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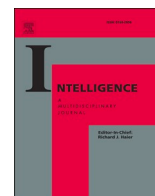
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# Sophisticated deviants: Intelligence and radical economic attitudes

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## ABSTRACT

Conservative economic attitudes have been theorized as symptoms of low cognitive ability. Studies suggest the opposite, linking more conservative views weakly to higher, not lower, cognitive ability, but with very large between-study variability. Here, we propose and replicate a new model linking cognitive ability not to liberal or conservative economics, but to economic extremism: How far individuals deviate from prevailing centrist views. Two large pre-registered studies in the UK ( $N = 700$  &  $700$ ) and the British Cohort Study dataset ( $N = 11,563$ ) replicated the predicted association of intelligence with economic deviance ( $\beta = 0.4$  to  $0.12$ ). These findings were robust and expand the role of cognitive ability from tracking the economic consensus to influencing support for (relatively) extremist views. They suggest opportunities to understand the generation and mainstreaming of radical fringe social attitudes.

“Stepan Arkadyich subscribed to and read a liberal newspaper, not an extreme one, but one with the tendency to which the majority held. And though neither science, nor art, nor politics itself interested him, he firmly held the same views on all these subjects as the majority and his newspaper did, and changed them only when the majority did, or, rather, he did not change them, but they themselves changed imperceptibly in him.”

Tolstoy (1878). Anna Karenina

## 1. Introduction

Intellectuals are responsible for economic and philosophical ideas as divergent as communism, fascism, nihilism, anarchism, and libertarianism, and often in extreme forms (Sesardic, 2016). If cognitive ability has any association with intellectual output, the question arises: *How might cognitive ability be associated with such apparently divergent intellectual extremes?* Recently, a productive model for studying this question has developed around measures of economic conservatism and support for economic redistribution. While this reveals motives such as malicious envy accounting for around half of support for redistribution (Lin & Bates, 2021; Lin & Bates, 2022; Szyner et al., 2017), research has also implicated higher cognitive ability as reducing support for economic redistribution (Caplan & Miller, 2010; Carl, 2014; Lewis & Bates, 2018; Mollerstrom & Seim, 2014; Oskarsson et al., 2015). Other studies, however, have found no association or even the reverse association (Choma, Sumantry, & Hanoch, 2019; Pennycook, Cheyne, Barr, Koehler,

& Fugelsang, 2014; Sterling, Jost, & Pennycook, 2016). A recent meta-analysis supports a small but significant net association in favour of economic conservatism (Jedinger & Burger, 2021). This program of existing research has been restricted, however, to treating economic attitudes as a single increasing or decreasing function of cognitive ability. Here, we propose and test a quite different linkage of cognitive ability to economic attitudes: That intelligence is associated with deviance of view, with equal likelihood of extreme support for economic conservatism and dramatic opposition to economic conservatism. Before presenting three tests of this idea, we briefly background existing research linking cognitive ability to economic attitudes.

## 2. Background

Research linking intelligence to economic and political attitudes is a rapidly developing area, building on historic research linking thinking styles to political views. The earliest of these cognitive-style models (Le Bon, 1913) associated all forms of extremism (whether left or right) with simplistic, inflexible, and dogmatic thinking (corresponding to the model depicted in Fig. 1 panel A). This model of extremists as cognitively restricted remains popular to this day, especially in its updated “value pluralism” form (Tetlock, 1986) which we discuss below. Following World War II, this view of extremism as cognitively unsophisticated, despite support and a more recent resurgence (Lammers, Koch, Conway, & Brandt, 2016; Zmigrod, Rentfrow, & Robbins, 2020),

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was largely displaced by the idea that over-simplification, inflexibility and dogmatism are characteristics only of the right, with left-aligned views reflecting sophistication and flexibility (e.g. Rokeach, 1960). Viewing these unsophisticated style as less cognitively demanding, Adorno, Frenkel-Brunswick, Levinson, and Sanford (1950), predicted lower cognitive ability should be associated with conservative economic attitudes (Fig. 1 panel B). As summarized compactly by Jedinger and Burger (2021) large modern studies of cognitive ability appeared initially to support this view, showing positive associations of cognitive ability with a broad swath of progressive social values such as permissive immigration (Deary, Batty, & Gale, 2008).

This monolithic model with linking right-wing politics to low intellectual ability, however, was soon challenged by research showing reversed links of intelligence to economic attitudes (Fig. 1 panel C). These studies isolated economic attitudes (e.g. support for markets, reduced regulation and higher fiscal restraint) from other social values, reporting robust associations linking cognitive ability and conservative economics, with consistent findings in the US (Carl, 2014, 2015), Sweden (Mollerstrom & Seim, 2014; Oskarsson et al., 2015), Denmark (Ludeke & Rasmussen, 2018) and two large representative United Kingdom population cohorts (Lewis & Bates, 2018). As Jedinger and Burger (2021) summarized in Fig. 2 of their work, a total of 19 studies have examined the association of intelligence with conservative economic ideologies, with meta-analysis of these finding a significant positive but weak ( $r = 0.05$  to  $0.07$ ) association. This meta-analytic analysis revealed, importantly, highly significant variation among reported effects (Jedinger & Burger, 2021), with some reporting cognitive ability being associated with progressive rather than conservative economic attitudes. Moreover, the cause of these associations of attitudes with intelligence remained obscure.

### 3. Contextual models

While the modest net effect and large variability in the association of cognitive ability to economic attitudes is confounding for linear models linking cognitive ability to economic attitudes, such differences are compatible with so-called contextual models which focus on deviation from local norms. These view ideology development as an interplay of individual's tendency to dogmatic, black-and-white thinking interacting with national norms transmitted in public communications (Di Palma & McClosky, 1970). Two quite different context-based models exist, and we discuss these next.

The first contextual model we consider is value pluralism (Tetlock, 1986). Perhaps the most widely accepted cognitive model of extreme ideologies (Van Hiel & Mervielde, 2003), this model makes similar predictions to the earliest models of Le Bon (1913), suggesting that extremists, whether to the left or the right, will be characterised by low levels of cognitive sophistication, measured by content analysis of their writing or utterances. Sophistication is assessed not by correctness, but by “differentiation” (distinct elements in the content) and “integration” (interrelatedness of elements). Example low and higher scoring samples

might be “We need this. It's what we want” versus “More spending would help others. And higher taxes would help the better-off find new ways to improve society”. Tetlock (1993) predicted that, because of conflicts arising from trying to support both freedom and equality, centre-left individuals would experience a type of cognitive dissonance and that mitigating this would require cognitive sophistication to accept these contradictions (Tetlock, 1986). In this model, then, maximum political sophistication results in centre-left views (Fig. 1 panel A). Related to this model, Rindermann, Flores-Mendoza, and Woodley (2012) suggest that intelligence promotes a middle-class worldview, typically at the mean of the social distribution. They suggest that social competence provided by intelligence (e.g., Bates et al., 2019) promotes entry to the middle class which in turn reinforces achievement, meritocratic relations, interest in education and goal-directed thought, adaptability, compromise, and benefits from effective government promotion of freedom and rule of law.

An alternative type of context-based model would see intelligent people move away from, rather than toward, the mean. Some early models tentatively sketched such scenarios, drawing on studies supporting extreme views in small samples of intelligent working class Marxists and Fascists (Eysenck, 1954), others supporting intelligence extremism among students. However Eysenck (1954, p. 236) concluded that “In general no conclusions can be drawn” given evidence for intelligent moderate conservatism, e.g. in middle-class adults, and possible confounds of SES.

Sidanius (1988) made a substantive step with the development of “context theory” (see Fig. 1 panel D). Context theory suggests it is normative – not extreme – attitudes that are compatible with low-information cognitive styles, supported as these normative views are by media tropes and popular communication (Sidanius, 1988). Extremists by contrast, require additional cognitive work invested in internalizing or developing an ideology contrary to that promoted in public communication and protecting this against arguments from centrists. Extremists are also proposed to have not only greater information search and greater interest in politics but also more self-esteem and self-confidence because these could help them generate more convincing arguments to support their political positions and resist the pressures of social approval or social censorship. Sidanius (1988) developed his own measure of complexity, testing how many of six factors e.g., national wealth, that a participant rated as being linked at least moderately to political violence in fictional countries. This involves recognising that complex outcomes often have more than one contributing factor. Other factors deemed as inputs to cognitive sophistication in context theory (Sidanius, 1988) include self-esteem and self-confidence also not measures of cognitive ability per se.

Empirical work testing value pluralism and context theory has found mixed support at best for both models. Early evidence for value pluralism was criticised as relying on artifacts in the original study designs (Gruenfeld, 1995). In an important paper, Van Hiel and Mervielde (2003) compared the predictions of the two context theories against each other in a single dataset. They failed to find clear support for either

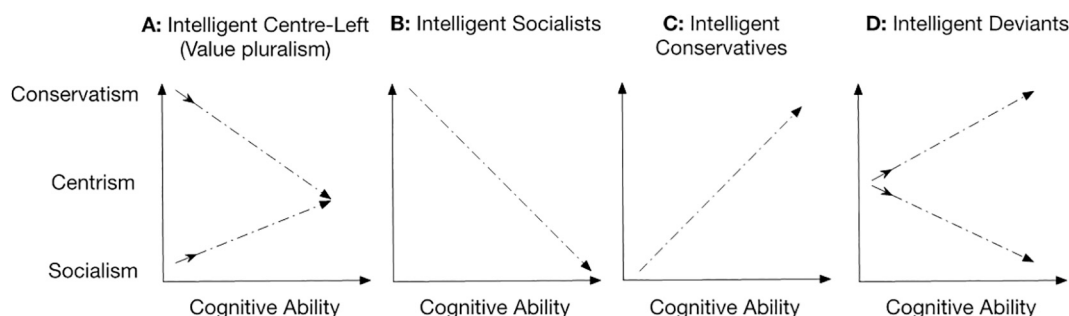


Fig. 1. Four models linking cognitive ability to economic conservatism.

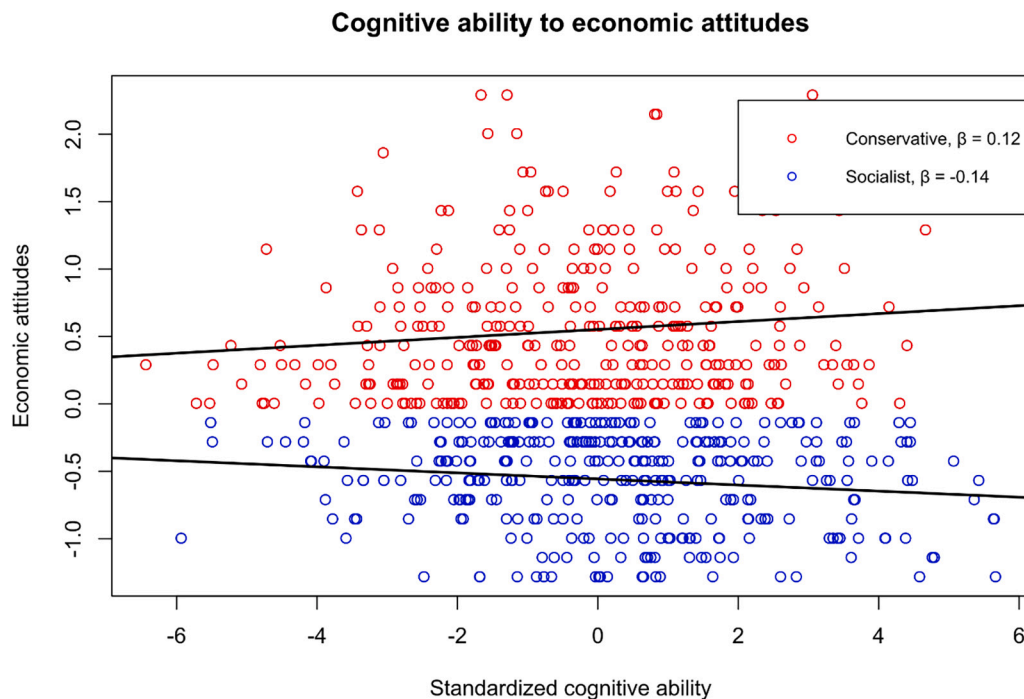


Fig. 2. Economic attitudes linking cognitive ability in Study 1. Economic attitudes calculated as deviation scores: red values capture above average economic conservatism. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

model with repeated failures of the value pluralism model, and partial support (along with some failures) for context theory. Importantly, this paper showed that the measures of cognitive sophistication/complexity themselves correlated almost negligibly, bringing into doubt whether occasional support for the predictions of either theory was due to chance results in relatively small studies rather than a coherent causal effect of a unitary sophistication motive.

#### 4. The present research

The present report resulted from a pilot study ( $N = 700$  adults) designed to test the role of economic knowledge and self-interest raised by Lewis and Bates (2018) as potential mediators or confounds of the association of intelligence with economic conservatism. While we expected to replicate the underlying positive linear association of intelligence and economic conservatism, instead we found no association of economic conservatism with intelligence ( $r = -0.02$ ) and an unexpected positive association of IQ with support for redistribution. Exploring these data, one of us (Bates) wondered whether both high and low scores might be linked to higher intelligence. This was supported. As result, we decided to run study 1 to validate this finding within a clearly stated model and with pre-registered hypotheses to corroborate or refute the effect. We did this in two phases – model development and model testing.

##### 4.1. Study 1

###### 4.1.1. Model development

To date, studies of economic attitudes incorporating cognitive ability as a causal variable have mapped increasing cognitive ability to either increases or decreases in economic conservatism (Jedinger & Burger, 2021). By contrast, extremism models of attitudes (Fig. 1 panels A and D) predict dual effects on both left and right extremism, but have focussed on “cognitive sophistication” as a causal variable rather than cognitive ability per se. Based in models explaining right-leaning attitudes via (low) cognitive complexity (Adorno et al., 1950), measures of cognitive complexity vary widely and, unlike ability tests, correlate

weakly even with each other (Van Hiel & Mervielde, 2003). In a further distinction from cognitive ability measures, complexity responses are scored not for correctness, but for the multiplicity of putative influences and interrelationships used or claimed. For instance perhaps the most widely used measure (Crockett, 1965) scores subjects for how different versus similar their descriptions of various people are from each other. As described above, context theory was tested using measures of seeing complex outcomes as multivariate in nature: perhaps making it comparable to openness to experience and measures of low black-white thinking rather than intelligence. Other factors deemed as crucial mechanisms in context theory include self-esteem and self-confidence (Sidanius, 1988), also not measures of cognitive ability per se. Cognitive sophistication, then, involves a mixture of traits from anti-dogmatism to self-esteem and consideration of multiple viewpoints (Tetlock, 1993), and measures of sophistication correlate only very weakly with each other (Rafaelli-Mor, Gotlib, & Revelle, 1999; Van Hiel & Mervielde, 2003). In the present work, by contrast, while retaining the idea of deviation from norms as a function of cognition, we replace cognitive sophistication with the well-understood construct of cognitive ability. Because intelligence is such a well understood and well measured construct, if it is a driving force of ideological deviancy as we propose, corroborating or refuting this claim should be relatively straightforward. Supporting this view, in a large student sample Kimmelmeier (2008) reported that extreme political scores on the left and right predicted higher SAT scores, i.e., that high SAT scores were associated with political extremism.

Our main hypothesis in study one was that cognitive ability would be associated with the degree of value deviance exhibited by subjects, defined as absolute deviation from the sample mean on economic conservatism. As this expectation conflicts directionally with value pluralism, we also hypothesised that value pluralism would be refuted (by an association in the opposite direction to that predicted from this model). Regarding the linear predictions (models B and C in Fig. 1), we hypothesised a small but significant association of intelligence with economic conservatism would be replicated. To maximise measurement precision, intelligence was assessed with three instruments, and economic conservatism was measured with the full 7-item *economic*



*conservatism scale*. Context theory (Sidanius, 1988) treats self-esteem as important. Here, we view cognitive ability as the key driver, not self-esteem, but predicted that self-efficacy for ability may enhance deviance. Given this, we asked participants to report their self-perceived intelligence score, predicting that self-report intelligence could be associated with value deviance. Sample size was chosen to give 80% power to detect effects above  $r \sim 0.1$  magnitude.

#### 4.1.2. Methods

**4.1.2.1. Subjects.** A total of 700 participants were recruited using the online research participant recruitment service Prolific Academic (350 females, mean age 40.19 years,  $SD = 14.25$ ). We pre-registered a criterion that subjects who completed the questionnaire  $< 1$  min would be excluded. No subjects met this criterion. The racial mix of the sample was representative, with participants identifying as White ( $n = 604$ ; 86.3%), Asian ( $n = 55$ ; 7.8%), Mixed ( $n = 22$ ; 3.1%), Black ( $n = 14$ ; 2%) and other ( $n = 5$ ; 0.7%). The study was approved by the Psychology Research Ethics Committee at the School of Philosophy, Psychology & Language Sciences in the University of Edinburgh. All participants gave informed consent.

**4.1.2.2. Measures and procedure.** Intelligence was measured using three measures: (1) A *paper folding task*, linked to spatial manipulation (Ekstrom, French, Harman, & Dermen, 1976, 2) A *sentence verification test* linked to processing speed (Baddeley, 1968); and (3) A *vocabulary measure* (Warrington, McKenna, & Orpwood, 1998). *Paper folding* consisted of 10 questions each with 3 images showing the process of folding a square of paper before punching a hole in it. Participants were asked to pick the correct image from 5 options showing the result when the paper was unfolded. The McDonald's Omega of *Paper Folding Test* was 0.77 in our sample. *Sentence verification* used 32 True/False questions in which participants indicated the truth or falsity of sentences of the format "A: A is before B". The McDonald's Omega of *sentence verification* was 0.89 in our sample. Finally, in the 25-item *vocabulary measure*, participants viewed target words, and were required to select from two options words which the same meaning as the target. The McDonald's Omega of *vocabulary measure* was 0.71 in our sample. As we had no specific view regarding whether a latent factor such as  $g$  would underpin cognitive ability was scored as the sum of the scaled *paper folding*, *sentence verification*, and *vocabulary measures*. We test the general factor approach in our structural models below with similar outcomes.

Economic conservatism was measured with the 7-item *economic conservatism scale* used in British Cohort Study 1970 and Child Development Study 1958 (Lewis & Bates, 2018). All items are scored with a Likert response scale from 1 (strongly disagree) to 5 (strongly agree). Example items include "Government should redistribute income from the better off to those who are less well off" (reverse-scored) and "Ordinary working people do not get their fair share of the nation's wealth" (reverse-scored). The McDonald's Omega of *economic conservatism* was 0.85 in this study. The sample mean on the *economic conservatism scale* was then used to generate extremism scores for each subject on this test, computed as the absolute deviation of subject's scores from the relevant sample mean. That is, an overall extremism score was computed as the deviation score of *economic conservatism*.

Self-report intelligence was measured using a visual normal distribution labelled as showing the average national general intelligence and labels at 40 to 160, with an instruction for subjects to estimate their score if they took such an objective test. This item was unavailable for 129 subjects. Demographic information was collected through Prolific Academic, including age, gender, household income and education level. Household income ranged from "Less than GBP10,000", to "More than GBP150,000", coded from 1 to 13. Education level had 7 levels from "No formal qualifications" to "Doctorate degree (PhD/other)", coded from 1 to 7.

Procedurally, all items and scales were given in the order reported above. Participants were shown an Information Sheet about how we would use their data and how to keep them safe, they were also informed that it is free to choose to leave the study or delete their responses at any time. After reading the information sheet, participants were offered a consent form asking them if they consented to join this study voluntarily or not. Only participants who choose to join the study voluntarily could proceed to the scales. After participants completed the study, a debriefing sheet was shown explaining the details and purpose of this study and they were returned to prolific academic to verify their participation.

#### 4.1.3. Results

The descriptive statistics and correlations of main variables are shown in Table 1. All hypotheses were tested using multiple regression and structural equation modelling.

The hypothesis that higher intelligence would be associated with economic extremism was tested using a linear model with total intelligence score as the independent variable, and economic extremism as the dependent variable, controlling for age, gender and education level. This supported the hypothesis, with a significant effect of 0.12 (CI95% [0.04, 0.19]) in the predicted direction ( $t(694) = 3.04, p = .002$ ).

To visualise this effect (Fig. 2) we analysed the relationship of intelligence separately for conservative and socialist economic extremism, producing a regression plot for each sub-set. As shown in Fig. 2, both extreme-conservatism and extreme-socialism were associated with intelligence, with beta values of 0.12 ( $t(354) = 2.22, p = .027$ ) and  $-0.14$  ( $t(342) = -2.67, p = .008$ ), respectively. This analysis divides the sample N: The theorized relationship can be captured in the full sample as an interaction between intelligence score and extremism type (conservative and socialist). This interaction was highly significant ( $t(696) = 3.31, p < .001$ ). This result again supported our hypothesis that higher intelligence is associated with economic extremism.

Hypothesis two, that self-report intelligence would be associated with economic extremism was tested using regression, with self-report intelligence score as the independent variable and economic extremism as the dependent variable, controlling for age, gender, and education level. As predicted, self-report intelligence was significantly related to economic extremism ( $t(565) = 2.06, p = .039$ ) though with an effect size smaller than that found for objective intelligence measures ( $\beta = 0.09, CI95\% [0.00, 0.18]$ ).

We next tested for the expected small main effect of intelligence on higher economic conservatism. This was tested in a regression model with total intelligence score as the independent variable, and economic conservatism as the dependent variable, controlling for age, gender, and education level. The prediction was supported, although intelligence was related to economic conservatism ( $\beta = -0.10, CI95\% [-0.17, -0.02], p = .01$ ), the association was smaller than the effect of economic extremism.

Finally, a structural modelling approach was used to express the study hypotheses compactly and at a latent score level, and to include the possible mediating role of self-perceived intelligence as well as latent general ability. The predicted model is shown in Fig. 3. This model fit well (CFI = 0.979, TLI = 0.929, RMSEA = 0.051,  $\chi^2(3) = 8.4, p = .038$ ), almost all fit statistics of the model met recommended cut-off criteria (Hair, Black, Babin, & Anderson, 2010; Schreiber, Nora, Stage, Barlow, & King, 2006). Extremism scores were related to general ability, both directly, and indirectly via confidence in the subject's elevated perception of their own intelligence. Dropping these effects reduced model fit significantly ( $\chi^2(1) = 6.792, p = .009, \Delta AIC = 4.792$ ).

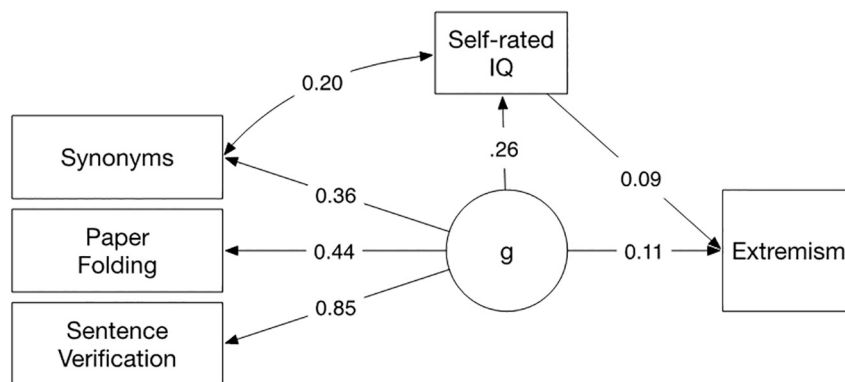
#### 4.1.4. Discussion

We found that cognitive ability positively predicted economic extremism, measured using economic conservatism. A negative relationship between cognitive ability and economic conservatism found in our pilot study was also replicated, but with a tiny effect. Finally,

**Table 1**  
Descriptive statistics and inter-correlations of variables in Study 1.

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Intelligence	0.00 (2.15)	–								
2. Paper Folding	4.74 (2.29)	0.70***	–							
3. Sentence Verification	17.14 (5.95)	0.78***	0.38***	–						
4. Vocabulary Measure	19.09 (3.40)	0.67***	0.15***	0.31***	–					
5. Self-report Intelligence	111.10 (17.55)	0.29***	0.13**	0.22***	0.29***	–				
6. Economic Conservatism	2.28 (0.71)	–0.09*	–0.12**	–0.11**	0.03	0.00	–			
7. Economic Extremism	0.55 (0.44)	0.13***	0.02	0.09*	0.15***	0.13*	0.24***	–		
8. Age	–	–0.01	–0.25***	–0.17***	0.41***	0.04	0.25***	0.04	–	
9. Gender	–	–0.07	0.00	–0.02	–0.15***	–0.27***	–0.04	–0.12**	–0.15***	–
10. Education Level	–	0.19***	0.09*	0.10**	0.22***	0.31***	0.00	0.01	0.01	–0.02

Note. Intelligence is the sum of the scaled *Paper Folding*, *Sentence Verification*, and *Vocabulary Measure*. The range of scores for *Paper Folding* was from 0 to 10; the range of scores for *Sentence Verification* was 0 to 32; the range of scores for *Vocabulary Measure* was 0 to 25; the range of scores for Self-report Intelligence was 40 to 160; the range of scores for *Economic Conservatism* was 1 to 5. \*\*\* =  $p < .001$ , \*\*  $\leq 0.01$ , \*  $\leq 0.05$ .



**Fig. 3.** Structural equation/path model of showing the effect of general ability on economic extremism, as well as partial mediation of this effect via self-report intelligence in Study 1. note: Extremism is the deviation scores on economic conservatism.

economic extremism was also positively predicted by people's estimates of their own intelligence. These results clearly support our ability-based context theory linking high cognitive ability to extreme economic attitudes. Wishing to confirm the robustness of this effect, we conducted a second study replicating the effect, with strict controls to test robustness of the phenomena.

#### 4.2. Study 2

Research on the replication crisis and the related crisis in theory building (Eronen & Bringmann, 2021) overwhelmingly supports the essential role of replication and demonstrations of robustness of phenomena for building a robust, cumulative, science and avoiding degenerative theory that is "not even wrong" (Scheel, 2021). For this reason, the main goal of study 2 was to conduct a replication of study 1, pre-registering our expectation that each of the findings in study 1 would replicate. In addition, since income is related to various political-economic attitudes such as left-right orientations (Rindermann et al., 2012), expressions on political issues (Rae Atkeson & Rapoport, 2003), and preferences toward redistribution (Guillaud, 2013), we added household income as an extra control variable in study 2.

##### 4.2.1. Methods

**4.2.1.1. Subjects.** A total of 703 participants were recruited using Prolific Academic (351 females, mean age 40.3 years (SD = 13.0)). We pre-registered a criterion that subjects who completed the questionnaire <3 min would be excluded. No subjects met this criterion. The racial mix of the sample was representative, with participants identifying as White ( $n = 652$ ; 92.7%), Black ( $n = 18$ ; 2.6%), Asian ( $n = 17$ ; 2.4%), Mixed ( $n = 14$ ; 2.0%) and other ( $n = 2$ ; 0.3%). The study was approved by the

Psychology Research Ethics Committee at the School of Philosophy, Psychology & Language Sciences in the University of Edinburgh. All participants gave informed consent prior to participating and received £1.25 for their participation.

**4.2.1.2. Measures and procedure.** All tests were as described in study 1 above. Cognitive ability was measured using the *paper folding* (Ekstrom et al., 1976), *sentence verification* (Baddeley, 1968) and *vocabulary measures* (Warrington et al., 1998). The McDonald's Omega of these measures was 0.76, 0.90 and 0.70 respectively. Economic conservatism was measured with the British Cohort Study *economic conservatism scale* (Lewis & Bates, 2018), and its McDonald's Omega was 0.83. As study 1, the overall extremism score was computed as the absolute deviation of subject's scores from the relevant sample mean of *economic conservatism*.

Self-report intelligence was measured using a visual normal distribution labelled as labelled at 100 (average) and at 40 (mild retardation) and 160 (gifted), with an instruction for subjects to estimate their score if they took such an objective test. Household income was recorded with 13 levels from "Less than GBP10,000" to "More than GBP150,000", coded 1 to 13. Other demographic information was as in study 1.

Procedurally, after reading an information sheet and consenting to participate these scales were administered in the order reported above. After participants completed the study, a debriefing sheet was shown explaining the details and purpose of this study and they were returned to prolific academic to verify their participation.

##### 4.2.2. Results

Intelligence and economic extremism were scored as in study 1. The descriptive statistics and correlations of main variables are shown in Table 2. Each hypothesis was tested using multiple regression and structural equation models.

**Table 2**  
Descriptive statistics and inter-correlations of variables in Study 2.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10
1. Intelligence	0.00 (2.12)	–									
2. Paper Folding	4.97 (2.29)	0.70***	–								
3. Sentence Verification	18.21 (6.38)	0.74***	0.32***	–							
4. Vocabulary Measure	19.37 (3.27)	0.67***	0.17***	0.26***	–						
5. Self-report Intelligence	106 (17.55)	0.39***	0.25***	0.25***	0.33***	–					
6. Economic Conservatism	2.23 (0.65)	–0.12**	–0.13***	–0.10**	–0.02	–0.05	–				
7. Economic Extremism	1.12 (0.76)	0.10**	0.05	0.05	0.11***	0.13**	0.23***	–			
8. Age	–	0.00	–0.25***	–0.17***	0.41***	0.08*	0.19***	0.05	–		
9. Gender	–	0.00	0.01	0.04	–0.05	–0.17***	–0.04	–0.05	–0.14***	–	
10. Education Level	–	0.21***	0.09*	0.13***	0.23***	0.29***	–0.01	0.07	–0.01	0.03	–
11. Household Income	–	0.11**	0.08*	0.10*	0.05	0.19***	0.20***	0.07	–0.09*	0.03	0.24***

Note. Intelligence is the sum of the scaled *Paper Folding*, *Sentence Verification*, and *Vocabulary Measure*. The range of scores for *Paper Folding* was from 0 to 10; the range of scores for *Sentence Verification* was 0 to 32; the range of scores for *Vocabulary Measure* was 0 to 25; the range of scores for Self-report Intelligence was 40 to 160; the range of scores for *Economic Conservatism* was 1 to 5. \*\*\* =  $p < .001$ , \*\*  $\leq 0.01$ , \*  $\leq 0.05$ .

The hypothesis that the positive association between higher intelligence and economic extremism would be replicated was tested using a linear model with total intelligence score as the independent variable, and economic extremism as the dependent variable, controlling for age, gender, education level, and household income. This was supported by our data, with a significant effect of .09 (CI95% [0.01, 0.16]) in the predicted direction ( $t(696) = 2.23, p = .026$ ).

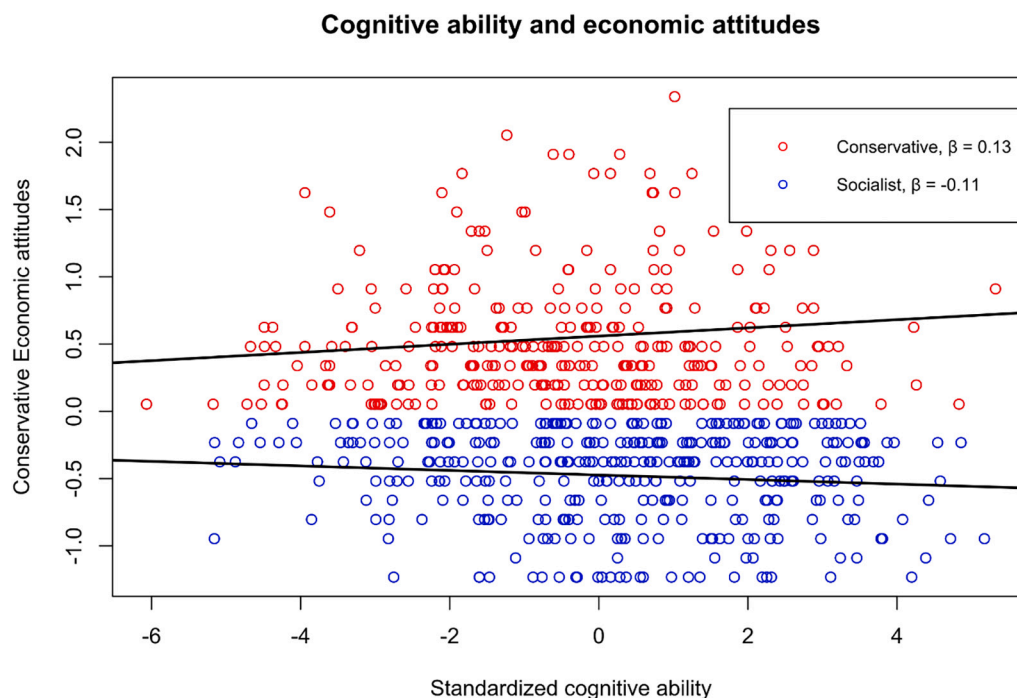
The visualization of intelligence separately for conservative and socialist economic extremism is shown in Fig. 4. Both extreme-conservatism and extreme-socialism were associated with intelligence, with beta values of .13 ( $t(326) = 2.35, p = .019$ ) and  $-0.11$  ( $t(373) = -2.05, p = .041$ ), respectively. This analysis can be captured in the full sample as an interaction between intelligence score and extremism type (conservative and socialist), and this interaction was highly significant ( $t(699) = 3.18, p = .002$ ). This result again supported our hypothesis that higher intelligence is associated with economic extremism.

The second hypothesis, that self-report intelligence would be positively associated with economic extremism would be replicated was tested using regression, with self-report intelligence score as the independent variable and economic extremism as the dependent variable,

controlling for age, gender, education level, and household income. This relationship was also replicated, self-report intelligence was significantly related to economic extremism ( $t(696) = 2.51, p = .012$ ) with an effect size of .09 (CI95% [0.02, 0.18]).

We next tested for the expected small main effect of intelligence on higher economic conservatism. This was tested in a regression model with total intelligence score as the independent variable, and economic conservatism as the dependent variable, controlling for age, gender, education level, and household income. This prediction was not supported by our data. Instead, intelligence was related to lower economic conservatism ( $\beta = -0.14, \text{CI95\%} [-0.21, -0.07], p < .001$ ).

Finally, structural modelling was used to express the study hypotheses compactly and at a latent score level, and to include the possible mediating role of self-perceived intelligence as well as latent general ability. This model fit well (CFI = 0.989, TLI = 0.962, RMSEA = 0.038,  $\chi^2(3) = 5.97, p = .113$ ), the predicted model is shown in Fig. 5. Extremism scores were related to general ability, both directly, and indirectly via confidence in the subject’s elevated perception of their own intelligence. The Likelihood Ratio test showed that dropping these effects slightly reduced model fit ( $\chi^2(1) = 4.841, p = .028, \Delta\text{AIC} =$



**Fig. 4.** Economic attitudes linking cognitive ability in Study 2. Economic attitudes calculated as deviation scores: red values capture above average economic conservatism. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

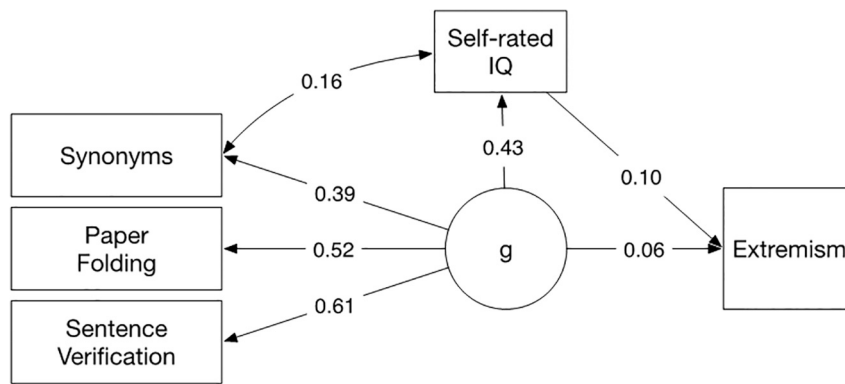


Fig. 5. Structural equation model showing the effect of general ability on economic extremism in Study 2, as well as partial mediation of this effect via self-report intelligence.

2.841).

#### 4.2.3. Discussion

In study 2, we replicated the predicted findings from study 1 with comparable effect sizes in a large independent sample. This result provided further supports to our predictions based on the context theory that high cognitive ability is associated with extreme economic attitudes. To further confirm the stability and reliability of this phenomenon, we next report a second replication in a large national cohort, with different measures of intelligence, but the same measure of economic conservatism and with a 30- and 42-year longitudinal gap between assessment of intelligence and economic attitudes to test the association between cognitive ability and extreme economic attitudes in two different age stages.

### 4.3. Study 3

The two independent samples of study 1 and 2 both showed significant relationships between cognitive ability and extreme economic attitudes. To confirm the robustness of this association, we conducted study 3 to test our predictions from study 1 and 2 in a population-based representative, longitudinal, dataset – the 1970 British Cohort Study (BCS1970) – in which participant cognitive ability was assessed at age 10 (University of London, I. o. E, et al., 2021), and attitudes toward economic conservatism were assessed at age 30 and again at age 42 (University of London, 2021a, 2021b). We would use these data to test our predictions across two different age stages, predicting the positive link between cognitive ability and extreme economic attitudes would replicate across three and four decades in a national representative cohort. Since this dataset is openly available, and as we have used it previously, we did not pre-register our hypotheses in study 3.

#### 4.3.1. Methods

**4.3.1.1. Subjects.** The BCS1970 is an ongoing longitudinal study includes 14,870 participants born in the UK between April 5th and 11th 1970. A total of 11,563 participants completed the cognitive ability test when they were 10 years old (5614 females), and there were 10,286 (5290 females) and 8070 (4283 females) participants completed measures of economic conservatism when they were age 30 and 42, respectively. Of these who completed cognitive ability test, 8233 and 6445 people provided complete data for the economic conservatism measure at age 30 and age 42.

**4.3.1.2. Measures and procedure.** Cognitive ability was measured using four subscales when participants were 10 years old: *Word Definitions*, *Recall of Digits*, *Similarities* and *Matrices*. The *Word Definitions* subscale consisted of 37 words, participants were asked to explain the meaning of

each word and then responses would be rated as “Acceptable” or “Unacceptable” by the examiner. The McDonald’s Omega of *Word Definitions* subscale was 0.86. *Recall of Digits* subscale had 34 items, each item was a task to repeat digits read out by the examiner, participant’s responses were recoded as “Correct recall” or “Incorrect recall”. The McDonald’s Omega of *Recall of Digits* subscale was 0.75. *Similarities* subscale had 42 items; participants were asked to say a word which was consistent with the 3 words given by the examiner. Participant’s responses were coded as “Acceptable” or “Unacceptable”, the McDonald’s Omega of *Similarities* subscale was 0.71. The *Matrices* subscale consisted of 28 items, each item was arrayed as an incomplete grid by several shapes, participants were asked to complete the grid based on the pattern of other shapes by drawing. Participant’s responses were coded as “Acceptable” or “Unacceptable”, the McDonald’s Omega of *Matrices* subscale was 0.86. The mean score of all four subscales was used as the total cognitive ability score in this study.

Economic conservatism was measured when participants were 30 and 42 years old. The economic conservatism measure at age 30 was the same as the 7-item *economic conservatism scale* we used in study 1 and 2. The McDonald’s Omega of this 7-item measure was 0.67. The economic conservatism measure at age 42 wave used 4 items picked from the 7-item economic conservatism scale, the McDonald’s Omega of the 4-item measure was 0.72. As study 1 and 2, the extremism score was computed as the absolute deviation of participant’s economic conservatism scores from the relevant sample mean.

Income of each participant was recorded by using “Gross pay (amount)” and “Net earnings from employment” at age 30 and age 42 waves, respectively.

Procedurally, cognitive ability measures at age 10 were collected through interview conducted by health visitors, and participants who were born in Northern Ireland were dropped from the study in all subsequent sweep (Elliott & Shepherd, 2006). Economic conservatism measures at age 30 and 42 were conducted through computer aided interviews (Brown, 2014). The majority of BCS70 data, including metadata and copies of the surveys could be accessed by registering with the UK Data Service.

#### 4.3.2. Results

The descriptive statistics and correlations of main variables of study 3 are shown in Table 3. Each prediction was tested using multiple regression and structural equation models.

The prediction that the association between higher intelligence and economic extremism would be positive was tested using a linear model with total intelligence score as the independent variable, and economic extremism as the dependent variable, controlling for gender and income. This was supported with significant effects of 0.04 (CI95% [0.01, 0.06]) and 0.05 (CI95% [0.02, 0.07]) in the predicted direction in both age 30 data ( $t(5718) = 2.69, p = .007$ ) and age 42 data ( $t(4447) = 3.07, p =$



**Table 3**  
Descriptive statistics and inter-correlations of variables in Study 3.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11
1. Intelligence	1.71 (0.08)	–										
2. Word Definitions	1.54 (0.18)	0.69***	–									
3. Recall of Digits	1.75 (0.08)	0.48***	0.18***	–								
4. Similarities	1.85 (0.08)	0.63***	0.33***	0.14***	–							
5. Matrices	1.61 (0.17)	0.78***	0.36***	0.17***	0.33***	–						
6. Economic Conservatism (age 30)	3.26 (0.54)	0.14***	0.09***	0.04***	0.09***	0.13***	–					
7. Economic Conservatism (age 42)	3.00 (0.70)	0.11***	0.08***	0.02	0.09***	0.10***	0.54***	–				
8. Economic Extremism (age 30)	0.42 (0.33)	0.04***	0.04***	0.04***	0.01	0.02	–0.04***	0.03**	–			
9. Economic Extremism (age 42)	0.54 (0.44)	0.04***	0.07***	0.03*	–0.01	0.03*	0.00	–0.02	0.32***	–		
10. Gender	–	0.06***	–0.03**	0.03**	0.08***	0.06***	0.07***	–0.04***	–0.10***	–0.09***	–	
11. Income (age 30)	5166 (13,045.80)	0.11***	0.09***	0.03*	0.06***	0.10***	0.14***	0.12***	0.05***	0.06***	–0.06***	–
12. Income (age 42)	2754 (10,619.91)	0.05***	0.04***	0.03*	0.03*	0.03*	0.07***	0.10***	0.06***	0.07***	–0.10***	0.11***

Note. Intelligence is the mean of the *Word Definitions*, *Recall of Digits*, *Similarities*, and *Matrices* subscale. The range of scores for *Word Definitions*, *Recall of Digits*, *Similarities*, and *Matrices* was 1 to 2; the range of scores for *Economic Conservatism* was 1 to 5. \*\*\* =  $p < .001$ , \*\*  $\leq 0.01$ , \*  $\leq 0.05$ .

.002), respectively. The relationship between higher intelligence and more economic extremism was successfully replicated, furthermore, as shown in Fig. 6, these results indicated this relationship was stable across different age stages.

We next tested for the expected small main effect of intelligence on higher economic conservatism. This was tested in a regression model with total intelligence score as the independent variable, and economic conservatism as the dependent variables, controlling for gender and income. The prediction was not supported by both datasets. Intelligence was significantly related to higher economic conservatism not only in the age 30 dataset ( $t(5718) = 8.44, p < .001$ ) with a beta value of 0.11 (CI95% [0.08, 0.14]), but also in the age 42 dataset ( $t(4447) = 5.66, p < .001$ ) with a beta value of 0.08 (CI95% [0.06, 0.11]).

Finally, a structural model was built expressing the study hypotheses compactly and at a latent score level. To make the model concise, we combined the economic extremism score at age 30 and age 42 as the

total economic extremism. This model fit well (CFI = 0.993, TLI = 0.986, RMSEA = 0.02,  $\chi^2(5) = 34.33, p < .001$ ), almost all fit statistics of the model met recommended cut-off criteria (Hair et al., 2010; Schreiber et al., 2006). As shown in Fig. 7, the total economic extremism was significantly associated with general ability with a beta value of 0.07 (CI95% [0.04, 0.09]).

4.3.3. Discussion

Study 3 replicated the predicted findings from study 1 and 2 with comparable effect sizes in a large longitudinal sample. Thus whereas tests of cognitive complexity models of extremism (Sidanius, 1988) have yielded weak support, our cognitive ability extremism model replicated in three independent datasets, showing this model is stable across different samples and stages of life. The direction of findings – with higher ability associated with extremist views is incompatible in sign with models linking high cognitive complexity to left-of-centre

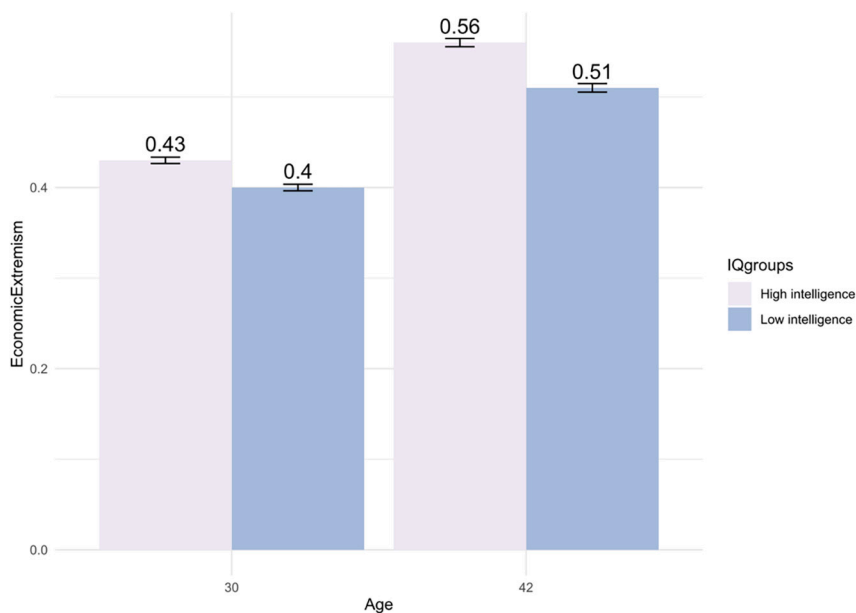


Fig. 6. The average economic extremism score in high (above average) and low (below average) intelligence groups across two age stages. Error bars show standard errors.

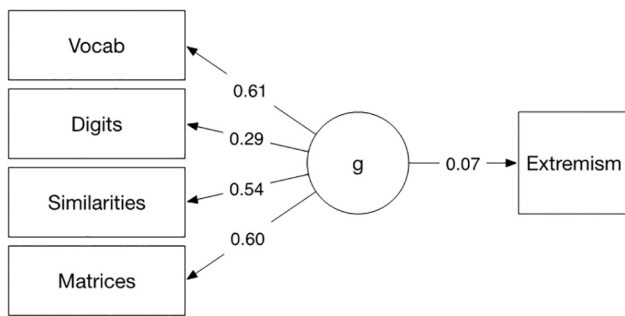


Fig. 7. Structural equation model showing the effect of general ability on total economic extremism in Study 3.

economic attitudes (Tetlock, 1993). Finally, regarding the simple association of cognitive ability with conservative economic attitudes, study 3 showed a significant association of cognitive ability with a preference for more conservative and less redistributive economic policy: a result distinct from that of study 1 and 2 (significant in the opposite direction) and pilot study (non-significant). We discuss a likely account of this variation in terms of intelligence tracking a consensus which itself changes across time – a *bien pensant* model in which brighter people are better at solving for the “current thing” (Di Palma & McClosky, 1970).

These results are important for two reasons. First, all three studies presented here find that cognitive ability influences economic views by determining how far these views deviate from the normative consensus. This contrasts with and expands the existing literature on cognitive ability and economic values which has been restricted to tests of linear associations with economic attitudes which masks links to absolute levels of deviation. Second, the contrast with previous mixed results from research on cognitive complexity supports the idea that it is cognitive ability not cognitive complexity which is the causal cognitive variable driving economic extremism. These cognitive complexity models have received mixed support at best, as might be expected if cognitive ability rather than non-cognitive complexity is the causal variable, and given the lack of correlation with intelligence with cognitive complexity measures (O’Keefe & Sypher, 1981).

In addition to extremism, we found support for a positive, neutral and negative association of ability with redistributive economic policy. This variability is compatible with the variability highlighted by Jedinger and Burger (2021). What could explain cognitive ability being significantly associated with conservative economic views in some samples (e.g. our study 3), negligible effects in others (e.g. our pilot study) and, (e.g. our study 1 and 2), showing significant links to progressive economic views? To the extent that the economic needs of a nation are dynamic, we suggest that cognitive ability aids understanding these changing demands and leads to ability being associated with support for these, be they more market policy in some samples or more centralization in others and at other times. For instance in times of high unemployment, trade deficits, or economic stresses and rapidly increasing public debt such as those associated with Covid-19 (when study 1 and 2 data were collected here in the UK), consensus attitudes might move toward support for more interventionist policy, while times of widespread wealth generation might be associated with a broad appreciation that a more market economic stance is appropriate. This model would not link cognitive ability to a particular magnitude or even sign of association with economic redistribution, but would predict dynamic alignment with what appears to be the “correct” answer, corresponding to a currently accepted mainstream view. This is similar to ideas raised earlier regarding the roll of cognition tracking current consensus (Di Palma & McClosky, 1970). If so, cognitive ability has two roles in support for redistributive economic policy, one tracking conformity to the currently desired policy, and a second role driving extremism: defined as deviance around and away from this dynamic

middle ground consensus. The latter can of course act as policy options which may become normalized.

This suggests opportunities to test possibly overlooked associations of cognitive ability to attitudes beyond economic attitudes to other enlightenment-linked but polarising socio-economic or ideology-linked attitudes such as globalism-nationalism (Carl, 2018). Examination of extremism with other factors previously associated with socio-political attitudes, for instance openness to experience (McCrae & Greenberg, 2014) or need for cognition (Cacioppo, Petty, & Kao, 1984) would be valuable. It seems plausible that openness, with its links to revisiting and re-evaluating one’s opinions and experiences may conform to centrism models, while cognitive ability is linked to extremism.

There are limitations to this initial finding, and future directions. It would be valuable to see independent labs replicate the finding with alternate measures of ability or economic tendency, testing how much of economic extremism could be explained by intelligence. Additionally, our studies did not measure self-identification as liberal or conservative, and it would be worth testing whether there is an asymmetry between liberals and conservatives in extremism in the future study. It would be valuable to test the effects across a change in mainstream consensus to confirm that bright people track this “*bien pensant*” or approved orthodoxy (this, we think, likely accounts for the strong positive average association found here in study two in the aftermath of Covid borrowing and health challenges). Furthermore, our study mainly focused on the extremism of economic beliefs, it would be valuable also to test the extremism of other beliefs (e.g. general political) or to examine the effects in countries with very different (less and more market) economies.

In terms of future directions, two implications could be explored and tested. First, if cognitive extremes are linked to ideological extremes, this may provide a partial rationale for aversion to governance by technocrats, e.g. as noted by William F. Buckley, Jr. in his quote that he “*would rather entrust the government of the United States to the first 400 people listed in the Boston telephone directory than to the faculty of Harvard University*”. If intellectuals tend to hold extremist views, people seeking moderate leadership may find less-intellectual leaders more appealing due to lower attraction/higher repulsion to extremes. Second, the model implies possible runaway extremism in groups which are selected both for intellect and for low ideological diversity. While in unselected intellectual groups, a range of competing views may tend to balance out and improve each other, but in groups selected for both high ability and viewpoint uniformity (e.g. Duarte et al., 2015), loss of cognitive diversity may have the unplanned side effect of generating ever more extreme theories as intellect explores ideas more extreme from this lopsided consensus. Relatedly, whether intelligent people are more (Rasmussen & Ludeke, 2021) or less (Ganzach & Schul, 2021) tolerant should be explored and resolved. Models developed by Ganzach and Schul (2021) which orthogonalize extremism and political orientation and predict tolerance/intolerance on the basis of an interaction with intelligence are a valuable direction in this regard.

## 5. Summary

The three studies presented here advance what might be termed “*cognitive sociology*”, showing that cognitive ability accounts for a significant factor in economic ideology: namely extremism, or how far an individual’s views fall from the mainstream or consensus view with extremes of intelligence and groups selected for intelligence tending to contain extremists.

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## Declaration of Competing Interest

We declare that we have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Access links to data are shared on OSF

## Acknowledgement

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.intell.2022.101699>.

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