of data used in this paper was funded by grants from the National Institutes of Health (Grant Nos. MH066140, AA011886, DA005147, AA009367, DA042755) and the John Templeton Foundation as part of the Genetics and Human Agency initiative (Grant No. 60780).

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Supplementary Material

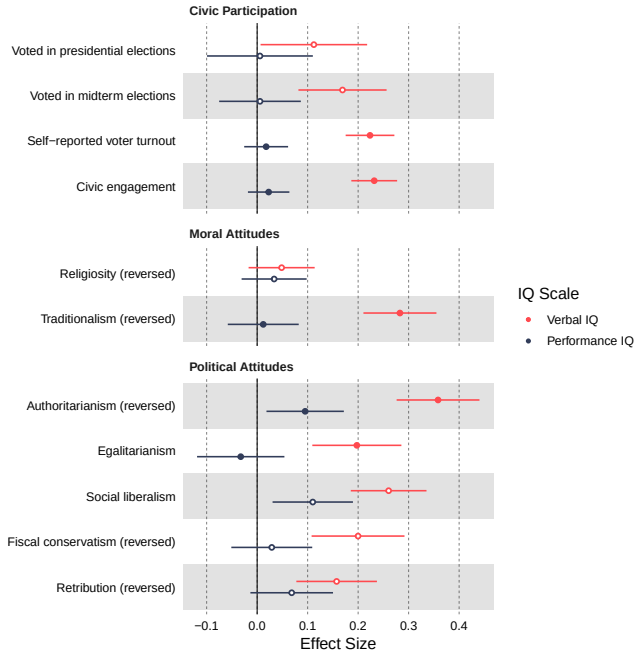

Figure S1: Effects of verbal and performance IQ after controlling for education. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include years of education, age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

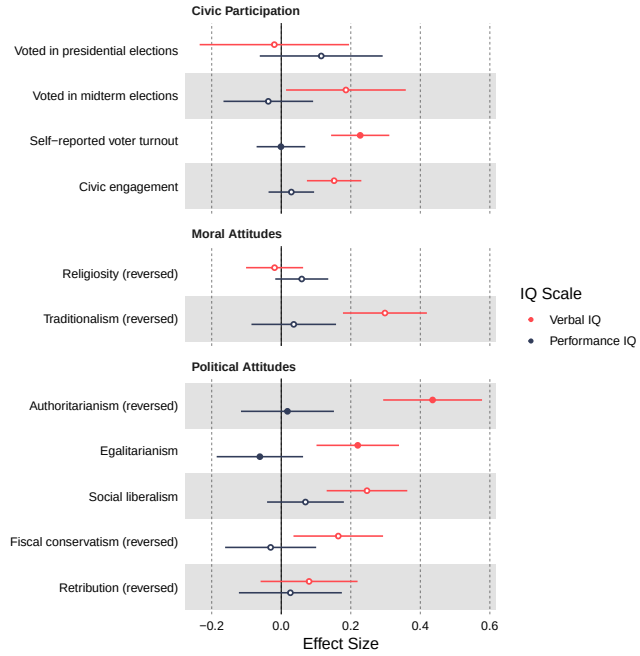

Figure S2: Effects of verbal and performance IQ after controlling for family fixed effects. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include family fixed effects, age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

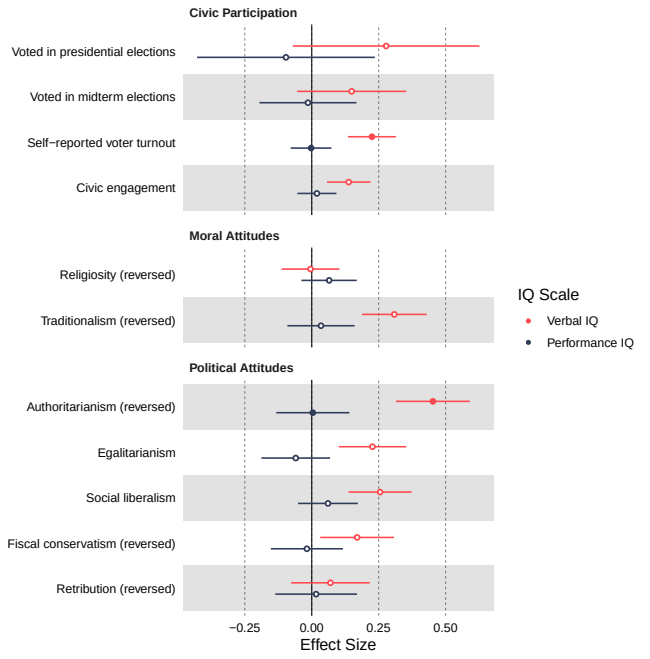

Figure S3: Effects of verbal and performance IQ after controlling for both education and family fixed effects. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include family fixed effects, years of education, age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

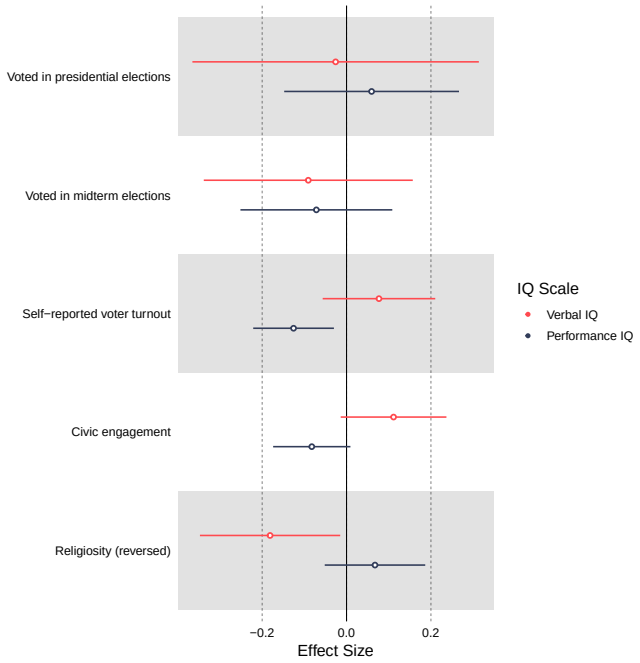

Figure S4: Effects of verbal and performance IQ in monozygotic twins after controlling for family fixed effects. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include family fixed effects, age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

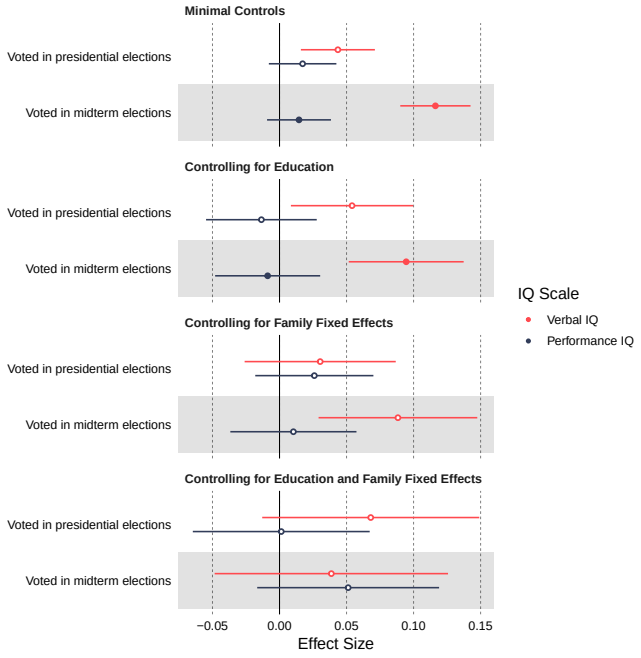

Figure S5: Effects of verbal and performance IQ on voting after treating missing observations as having not voted. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a voting measure. In each model, verbal and performance IQ are both used as predictors. Minimal controls include family fixed effects, age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

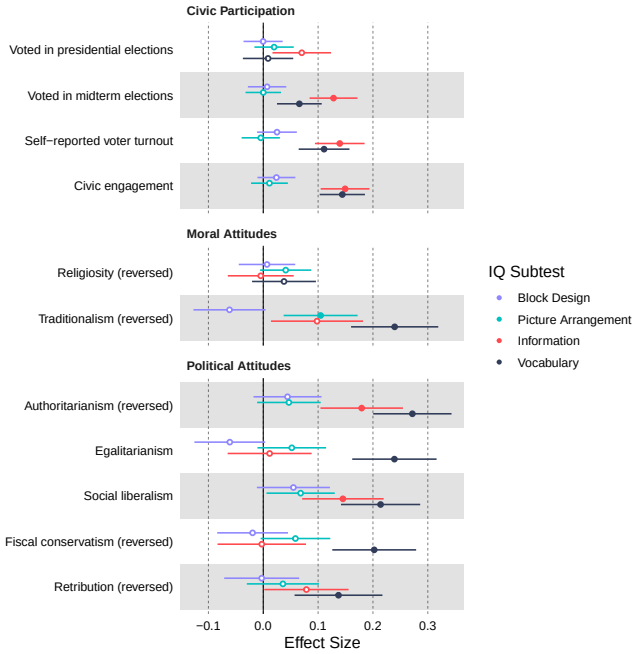

Figure S6: Effects of Wechsler subtests on socio-political attitudes. The data points represent the partial regression coefficients of Wechsler subtests in the prediction of a socio-political attitude. In each model, all four available subtests are used as predictors. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if they are significantly different from zero ($p < .005$).

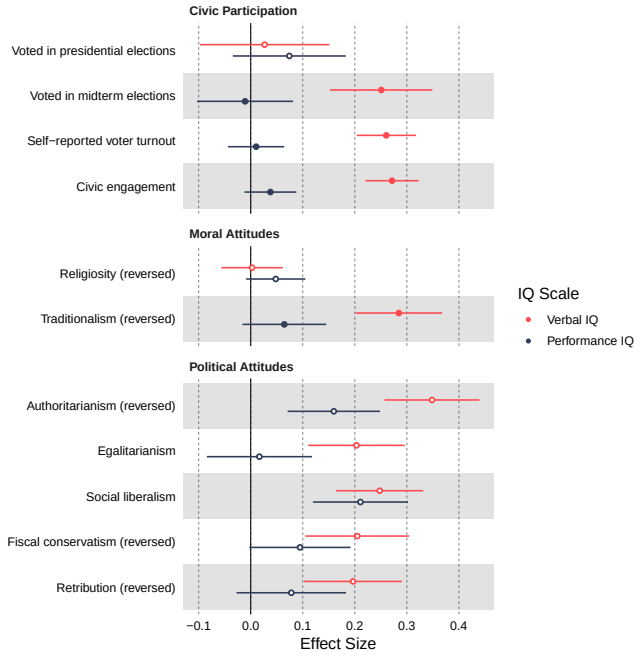

Figure S7: Effects of verbal and performance IQ in subjects who took the WISC-R. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

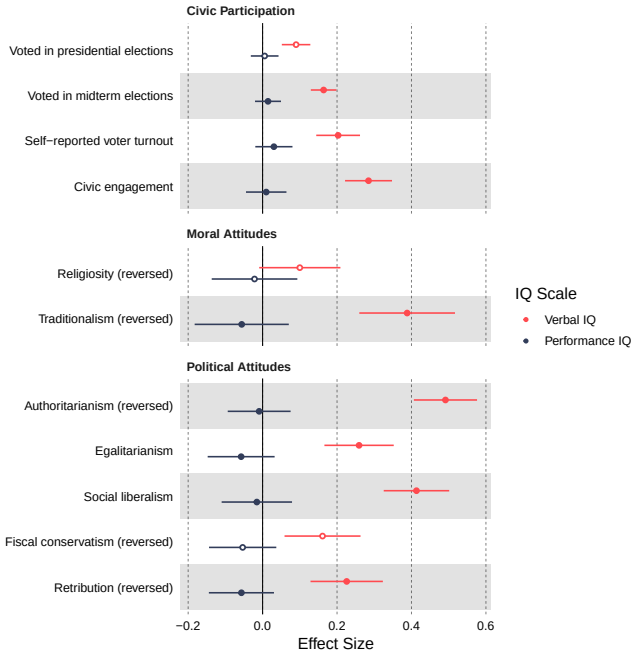

Figure S8: Effects of verbal and performance IQ in subjects who took the WAIS-R. The data points represent the partial regression coefficients of verbal and performance IQ in the prediction of a socio-political attitude. In each model, verbal and performance IQ are both used as predictors. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if the difference between the coefficients of verbal and performance IQ is significant ($p < .005$).

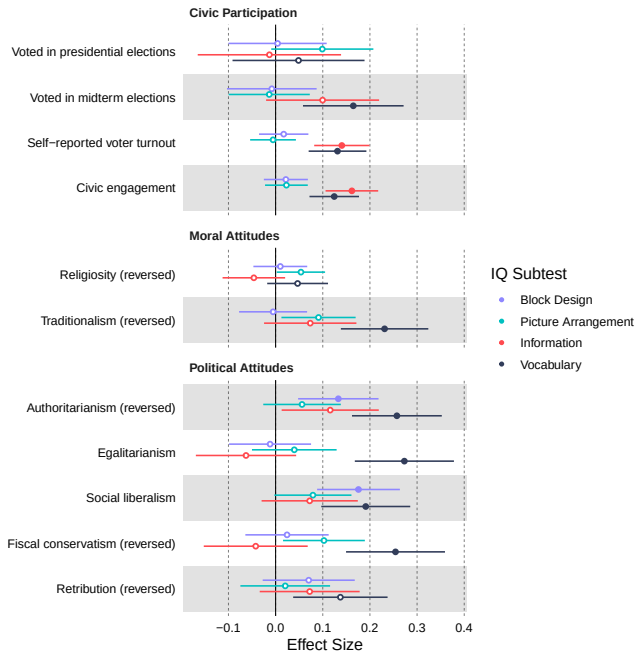

Figure S9: Effects of Wechsler subtests on socio-political attitudes in subjects who took the WISC-R. The data points represent the partial regression coefficients of Wechsler subtests in the prediction of a socio-political attitude. In each model, all four available subtests are used as predictors. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if they are significantly different from zero ($p < .005$).

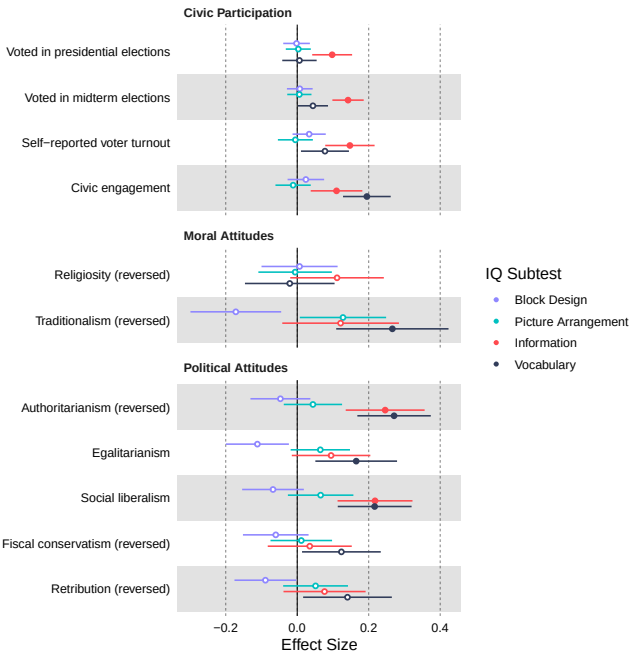

Figure S10: Effects of Wechsler subtests on socio-political attitudes in subjects who took the WAIS-R. The data points represent the partial regression coefficients of Wechsler subtests in the prediction of a socio-political attitude. In each model, all four available subtests are used as predictors. Control variables include age, sex, a cohort categorical variable, and an ethnicity categorical variable. Estimates are presented with 95% confidence intervals. Standard errors are clustered at the family level. Data points are colored in if they are significantly different from zero ($p < .005$).