Psychological Research (2023) 87:2533–2547
https://doi.org/10.1007/s00426-023-01832-w

RESEARCH

# Does social rigidity predict cognitive rigidity? Profiles of socio-cognitive polarization

**Carola Salvi[1,2] · Paola Iannello[3] · Alice Cancer[3] · Samuel E. Cooper[1] · Mason McClay[4] · Joseph E. Dunsmoor[1] · Alessandro Antonietti[3]**

Received: 21 June 2022 / Accepted: 26 April 2023 / Published online: 6 May 2023


**Abstract**
Recent research has proposed a relationship between rigid political ideologies and underlying 'cognitive styles'. However, there remain discrepancies in how both social and cognitive rigidity are defined and measured. Problem-solving, or the ability to generate novel ideas by exploring unusual reasoning paths and challenging rigid perspectives around us, is often used to operationalize cognitive flexibility. Thus, we hypothesized a relation between forms of social rigidity, including Socio-cognitive polarization (i.e., a factor capturing conservative political ideology, absolutism/intolerance of ambiguity, and xenophobia), bullshit receptivity (i.e., overestimating pseudo-profound statements), overclaiming (tendency to self-enhance), and cognitive rigidity (i.e., problem-solving). Our results showed differences in performance on problem-solving tasks between four latent profiles of social rigidity identified in our sample. Specifically, those low in socio-cognitive polarization, bullshit, and overclaiming (i.e., less rigid) performed the best on problem-solving. Thus, we conclude that social and cognitive rigidity may share an underlying socio-cognitive construct, wherein those who are more socially rigid are also more likely to be also cognitively rigid when processing non-social information.

## Introduction

Since Adorno and colleagues' classic work on the authoritarian personality, psychologists and sociologists have theorized a connection between different forms of social rigidity (Cools & Robbins, 2004; Kehagia et al., 2010, Adorno et al.,1950; Frenkel-Brunswik, 1948, 1949, 1951; Jost, 2017). While most of the theories have hypothesized a relationship between a rigid 'cognitive style' of reasoning and ideological attitudes, there are discrepancies in the literature on how a 'cognitive style' is defined and measured (e.g., Davids, 1963; Eckhardt, 1991; Frenkel-Brunswik, 1949; Kohn, 1974; O'Connor, 1952; Vannoy, 1965). For instance, many studies rely on self-report questionnaires (i.e., on political conservatism) and qualitative measures rather than objective tests assessing cognitive functions (Onraet et al., 2015; Van Hiel et al., 2016). Thus, researchers have proposed mapping cognition onto political orientation using measures that are based on political content-free (i.e., pure cognitive tasks) such as those used in cognitive neuroscience (e.g., Remote Associates Test. See Jost, 2017; Rollwage et al., 2019; Salvi et al., 2016a, b, c; Zmigrod et al., 2018; Zmigrod, 2022). Early results using these tests show an inverse relationship between features of social rigidity (e.g., conservative ideologies, intolerance of uncertainty, need for order/structure) and cognitive flexibility, namely, the ability to solve problems by considering alternatives and changing one's point of view (Zmigrod, 2018; Salvi, et al.,2016a, b, c). Problem-solving is considered an expression of cognitive flexibility, which translates into the ability to generate novel and original ideas by exploring unusual reasoning paths and challenging rigid perspectives around us (De Dreu et al., 2008; De Dreu et al., 2008; Perry-Smith & Mannucci, 2017). While problem-solving has been shown to positively predict the ability to discern veridical from false or misleading information, cognitive attributes including bullshit receptivity (i.e., the tendency to believe in pseudo-profound

✉ Carola Salvi
carola.salvi@austin.utexas.edu

1 Department of Psychiatry and Behavioral Sciences, University of Texas at Austin, Austin, TX, USA

2 Department of Psychology and Social Sciences, John Cabot University, Rome, Italy

3 Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy

4 Department of Psychology, University of California, Los Angeles, CA, USA

statements) and overclaiming (i.e., the tendency to claim to know something that actually does not exist) have been demonstrated to predict lower discernment of misinformation (e.g., Pennycook et al., 2020; Salvi et al., 2021a, b, 2022).

We recently proposed the construct of *socio-cognitive polarization* (SCP), which includes conservative political ideology, absolutism/intolerance of ambiguity, and xenophobia, to capture dimensions that share features of social and cognitive rigidity that go beyond just pure political beliefs (Salvi et al., 2021a, b). The shared literature on emotional, social, and cognitive factors underlying SCP suggests that people who score higher in these social measures may be less likely to handle complexity (such as understanding vaccination efficacy; Cancer et al., 2023a, b) and thus fail to seek out alternative explanations when processing especially novel information (Salvi et al., 2016a, b, c, 2021a, b; Rollwage, Zmigrod et al., 2019; Zmigrod et al., 2018, 2019). Therefore, people higher in SCP may be more prone to rate pseudo-profound bullshit statements as profound, and to their overclaim knowledge about fake historical events. Bullshit receptivity requires a degree of analytical engagement with the content, while overclaiming is an actuarial, objective measure of faking that is often associated with bullshit and fabricating of information (Pennycook & Rand, 2020).

In the present study, we aimed to investigate the relationship between social and cognitive rigidity. To this end, we compared performance on cognitive tasks (problem-solving, bullshit receptivity, and overclaiming), between latent profiles of social rigidity (SCP) in our samples. We aim to identify 'cognitive styles' based on the association between SCP, problem-solving, bullshit receptivity, and overclaiming. In the following section, we outline each of the social variables investigated in the current study and argue for their respective theoretical and empirical ties to cognitive rigidity.

## Socio-cognitive polarization

Most of the research on political ideologies focuses on political orientation and extremism, often neglecting several aspects related to how people conceive politics and what is the cognitive architecture behind political partisanship. In line with Adorno's view of 'cognitive styles', we believe that political ideologies are the expression of multifaced underlined structures. Therefore, in our recent paper, we proposed a novel construct called *Socio-Cognitive Polarization* (SCP), which goes beyond conservatism, extending to tolerance to ambiguity and xenophobia (see Salvi et al., 2021a, b and Cancer et al., 2023 for more details). In the following section, we justify our construct by showing how these factors are interdependent and motivate their relationship with problem-solving.

## Conservatism

According to the 'rigidity of the right' perspective, politically conservative beliefs are paired with cognitive and even perceptual rigidity (e.g., Jost et al., 2003; Tetlock et al., 1985). This framework is explained as a form of 'motivated social cognition', where politically right-wing attitudes are grounded in feelings of fear and uncertainty avoidance, which would result in conservative attitudes (e.g., resist any change to the *status quo* and a preference toward order and structure). Compared to moderates, people with polarized political perspectives experience more negative emotions about politics and tend to derogate outgroups (van Prooijen et al., 2015a, b), conceive politics in more simplistic terms (Lammers et al., 2017), are more likely to reject external information and exhibit greater belief of superiority (Brandt et al., 2015; Baron et al., 2022). Political extremists seem to be more prone to inductive reasoning only when information is provided by other extremist in groups and tend to neglect sources of information that differ from their beliefs (Hardin, 2002). Furthermore, they tend to construct simple political solutions to complex societal issues, a behavior that predicts their likelihood of believing in conspiracy theories (van Prooijen, Krouwel, & Pollet, 2015). Political extremism is, indeed, associated with black-and-white dichotomous thinking where social facts are seen as good or evil, positive, or negative (Greenberg & Jonas, 2003; Priniski et al., 2021).

Adorno, Frenkel-Brunswik, Levinson, and Sanford proposed that the rigidity of conservative people would also be expressed in non-political contexts, such as in perceptual processing and problem-solving (Jost, 2017; Rollwage et al., 2019; Salvi et al., 2016a, b, c; Zmigrod, 2020; Zmigrod et al., 2018, 2019). In 2016, we reported that liberals were more insightful than conservatives when solving (i.e., free from social content) free problems, i.e., Remote Associates (Bowden & Jung-Beeman, 2003; Salvi et al., 2016a, b, c). Conservative political orientation was also associated with a tendency to make errors of commission (i.e., giving incorrect responses) more frequently than people with a liberal political orientation. This study found evidence that differences in political orientation are also apparent in a structured and quantitative task that measures problem-solving regardless of any political content. More recently, Zmigrod and colleagues (2020) showed that there is a U shaped relation between political partisanship and three different problem-solving tasks—the Remote Associates, the Wisconsin Card Sorting Test, and the Alternative Uses Task—that have been classically used to operationalize specific dimensions of

cognitive flexibility.[1] People who exhibit politically polarized perspectives, in either conservative or liberal orientations, performed worse on problem solving, whereas those who were more moderate scored higher (Zmigrod et al., 2020). These studies demonstrate how problem-solving ability is negatively related to polarized ideological thinking, also in the realms of nationalism (Zmigrod et al., 2018), extremism, religiosity (Zmigrod et al., 2019), and dogmatism (Zmigrod et al., 2019).

## Tolerance for ambiguity

Ambiguous situations are those which could be unclear, confusing, or interpreted in more than one way. Those who are intolerant of ambiguity tend to resort to black-or-white solutions and are distinguished for their quick and overconfident judgment, even at the neglect of reality (Frenkel-Brunswik, 1949). By contrast, those who are tolerant of ambiguity are attracted to situations they find ambiguous, challenging, and complex. They are also individuals who score highly on the openness to experience and sensation-seeking behavior scales (Caligiuri et al., 2000; Lauriola et al., 2007; McLain, 1993, 2009). Individuals with a low tolerance for ambiguity present an aversive reaction to ambiguous situations, often because the lack of information makes it difficult to evaluate risk and thus make decisions. These scenarios are perceived as a source of discomfort and people react to a perceived threat with stress, avoidance, delay, suppression, and denial (Budner, 1962; Mac Donald, 1970; McLain, 1993; Furnham & Ribchester, 1995; Iannello et al., 2017). Tolerance for ambiguity negatively correlates with right-wing attitudes and xenophobia. Zmigrod et al. (2018) found that participants' intolerance for uncertainty and dependence on routines and traditions in their daily lives act as proxies for subjective behavioral flexibility in contexts of ambiguity and volatility. The tolerance for ambiguity scale negatively correlates with authoritarianism (Mac Donald, 1970) and ethnocentrism (O'Connor, 1952) and positively with openness (Bardi et al., 2009), extraversion, and novelty-seeking (Rajagopal & Hamouz, 2009). We decided to include this scale in our construct since tolerance for ambiguity is a well-established trait of personality, also known to predict creativity and problem-solving (Merrotsy, 2013). The Multidimensional Attitude Toward Ambiguity Scale used in this study detects three different dimensions of intolerance for ambiguity: the affective (Discomfort with Ambiguity), cognitive (Moral Absolutism/Splitting), and epistemic (Need for Complexity and Novelty) components (Lauriola et al., 2016).

## Xenophobia

From previous studies, we know that skilled problem-solving is associated with flexible political perspectives, tolerance to diversity, morality, and fake news discernment (Shen et al., 2018, 2019; Salvi et al., 2016a, b, c; Salvi et al., 2021a, b ; Zmigrod, 2020). A recent study by Zmigrod et al. (2018) investigated the cognitive underpinnings of nationalistic ideology and showed that the adoption of strongly nationalistic attitudes in the context of the EU referendum was related to reduced psychological flexibility across multiple content-free tasks used to study problem solving (i.e., Wisconsin Card Sorting Test and Remote Associates Test). Attitudes in favor of Brexit were associated with authoritarian, nationalistic, and conservative, ideological orientations. The results also revealed significant negative correlations between xenophobic attitudes (i.e., positive feelings toward Brexit and negative feelings toward immigration, the European Union, and free movement of labor) and cognitive flexibility measured using problem solving tasks.

Because conservatism, tolerance to ambiguity, and xenophobia share several critical characteristics including a negative correlation with problem-solving, we collapsed them into a single construct: socio-cognitive polarization (SCP).

## Bullshit receptivity and overclaiming

Ideologically biased narratives are often associated with a lower ability to engage with complex, effortful, analytical thinking versus simple, heuristics-based, thinking (Adorno et al., 1950; Jost & Krochik, 2014; Jost et al., 2003). In the literature on political ideology and voting behavior, we found two dimensions associated with social rigidity that are relatively unexplored: bullshit receptivity and overclaiming.

*Bullshit receptivity* (BR) has been defined as the tendency to believe in pseudo-profound statements and it is associated with right-wing ideology (Frankfurt, 2005; Nilsson et al., 2019). Pennycook et al. (2015) introduced the Bullshit Receptivity Scale and showed that tendency to rate bullshit sentences as profound is consistently associated with a lower problem-solving ability (measured using the Cognitive Reflection Test—CRT), religious and paranormal beliefs, stronger beliefs in alternative medicine and conspiracy

[1] As reviewed by Ionescu (2012), there are several behavioral tasks that are classically used to operationalize cognitive flexibility in adults, including the Wisconsin Card Sorting Test (Grant & Berg, 1948), task switching and optional shift paradigms (Miyake & Friedman, 2012), the Alternative Uses Task (AUT; Guilford, et al. 1978), insight problems (Salvi, Costantini, Pace & Palmiero, 2018), and induction tasks (Shafto, Coley, & Vitkin, 2007).

theories, and ontological confusion.[2] Recently, Nilsson et al. (2019) showed an overlap between BR and social conservatism, economic right-wing ideologies, respect for authority, purity, and resistance to change.

*Overclaiming.* Extreme political ideologies are often seen in association with a tendency to overclaim. Regardless of the actual knowledge people have on a certain political matter, people who express radical political ideologies often tend to advocate for their ideology, even when lacking real information, and pursue their ideas with zeal and conviction (McGregor, 2006). For example, they tend to have more confidence in their domain-specific knowledge of geopolitical events (van Prooijen et al., 2018; Baron et al., 2022) and Van Prooijen et al. (2020) showed that knowledge overclaiming predicts anti-establishment voting, particularly in the radical right.

Bullshit Receptivity and Overclaiming (termed BR_O here) have been studied mostly in relation to reasoning factors such as the Cognitive Reflection Task (CRT- Frederick, 2005) as a measure of engaging in analytical reasoning; however, evidence from better-structured problem-solving tasks is lacking. CRT problems are often tricky and require high-level pragmatic competence to be solved (rather than logical analytic thinking) (e.g., Macchi & Bagassi, 2012). As a proxy of these two constructs, we administered two scales that measure people's tendency to believe in pseudo-profound statements and to 'self-enhance' when asked about their familiarity with general knowledge questions (i.e., overclaiming, operationalized here as an index of self-confidence in meaning fabrication).

To investigate how these social constructs may share an underlying relationship to cognitive rigidity, we implemented a latent profile analysis (LPA) approach. LPA is a mixture-model (i.e., probabilistic) technique for detecting sub-populations within a set of continuous measurements and is well-suited for dimension-reduction of multiple observed variables that represent different facets of a superordinate construct (Ferguson et al., 2020; Oberski, 2016). A benefit of LPA in the context of the current investigation is that it yields empirically derived groupings that have qualitative meaning while allowing for quantitative prediction of outcome variables. Under this approach, we assumed that LPA would be able to detect homogenous subpopulations within our overall sample and that these subpopulations would represent distinct 'types' of people in relation to SCP and BR_O variables. We hypothesized that individual SCP and BR_O profiles would differ in problem-solving task performance. Specifically, we hypothesized that those identified as belonging to the latent profile with the highest SCP and BR_O scores would perform worse on problem-solving tasks compared to those on the lowest-scoring SCP latent profile.

[2] Ontological confusion occurs when the elements that make up the natural world and the basic rules that govern them become confused and misrepresented. Ontological confusion has been found to be a strong predictor of non-evidence based beliefs (Lobato et al. 2014).

## Methods

### Study design

An online survey, hosted by Qualtrics (Qualtrics.com), was administered in Italy (3–24 April 2020) and the US (14–28 April 2020). Invitations to voluntarily participate in the study were shared via email, social media platforms, and psychology and creativity websites. Preliminary analyses of the collected data were reported by Salvi and colleagues 2021a, b. Data and material can be found at https://osf.io/4pd2u/.

### Participants

Five hundred seventy-five participants (300 Italians, and 275 Americans) were recruited to complete the survey. Analyses were conducted on data from 525 participants (272 Italians, 253 Americans; 378 women, 145 men, 2 self-reported as other or undisclosed, *M* age = 37.86 yrs., *SD* age = 16.29) who completed each measure of the survey.

### Survey measures

For a complete list of survey measures, refer to Salvi and colleagues 2021a, b. Measures that were included in the design of the present study are listed below.

#### Problem solving

Problem-solving abilities were assessed using two performance tasks, namely, the rebus puzzle task, taken from Salvi and colleagues 2016a, b, c, and a selection of problems from the Cognitive Reflection Test (CRT; Frederick, 2005; Thomson & Oppenheimer, 2016).

**Rebus puzzles** Participants were asked to solve 20 rebus puzzles (Salvi et al., 2016a, b, c for the Italian version; MacGregor & Cunningham, 2008 for the English version) by providing a common phrase as a text string response for each rebus. To formulate a response, participants had to merge the verbal and visual clues in each puzzle. For example, "/R/E/A/D/I/N/G/" is solved "Reading between the lines". A rebus puzzle accuracy score (i.e., percent of solved problems) was calculated and considered in the analyses. Rebus Puzzles have several characteristics in common with Remote Associates and they are often

used to study insight problem-solving and were used by Zmigrod and coworkers as a measure of Cognitive flexibility (e.g., Salvi et al., 2016a, b, c; Bowden & Jung-Beeman, 2003 ). These problems have been determined to be an accurate and reliable measure of cognitive flexibility through multiple behavioral and neurological studies (e.g., Cancer et al., 2023a, b; Cristofori et al., 2018; Salvi and Costantini, et al. 2015; Salvi et al., 2020a, b; Salvi et al., 2020a, b; Salvi and Leiker et al. 2021a, b; Santarnecchi et al., 2019; Sprugnoli et al., 2021).

**Cognitive reflection test problems** Four Cognitive Reflection Test (CRT) problems from Frederick (2005) and Thomson and Oppenheimer (2016) (Italian version, Baldi et al., 2013; Oldrati et al., 2016) were selected and administered to the participants, namely, the 'bat and ball', 'machines', 'lily pads', and 'Emily's' problems. CRT problems are deliberately designed to induce an immediate incorrect response that can be excluded after further consideration. A CRT accuracy score (i.e., percent of problems correctly solved) was calculated and considered in the analyses.

#### Socio-cognitive polarization (SCP)

The SCP factor, which was already considered by Salvi and colleagues 2021a, b, was calculated by clustering measures of conservatism (Robinson et al., 1999; Salvi et al., 2016a, b, c), absolutism (Lauriola et al., 2016), and xenophobia (van der Veer et al., 2013).

**Conservatism** Conservative political ideology was calculated by subtracting a rating score for liberalism from the score for conservatism. More precisely, participants were asked to evaluate on a 7-point Likert scale their level of agreement with each of two statements, namely, 'I endorse many aspects of conservative political ideology' and 'I endorse many aspects of liberal political ideology' (Robinson et al., 1999; Salvi et al., 2016a, b, c).

**Absolutism** To measure absolutism, the 30-item version of the Multidimensional Attitude Toward Ambiguity Scale (MAAS; Lauriola et al., 2016) was used. Participants were asked to rate their tolerance *vs.* intolerance of ambiguous stimuli (e.g., 'There's a right way and a wrong way to do almost everything') on a 7-point Likert scale.

**Xenophobia** van der Veer and colleagues' (2013) Xenophobia Scale was used to measure fear and hostility towards immigrants. Participants were asked to indicate their level of agreement with statements like 'I worry that immigrants may spread unusual diseases' on a 7-point Likert scale.

**Bullshit receptivity (BR)** The Bullshit Receptivity Questionnaire (Pennycook et al., 2015) was used to measure participants' tendency to consider pseudo-profound statements, such as 'Eternal stillness is reborn in infinite human observation', as meaningful and profound. Pennycook and colleagues (2015) defined pseudo-profound bullshit as meaningless, vacuous assertions that are presented as profound and insightful. A BR score was calculated from participants' profundity ratings of pseudo-profound statements on a 5-point Likert scale.

**Overclaiming** The individual tendency to self-enhance and overrate one's familiarity with general knowledge questions was measured using a shortened 13-item version of the Paulhus et al. (2003) overclaiming questionnaire. Participants were asked to rate how familiar they were with a list of factual notions about physical sciences, historical events, or historical figures, plus 2 foils items designed to detect participants' overclaims. A 60 s timer was set for this questionnaire, to lower the risk of participants researching the items. An overclaiming score was calculated by subtracting the number of factual items that received a familiarity rating ≥ of 4 from the number of foils that received a familiarity rating ≥ of 4 (Paulhus et al., 2003).

## Analytic approach

All analyses were conducted in R (R Core Team, 2019) using base functions unless otherwise noted. Bivariate correlations, *t*-tests, and multiple comparisons corrections were conducted using the *rstatix* library. LPA was conducted with the *tidyLPA* and *mclust* libraries (Rosenberg et al., 2019; Scrucca et al., 2016). Regression interactions were probed with the *interactions* and *emmeans* libraries (Lenth, 2021; Long, 2019), which provide functions consistent with standard interaction decomposition approaches (Aiken & West, 1991; Hayes, 2017). Dominance analyses were conducted with *yhat* (Nimon et al., 2021). The *easystats* ecosystem of related libraries were used to extract model diagnostics, standardized parameter estimates, and effect sizes (Ben-Shachar, Lüdecke, & Makowski, 2020; Lüdecke et al., 2019, 2020a, b; Lüdecke et al., 2020).

#### LPA model fitting, selection, and characterization

We extracted latent profiles using standard recommendations (Ferguson et al., 2020; Lanza et al., 2003; Pastor et al., 2007). We tested all solutions up to a 6-profile solution, which was established as an upper limit based on prior work on related variables that generally finds 4- or 5-profile solutions evidence the best fit (e.g., flexible and analytical thinking; Fletcher et al., 2012; Marsh et al., 2009, socio-political dimensions; Greenway et al., 2019). Due to a lack of a priori

**Table 1** Bivariate correlations amongst variables of interest and demographic covariates

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rebus | 1 | | | | | | | | |
| 2 | CRT | **0.39** | 1 | | | | | | | |
| 3 | Age | −0.063 | **−0.26** | 1 | | | | | | |
| 4 | Education | **0.17** | −0.007 | **0.096** | 1 | | | | | |
| 5 | BR | **−0.18** | **−0.15** | −0.072 | **−0.13** | 1 | | | | |
| 6 | Overclaiming | **−0.24** | −0.061 | **−0.29** | **−0.18** | **0.099** | 1 | | | |
| 7 | Xenophobia | **−0.15** | −0.047 | **0.097** | **−0.26** | **0.088** | **−0.27** | 1 | | |
| 8 | Conservativism | **−0.16** | −0.079 | −0.041 | **−0.18** | **0.087** | **−0.23** | **0.71** | 1 | |
| 9 | Absolutism | **−0.17** | **−0.086** | **0.11** | **−0.3** | **0.16** | **−0.21** | **0.51** | **0.36** | 1 |

*BR* Bullshit Receptivity, *CRT* cognitive reflection test

Significant correlation coefficients ($\alpha = 0.05$) are in bold

hypotheses regarding variation within or between profiles, all within-cluster variances were fixed and all covariances were set to zero (i.e., class-invariant parameterization, e.g., Lubke & Luningham, 2017). Although not necessary for unbiased model fit (e.g., Pastor et al., 2007), we standardized all indicators prior to analysis to ensure profiles reflected all variables on the same scale.

Standard fit statistics (most pertinently, Akaike's Information Criterion [AIC], Approximate Weight of Evidence [AWE], Bayesian Information Criterion [BIC], Classification Likelihood Criterion [CLC], and Kullback Information Criterion [KIC]) were extracted for all solutions and subjected to an analytic hierarchy process that yields a consensus best fit (Akogul & Erisoglu, 2017). For an inferential test, we calculated bootstrapped likelihood ratio tests (LRT) for all models. Fit statistics and tests, along with alignment with theory and interpretability, were all used to select a final number of profiles for further analysis. Profile groups were then formed by assigning each observation to the profile for which it demonstrated the largest posterior probability of membership. Differences in continuous variables between each profile group were then analyzed using Kruskal–Wallis (non-parametric) ANOVAs and Dunn's test was used for post-hoc pairwise analysis. For categorical variables, group differences were tested using chi-squared tests. All $p$ values were Bonferroni corrected.

#### Hierarchical regressions and dominance analyses

We fit two series of hierarchical linear regressions, one with Rebus accuracy and one with CRT accuracy as the outcome. Standard LRTs were used to assess goodness-of-fit between different levels of the hierarchy. Participant country was included in all models. Dominance analyses, which are used to calculate a weighted estimate of proportion variance explained by each predictor within each model (Azen & Budescu, 2003; Budescu, 1993), was conducted on predictors from all models. General dominance weights (GDW) were calculated for each predictor, with larger values indicating dominance over predictors with smaller values. We also provide a metric of the proportion of total variance explained for each predictor (GDW divided by the $R^2$ from the model with all predictors) to contextualize dominance within the explanatory power of a given model (e.g., Maples–Keller et al. 2021).

## Results

### Bivariate relations

Rebus accuracy and CRT accuracy were moderately correlated ($r = 0.39$). All SCP and bullshit receptivity and overclaiming (BR_O) variables were significantly negatively correlated with Rebus accuracy ($r$s −0.15 to −0.24), including Conservatism ($r = -0.16$). Of the SCP and BR_O variables, only the absolutism ($r = -0.15$) and bullshit receptivity ($r = -0.08$) variables were significantly correlated with CRT accuracy. See Table 1 for the full correlation matrix.

### Latent profiles of SCP, BR, and overclaiming

#### Model selection

Examination of fit statistics (see Supplementary Materials Table S1 for all fit statistics for all tested solutions) found that a four-profile solution was the best fit for the data ($\lambda_{BLR} = 50.7$, $p = 0.009$) and yielded interpretable and theory-aligned profiles (see Fig. 1). All profiles were well-differentiated on SCP variables, however, three of four profiles had similar levels of bullshit receptivity and overclaiming. Accordingly, we labeled each group to reflect individual levels on SCP variables but dichotomized based on high or low Bullshit receptivity and overclaiming. This resulted in group labels of "High SCP/High BR_O", "Mod SCP/High BR_O", "Mild SCP/High BR_O", and "Low SCP/Low BR_O".

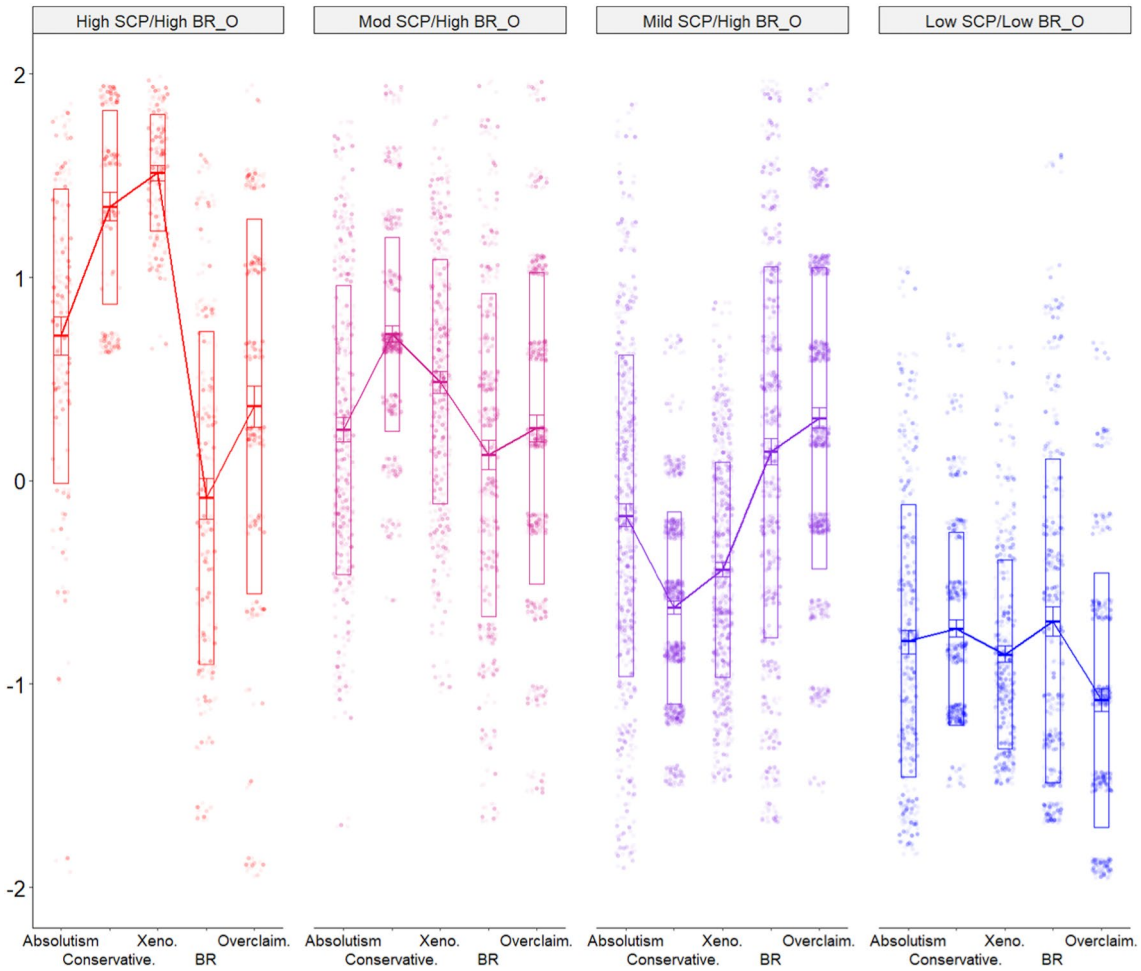


**Fig. 1** Centroids (means) and raw data for the final 4-profile solution. Individual points indicate standardized scores for each profile member on each indicator variable. The transparency of each point is weighted by the posterior probability of that observation belonging to that profile group; Lower probability points are less visible. Error bars indicate 95% CI, crossbars indicate ± 1 SD, *BR_O* bullshit receptivity and overclaiming, *SCP* socio-cognitive polarization

### Profile characteristics

As expected, non-parametric ANOVAs revealed significant group differences between profile groups on all variables that were included in the profile models (see Table 2 for descriptive and test statistics). Dunn pairwise comparisons indicated that all profile groups significantly differed from on all SCP and BR_O variables, with the exception of the comparison between the Conservatism means for the Mild SCP/High BR_O and Low SCP/Low BR_O groups ($p = 1$). In terms of demographic variables, mean age, $H(3) = 24.5$, $p < 0.001$, $\eta^2_H = 0.041$, and education level, $H(3) = 44.2$, $p < 0.001$, $\eta^2_H = 0.079$, significantly differed across profile groups. Country significantly differed across group, $\chi^2(3, N = 525) = 136$, $p < 0.001$. Gender did not significantly differ across groups, $\chi^2(6, N = 525) = 6.30$, $p = 0.39$. Profile groups significantly differed on Rebus, $H(3) = 35.6$, $p < 0.001$, $\eta^2_H = 0.062$, but not CRT, $H(3) = 7.27$, $p = 0.635$, $\eta^2_H = 0.008$, performance (see Table 2 and Fig. 2). However, despite a non-significant omnibus test, the High SCP/High BR_O and Low SCP/Low BR_O groups significantly differed in CRT performance ($p = 0.046$) Table 3.

## Predicting problem solving with SCP/BR_O latent profiles

Table 2 shows all estimates, statistics, and dominance weights for the models described below. Table S2 shows all pairwise combinations of estimated marginal means tests, including those not reported below.

Addition of the profile predictor to the base Rebus model that only included participant country improved the prediction of Rebus accuracy, $\chi^2(3) = 33.42$, $p < 0.001$. Pairwise comparisons of estimated marginal means from this model revealed that the Low SCP/Low BR_O profile group had

**Table 2** Latent profile characteristics and inferential tests

| Variable | 1. High SCP/high BR_O ($n=68$) | 2. Mod. SCP/high BR_O ($n=138$) | 3. Mid SCP/high BR_O ($n=201$) | 4. Low SCP/low BR_O ($n=118$) | $\chi^2$ | |
|---|---|---|---|---|---|---|
| Gender, *n* (%) | | | | | **6.3** | |
| Woman | 17 (25) | 92 (66.7) | 150 (74.6) | 86 (72.9) | | |
| Man | 50 (73.5) | 46 (33.3) | 50 (24.9) | 32 (27.1) | | |
| Other/undisclosed | 1 (1.5) | 0 (0) | 1 (0.5) | 0 (0) | | |
| Country, *n* (%) | | | | | **135.9** | |
| Italy | 59 (86.8) | 100 (72.5) | 100 (49.8) | 13 (11) | | |
| USA | 9 (13.2) | 38 (27.5) | 101 (50.2) | 105 (89) | | |
| | | | | | $H$ ($\eta^2_H$) | Pairwise comparisons |
| Age (years), *M* (SD) | 41.3 (15.3) | 35.9 (16.5) | 35.6 (15.6) | 42.1 (16.7) | **24.4 (.04)** | 4,1 > 2,3 |
| Education, *M* (SD) | 3.69 (.88) | 4.47 (.83) | 4.00 (.90) | 3.81 (.95) | **44.2 (.08)** | 4 > 1,2,3 |
| Standardized profile indicators, $M_z$($SD_z$) | | | | | | |
| Absolutism | 1.02 (0.94) | 0.32 (0.79) | − 0.08 (0.89) | − 0.83 (0.68) | **171.1 (.32)** | 1 > 2 > 3 > 4 |
| Bullshit Receptivity | − 0.01 (0.92) | 0.26 (0.93) | 0.23 (0.99) | − 0.69 (0.8) | **78.1 (.14)** | 1,2,3 > 4 |
| Conservatism | 1.59 (0.62) | 0.75 (0.52) | − 0.62 (0.48) | − 0.74 (0.47) | **367.8 (.7)** | 1 > 2 > 3,4 |
| Overclaiming | 0.37 (0.96) | 0.32 (0.82) | 0.31 (0.78) | − 1.11 (0.72) | **174.9 (.33)** | 1, 2, 3 > 4 |
| Xenophobia | 1.79 (0.56) | 0.48 (0.59) | − 0.42 (0.53) | − 0.87 (0.45) | **339.5 (.64)** | 1 > 2 > 3 > 4 |
| Problem solving indices, *M* (SD) | | | | | | |
| Rebus accuracy | 40 (20) | 40 (19) | 42 (19) | 52 (15) | **36.4 (.06)** | 1, 2, 3 > 4 |
| CRT accuracy | 44 (33) | 53 (36) | 53 (33) | 57 (34) | 6.4 (.01) | *ns* |

*BR_O* bullshit receptivity and overclaiming variables, *CRT* cognitive reflection test, *ns* non-significant, *SCP* socio-cognitive polarization. Rebus and CRT accuracy values are percentages

Bolded test statistics indicate significance at alpha = 0.05. Education is coded as a continuous variable ranging from "elementary school" = 0 to "doctorate" = 6 to facilitate comparison with other continuous variables


**Fig. 2** Mean scores for Rebus and CRT for each latent profile group. Error bars correspond to ± 95% CI. *BR_O* bullshit receptivity and overclaiming, *CRT* cognitive reflection test, *SCP* socio-cognitive polarization

**Table 3** Estimates for hierarchical multiple regression models predicting Rebus and CRT accuracy

| | Level 1 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rebus (accuracy) | | | | | | CRT (accuracy) | | | | | |
| | *b* | SE | *β* | *t* | *p* | | *b* | SE | *β* | *t* | *p* | |
| Country | −0.02 | 0.01 | −0.13 | 1.52 | 0.128 | | −0.03 | 0.02 | −0.09 | 1.08 | 0.280 | |
| $R_{adj}^2$ | | | | | | 0.003 | | | | | | 0.001 |
| | Level 2 | | | | | | | | | | | |
| | Rebus (accuracy) | | | | | | CRT (accuracy) | | | | | |
| | *b* | SE | *β* | *t* | *p* | GDW (%$R^2$) | *b* | SE | *β* | *t* | *p* | GDW (%$R^2$) |
| Profile (reference: Low SCP /Low BR_O) | | | | | | **0.062 (93.6)** | | | | | | **0.020 (71.9)** |
| High SCP/High BR_O | −0.13 | 0.03 | −0.72 | 4.34 | **< 0.001** | | −0.21 | 0.05 | −0.65 | 3.64 | **< 0.001** | |
| Mod. SCP/High BR_O | −0.14 | 0.02 | −0.75 | 5.49 | **< 0.001** | | −0.10 | 0.04 | −0.45 | 2.20 | **0.028** | |
| Mid SCP/High BR_O | −0.10 | 0.02 | −0.58 | 4.82 | **< 0.001** | | −0.08 | 0.04 | −0.38 | 2.08 | **0.037** | |
| Country | −0.02 | 0.01 | −0.15 | 1.48 | 0.138 | 0.004 (6.4) | −0.09 | 0.03 | −0.32 | 2.64 | **0.008** | 0.008 (28.1) |
| $R_{adj}^2$ | | | | | | 0.059 | | | | | | 0.020 |
| $\Delta R_{adj}^2$ | | | | | | 0.056 | | | | | | 0.019 |

*BR_O* bullshit receptivity and overclaiming variables, *CRT* cognitive reflection test, *GDW* general dominance weight, *SCP* sociocultural polarization

Bolded values *p* values indicate significant alpha = 0.05. Bolded GDW indicates the most dominant predictor in a given model

significantly increased accuracy in relation to all other profiles (High SCP/High BR_O: $\beta = 0.72$, 95% CI [0.37, 1.16], $t[517] = 4.34$, $p < 0.001$; Moderate SCP/High BR_O: $\beta = 0.75$, 95% CI [0.39, 1.11], $t[517] = 5.49$, $p < 0.001$; Mild SCP/High BR_O: $\beta = 0.57$, 95% CI [0.26, 0.89], $t[517] = 4.82$, $p < 0.001$). Dominance analyses revealed that the profile predictor was dominant over the country predictors (GDW = 0.62, $\%R^2 = 93.6$). For these analyses with additional demographic covariates also included, see Table S3.

Addition of the profile predictor to the base CRT model that only included participant country also improved prediction of CRT accuracy, $\chi^2(3) = 13.28$, $p = 0.004$. As with analyses of Rebus accuracy, pairwise comparisons of estimated marginal means from this model revealed that the Low SCP/Low BR_O profile group had significantly increased accuracy in relation to all other High SCP/High BR_O profile $\beta = 61.7$, 95% CI [0.16, 1.06], $t[520] = 3.64$, $p = 0.001$. However, the Low SCP/Low BR_O profile group did not have significantly different accuracy compared with the other groups (Moderate SCP/High BR_O: $\beta = 0.30$, 95% CI [-0.06, 0.67], $t[520] = 2.20$, $p = 0.168$; Mild SCP/High BR_O: $\beta = 0.25$, 95% CI [−0.06, 0.57], $t[520] = 2.08$, $p = 0.226$). Participant country also emerged as a significant predictor of CRT accuracy, with those in the USA showing worse accuracy within the context of the overall model, $\beta = -0.27$, 95% CI [−0.46, −0.07], $t(520) = 2.64$, $p = 0.009$. The profile predictor accounted for a moderate amount of the overall model $R^2$(GDW = 0.019, $\%R^2 = 71.9$); Country (GDW = 0.009, $\%R^2 = 28.1$) was less dominant a predictor than the profile predictor. For these analyses with additional demographic covariates also included, see Table S3.

## Discussion

There is a sheer breadth of conditions under which rigidity can manifest in human reasoning. In this study, we bridged between two distinct fields of research in psychology showing that social rigidity predicts cognitive rigidity in problem-solving. Our results suggest that inflexible thinking extends beyond strict political ideologies to a holistic reasoning style that includes aspects of rigidity such as xenophobia and absolutism. This result includes aspects often associated with polarized political ideologies such as bullshit receptivity and overclaiming. The LPA performed revealed that those low in SCP, bullshit receptivity, and overclaiming performed the best on measures of problem-solving. Therefore, we argue that social rigidity may be shared by an underlying socio-cognitive construct, wherein those who are more socially rigid are more likely to be cognitively rigid as well.

Since Adorno's *The authoritarian personality*, sociologists and psychologists have hypothesized that right-wing attitudes are related to a cognitive style characterized by rigidity. While there is a growing consensus among researchers that rigidity is not a unitary construct (for reviews, see

Barron & Harrington, 1981; Batey & Furnham, 2006; Runco, 2004; Baron et al., 2022), to our knowledge there are no studies that investigated latent profiles of social rigidity and problem-solving. Former research has shown that political partisan identity and conservatism are related to cognitive rigidity, specifically in problem solving Salvi, et al., 2016a, b, c; Salvi et al., 2021a, b; Zmigrod, 2020; Zmigrod et al., 2018, 2019. However, in the current study, we extended these results to show that other forms of social reasoning (conservatism, absolutism, xenophobia, bullshit receptivity, and overclaiming) predict different performance in problem-solving. Our results extend Zmigrod's findings by showing that social rigidity, as captured by SCP, predicts performance on validated measures of cognitive rigidity (Rebus puzzles and CRT).

Why problem solving? A good problem solver practices overcoming rigid perspectives and seeing problems in a different light, seeks to find alternative reasoning paths that will converge to a solution and is more tolerant toward not having an immediate solution. Solving a complicated problem might take a lot of time, implying tolerance and patience. We believe that this thinking skill is reflected in other forms of social reasoning. For example, overcoming functional fixedness entails embracing new perspectives and questioning the *status quo,* whether one is trying to solve a problem or is fixated on some political ideologies. While such an ability implies depth in logical analysis, it also entails having a low stubbornness to abandon rigid perspectives. The same type of stiffness characterizes political extremists who pursue their ideas with zeal and intolerance. In our analysis, we found that those profiles high in SCP also lacked the flexibility that would allow them to solve problems easily, revealing that their social rigidity predicted cognitive rigidity when reasoning on political-free content. The opposite can be said about the "Low SCP/Low BR_O" group. The two profiles that are lower in SCP relative to the other profiles have markedly distinct indices of BR and overclaiming ("Mild SCP/High BR_O" and "Low SCP/Low BR_O"). Within those who are low in SCP, there is a specific group of individuals who are relatively good at detecting pseudo-profound and overclaiming statements ("Low SCP/Low BR_O") and another profile of individuals who tend to fail to detect these statements, similarly to the profiles high in SCP. We have reason to believe that our profile analysis taps into a latent subgroup of people (i.e., Mild SCP/High BR_O) who are understudied in social psychology, namely, individuals who embrace liberal ideologies but who also tend to overclaim their knowledge and believe in bullshit. Our findings are consistent with the few studies that have found a relationship between the tendency to be so open-minded as to readily accept new ideas, thus overestimating the deepness of nonsense statements. It seems that these people lie on the boundary between being tolerant, but perhaps overly receptive and credulous. What we found allows us to conclude that this tendency toward bullshit receptivity and overclaiming is not a matter of low, but rather of pseudo-flexibility, given that individuals assigned to this profile also performed worse on problem solving than those in the low SCP and low bullshit receptivity and overclaiming profile. We conclude that these characteristics may make these people less able to engage in the critical examination of pertinent information. Several psychological features are associated with bullshit receptivity including non-analytic thinking styles, faith in intuition, low need for cognition, low cognitive ability, and political ideology. Specifically, neo-liberals and moderate supporters of free-market ideology are more susceptible to bullshit than ideological extremists in either direction (Pennycook et al., 2015; Sterling et al., 2016). Several reasons have been proposed to explain why ideological differences in bullshit receptivity would exist. Conservatives have been characterized as intuitive rather than analytic (Deppe et al., 2015; Jost & Krochik, 2014; Kemmelmeier, 2010; Talhelm et al., 2015). They are more receptive to biased rather than systematic reasoning (Jost & Krochik, 2014; Stern et al., 2013), prefer simple rather than complex thinking (Jost et al., 2003; Tetlock, 2007), and show a low rather than high trait 'need for cognition' or 'enjoyment of thinking' (Carraro et al., 2011; Hennes et al., 2012; Sargent, 2004; Stern et al., 2013). However, liberals tend to be more open than conservatives to spiritual thinking which would make them especially susceptible to bullshit receptivity and overclaiming (Hirsh et al., 2013; Sterling et al., 2016). Crucially, whether they express conservative or moderately liberal political ideology, they lack deep analysis, cannot detect bullshit receptivity, and feel confident about their judgment. Overclaiming is indeed considered the tendency for people to 'self-enhance' when asked about their familiarity with general knowledge questions (Paulhus et al., 2003). People who score higher on the bullshit receptivity index also have high levels of confidence in their mathematics self-efficacy and problem-solving skills as well as a tendency to overclaim regardless of the problem accuracy (Jerrim et al., 2019; Phillips & Clancy, 1972). We speculate that this feeling of overconfidence may make people less prone to doubt their thinking and, therefore, less likely to explore further information, consider alternative explanations of events, and thus perform worse on problem solving and resist change when engaged in social ideologies.

## Limitations and future directions

Our results highlight a straight parallelism between social and cognitive rigidity; however, more research is now needed to speculate on the underlying unitary mechanisms of this effect. That said, our findings might fit with the metacontrol model of interindividual transfer between

a more persistent and a more flexible mode of processing information by Hommel and Colzato, (2017). The authors propose a framework based on genetic predisposition and cultural learning, which account also for shifts towards persistence and flexibility by situational factors. Within this framework what we called 'rigidity' might be easily represented by what they term extreme persistence or restricted variability on the persistence/flexibility scale.

While the data were gathered at the beginning of the COVID-19 outbreak, this event did not meaningfully affect our profile analysis (see Supplementary Material for regression analyses that included self-report COVID-19 anxiety and local COVID-19 case counts). It is worth noting that the two subsamples we investigated were relatively well-balanced in terms of gender and age, but we acknowledge that they might not be fully representative of the demographics of Italian and US populations. This suggests that while SCP/BR_O variables are significantly related to problem solving overall, their relation to performance on specific cognitive tasks might fluctuate given how more basic individual differences might affect task performance. Regarding CRT accuracy results, Low SCP/Low BR_O profile group did not have significantly different accuracy compared with the other groups. However, participant country also emerged as a significant predictor of CRT accuracy, with those in the USA showing worse accuracy within the context of the overall model. We acknowledge this is a limitation of the study and the difference in the performance of the two countries on CRT needs to be further investigated. To date, we are not aware of any cultural differences in solving the CRT. We point out that while the CRT is a widely used instrument to assess reasoning in problem solving it is highly criticized. Previous research shows that CRT problems are considered tricky and require high-level pragmatic competence to be solved (rather than logical analytic thinking) (e.g., Macchi & Bagassi, 2012). Also, these problems are very popular, and many subjects are already familiar with them (Toplak et al. 2014a; Baron et al., 2015; Chandler et al., 2014), they are frequently used in introductory psychology courses and workshops (Thomson & Oppenheimer, 2016) so their popularity in certain subgroups might have influenced the result. Because of the known problems presented by the CRT, we decided to add the Rebus Puzzle task. An increasing number of studies are using Rebus Puzzle-like problems to investigate aspects of cognitive flexibility such as political partisanship, dogmatism, and xenophobia (e.g., Salvi, et al., 2021a, b, 2022); Salvi et al., 2016a, b, c; Zmigrod et al., 2019; Zmigrod, 2020 ).

Further, more evidence needs to be gathered regarding the downsides of open-mindedness and how it can translate into bullshit receptivity and overclaiming or even conspiracy theories and mysticism. Thus, because of the lack of literature, we would suggest our interpretation and outcome as 'preliminary results'. Also, our result on political partisanship must be read in a socio-cultural environment that could have been affected by the impending 2020 US political election. However, the Italian sample was not experiencing any political election and still yielded the same results. We recognize that administering the study online might have led to less experimental control and introduced confounds common for online sampling. Nonetheless, studying this phenomenon in laboratories would have been impossible considering the methodological restrictions induced by the lockdown. Thus, we acknowledge that our participants' recruitment methods and channels could have affected the composition of our sample, and that is why we report specific information about it in the supplementary material section. That said, it is legitimate to wonder if our results on bullshit receptivity could have been amplified by the social isolation condition imposed by the worldwide lockdown, or by the massive social media exposure that characterized that specific historical time. Only future research can address these questions, and whether these factors were tight to a specific historical period or not.

**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1007/s00426-023-01832-w.

**Acknowledgements** We thank all the volunteers that supported our project and took the questionnaire without being paid, just under the commitment to supporting science. An infinite "thank you" goes to Milena Fisher and the Creativity Post, AIRIcerca association of Italian Researchers in the World, and the Italian Psychology Association (Associazione Italiana Psicologia, AIP) for promptly and enthusiastically sharing the link and taking the questionnaire.

**Author contributions** This work was possible thanks to the collaborative effort of everyone who was involved in the project and understood the importance of supporting science during the pandemic. CS: contributed to work coordination, conceptualization, methodology, and writing. PI: contributed to conceptualization, methodology, and writing. AC: contributed to conceptualization, methodology, data curation, and writing. SC: analyzed the data, interpreted it, and contributed to reviewing and writing; MM: contributed to conceptualization, methodology, and writing. JD and AA: contributed to supervision, writing, reviewing, and final editing. No author has any conflict of interest with the study.

**Funding** JD was supported by the NSF CAREER Award # 1844792 (PI J.E.D.). SC by the F32 MH129136, NIMH.

**Data availability** Our materials and datasets can be found at our OSF project online (https://osf.io/ 4pd2u).

## Declarations

**Competing interests** The authors declare no competing interests.

**Conflict of interest** All authors declare that they have no conflicts of interest.

**Ethical approval** The studies involving human participants were reviewed and approved by IRB at The University of Texas at Austin. The participants provided their written informed consent to participate in this study.

## References


Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). *The authoritarian personality*.

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.

Akogul, S., & Erisoglu, M. (2017). An approach for determining the number of clusters in model-based cluster analysis. *Entropy, 19*(9), 452. https://doi.org/10.3390/e19090452

Azen, R., & Budescu, D. V. (2003). The dominance analysis approach for comparing predictors in multiple regression. *Psychological Methods, 8*(2), 129. https://doi.org/10.1037/1082-989X.8.2.129

Baldi, P. L., Iannello, P., Riva, S., & Antonietti, A. (2013). Cognitive reflection and socially biased decisions. *Studia Psychologica., 55*(4), 265–271. https://doi.org/10.21909/sp.2013.04.641

Bardi, A., Guerra, V. M., & Ramdeny, G. S. D. (2009). Openness and ambiguity intolerance: Their differential relations to well-being in the context of an academic life transition. *Personality and Individual Differences, 47*(3), 219–223. https://doi.org/10.1016/j.paid.2009.03.003

Baron, J., Isler, O., & Yilmaz, O. (2022). Actively open-minded thinking and the political effects of its absence. PsyArXiv. https://doi.org/10.31234/osf.io/g5jhp.

Baron, J., Scott, S., Fincher, K. S., & Metz, S. E. (2015). Why does the cognitive reflection test (sometimes) predict utilitarian moral judgment (and other things)? *Journal of Applied Research in Memory and Cognition, 4*(3), 265–284.

Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual Review of Psychology, 32*(1), 439–476. https://doi.org/10.1146/annurev.ps.32.020181.002255

Batey, M., & Furnham, A. (2006). Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs, 132*(4), 355–429. https://doi.org/10.3200/MONO.132.4.355-430

Ben-Shachar, M. S., Lüdecke, D., & Makowski, D. (2020). effect size: Estimation of Effect Size Indices and Standardized Parameters. *Journal of Open Source Software, 5*(56), 2815.

Bowden, E. M., & Jung-Beeman, M. (2003). Normative data for 144 compound remote associate problems. *Behavior Research Methods, Instruments, & Computers, 35*, 634–639.

Brandt, M. J., Evans, A. M., & Crawford, J. T. (2015). The unthinking or confident extremist? Political extremists are more likely than moderates to reject experimenter-generated anchors. *Psychological Science, 26*(2), 189–202.

Budescu, D. V. (1993). Dominance analysis: A new approach to the problem of relative importance of predictors in multiple regression. *Psychological Bulletin, 114*(3), 542. https://doi.org/10.1037/0033-2909.114.3.542

Budner, S. (1962). Intolerance of ambiguity as a personality variable. *Journal of Personality, 30*, 29–50. https://doi.org/10.1111/j.1467-6494.1962.tb02303.x

Caligiuri, P. M., Jacobs, R. R., & Farr, J. L. (2000). The attitudinal and behavioral openness scale: Scale development and construct validation. *International Journal of Intercultural Relations, 24*(1), 27–46. https://doi.org/10.1016/S0147-1767(99)00021-8

Cancer, A., Iannello, P., Salvi, C., & Antonietti, A. (2023a). Executive functioning and divergent thinking predict creative problem-solving in young adults and elderlies. *Psychological Research Psychologische Forschung, 87*(2), 388–396.

Cancer, A., Salvi, C., Antonietti, A., & Iannello, P. (2023b). Not getting vaccinated? It is a matter of problem-solving abilities and socio-cognitive polarization. *International Journal of Environmental Research and Public Health, 20*(3), 1721.

Carraro, L., Castelli, L., & Macchiella, C. (2011). The automatic conservative: Ideology-based attentional asymmetries in the processing of valenced information. *PLoS ONE, 6*(11), e26456. https://doi.org/10.1371/journal.pone.0026456

Chandler, J., Mueller, P., & Paolacci, G. (2014). Non- naivete among Amazon Mechanical Turk workers: Con- sequences and solutions for behavioral researchers. *Be- Havioral Research Methods, 46*(1), 112–130.

Cools, R., & Robbins, T. W. (2004). Chemistry of the adaptive mind. *Philosophical Transactions of the Royal Society of London A Mathematical Physical and Engineering Sciences, 362*(1825), 2871–2888.

Cristofori, I., Salvi, C., Beeman, M., & Grafman, J. (2018). The effects of expected reward on creative problem solving. *Cognitive, Affective, & Behavioral Neuroscience, 18*, 925–931.

Davids, A. (1963). Psychodynamic and sociocultural factors related to intolerance of ambiguity. In R. W. White (Ed.), *The study of lives* (pp. 160–177). Atherton Press.

De Dreu, C. K., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the mood-creativity link: Toward a dual pathway to creativity model. *Journal of Personality and Social Psychology, 94*(5), 739. https://doi.org/10.1037/0022-3514.94.5.739

De Dreu, C. K., & Nijstad, B. A. (2008). Mental set and creative thought in social conflict: Threat rigidity versus motivated focus. *Journal of Personality and Social Psychology, 95*(3), 648–661.

Deppe, K. D., Gonzalez, F. J., Neiman, J., Pahlke, J., Smith, K., & Hibbing, J. R. (2015). Reflective liberals and intuitive conservatives: A look at the Cognitive Reflection Test and ideology. *Judgment and Decision Making, 10*(4), 314–331.

Eckhardt, W. (1991). Authoritarianism. *Political Psychology, 12*, 97–124.

Erceg, N., Galić, Z., & Ružojčić, M. (2020). A reflection on cognitive reflection—Testing convergent/divergent validity of two measures of cognitive reflection. *Judgment and Decision Making, 15*(5), 741–755.

Ferguson, S. L., Moore, G. E. W., & Hull, D. M. (2020). Finding latent groups in observed data: A primer on latent profile analysis in Mplus for applied researchers. *International Journal of Behavioral Development, 44*(5), 458–468. https://doi.org/10.1177/0165025419881721

Fletcher, J. M., Marks, A. D., & Hine, D. W. (2012). Latent profile analysis of working memory capacity and thinking styles in adults and adolescents. *Journal of Research in Personality, 46*(1), 40–48. https://doi.org/10.1016/j.jrp.2011.11.003

Frankfurt, H. G. (2005). *On bullshit* (p. 67). Princeton University Press. https://doi.org/10.1080/10584600701641920

Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives, 19*(4), 25–42. https://doi.org/10.1257/089533005775196732

Frenkel-Brunswik, E. (1948). A study of prejudice in children. *Human Relations, 1*, 295–306.

Frenkel-Brunswik, E. (1949). Intolerance of ambiguity as an emotional and perceptual personality variable. *Journal of Personality, 18*, 108–143.

Frenkel-Brunswik, E. (1951). Personality theory and perception. In R. R. Blake & G. V. Ramsey (Eds.), *Perception: An approach to personality* (pp. 356–420). Ronald Press.

Furnham, A., & Ribchester, T. (1995). Tolerance of ambiguity: A review of the concept, its measurement and applications. *Current Psychology., 14*, 179–199. https://doi.org/10.1007/BF02686907

Grant, D., & Berg, E. A. (1948). Abehavioral analysis ofdegree ofreinforcement and ease of shifting to new response in a Weigl-type card-sorting problem. *Journal ofExperimental Psychology, 38*, 404–411.

Greenberg, J., & Jonas, E. (2003). Psychological motives and polit- ical orientation—The left, the right, and the rigid: Comment on Jost et al. (2003). *Psychological Bulletin, 129*, 376–382.

Greenway, T. S., Jin, J., Shepherd, A. M., & Schnitker, S. A. (2019). Beyond the liberal-conservative binary: Generosity, religion, and a latent profile analysis of moral foundations in a Christian sample. *American Behavioral Scientist, 63*(14), 1938–1964. https://doi.org/10.1177/0002764219850867

Guilford, J. P., Christensen, P. R., Merrifield, P. R., & Wilson, R. C. (1978). *Alternate uses: Manual of instructions and interpretations*. Orange, CA: Sheridan Psychological Services.

Hardin, R. (2002). The crippled epistemology of extremism. In A. Breton, G. Galeotti, P. Salmon, & R. Wintrobe (Eds.), *Political extremism and rationality* (pp. 3–22). Cambridge University Press.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.

Hennes, E. P., Nam, H. H., Stern, C., & Jost, J. T. (2012). Not all ideologies are created equal: Epistemic, existential, and relational needs predict system-justifying attitudes. *Social Cognition, 30*(6), 669–688. https://doi.org/10.1521/soco.2012.30.6.669

Hirsh, J. B., Walberg, M. D., & Peterson, J. B. (2013). Spiritual liberals and religious conservatives. *Social Psychological and Personality Science, 4*(1), 14–20. https://doi.org/10.1177/1948550612444138

Hommel, B., & Colzato, L. S. (2017). The social transmission of metacontrol policies: Mechanisms underlying the interpersonal transfer of persistence and flexibility. *Neuroscience and Biobehavioral Reviews, 81*, 43–58.

Iannello, P., Mottini, A., Tirelli, S., Riva, S., & Antonietti, A. (2017). Ambiguity and uncertainty tolerance, need for cognition, and their association with stress. A study among Italian practicing physicians. *Medical Education Online., 22*, 1270009.

Ionescu, T. (2012). Exploring the nature of cognitive flexibility. *New Ideas in Psychology, 30*(2), 190–200. https://doi.org/10.1016/j.newideapsych.2011.11.001.

Jerrim, J., Parker, P., & Shure, D. (2019). *Bullshitters. Who are They and What Do We Know About Their Lives? IZA Discussion Paper No. 12282*. Available at SSRN: https://ssrn.com/abstract=3390272. https://doi.org/10.2139/ssrn.3390272.

Jost, J. T. (2017). Ideological asymmetries and the essence of political psychology. *Political Psychology, 38*(2), 167–208.

Jost, J. T., Glaser, J., Kruglanski, A. W., & Sulloway, F. J. (2003). Political conservatism as motivated social cognition. *Psychological Bulletin, 129*(3), 339. https://doi.org/10.1037/0033-2909.129.3.339

Jost, J. T., & Krochik, M. (2014). Ideological differences in epistemic motivation: Implications for attitude structure, depth of information processing, susceptibility to persuasion, and stereotyping. In A. J. Elliot (Ed.), *Advances in motivation science* (pp. 181–231). Elsevier.

Kehagia, A. A., Murray, G. K., & Robbins, T. W. (2010). Learning and cognitive flexibility: Frontostriatal function and monoaminergic modulation. *Current Opinion in Neurobiology, 20*(2), 199–204.

Kemmelmeier, M. (2010). Authoritarianism and its relationship with intuitive-experiential cognitive style and heuristic processing. *Personality and Individual Differences, 48*(1), 44–48. https://doi.org/10.1016/j.paid.2009.08.012

Kohn, P. M. (1974). Authoritarianism, rebelliousness, and their correlates among British undergraduates. *British Journal of Social and Clinical Psychology, 13*, 245–255.

Lammers, J., Koch, A., Conway, P., & Brandt, M. J. (2017). The political domain appears simpler to the politically extreme than to political moderates. *Social Psychological and Personality Science*. https://doi.org/10.1177/1948550616678456

Lanza, S. T., Flaherty, B. P., & Collins, L. M. (2003). *Latent class and latent transition analysis. Handbook of psychology* (pp. 663–685). Wiley.

Lauriola, M., Foschi, R., Mosca, O., & Weller, J. (2016). Attitude toward ambiguity: Empirically robust factors in self-report personality scales. *Assessment, 23*(3), 353–373. https://doi.org/10.1177/1073191115577188

Lauriola, M., Levin, I. P., & Hart, S. S. (2007). Common and distinct factors in decision making under ambiguity and risk: A psychomet- ric study of individual differences. *Organizational Behavior and Human Decision Processes., 104*, 130–149. https://doi.org/10.1016/j.obhdp.2007.04.001

Lenth, R. (2021). emmeans: Estimated marginal means, aka least-squares means. *R Package Version, 1*(5), 4.

Lobato, E., Mendoza, J., Sims, V., & Chin, M. (2014). Examining the relationship between conspiracy theories, paranormal beliefs, and pseudoscience acceptance among a university population: Relationship between unwarranted beliefs. *Applied Cognitive Psychology, 28*(5), 617–625.

Long, J. A. (2019). *Interactions: Comprehensive, User-Friendly Toolkit for Probing Interactions*.

Lubke, G. H., & Luningham, J. (2017). Fitting latent variable mixture models. *Behaviour Research and Therapy, 98*, 91–102. https://doi.org/10.1016/j.brat.2017.04.003

Lüdecke, D., Makowski, D., Waggoner, P., & Patil, I. (2020b). *Package 'performance'*.

Lüdecke, D., Ben-Shachar, M. S., Patil, I., & Makowski, D. (2020a). Extracting, computing and exploring the parameters of statistical models using R. *Journal of Open Source Software, 5*(53), 2445.

Lüdecke, D., Waggoner, P. D., & Makowski, D. (2019). Insight: A unified interface to access information from model objects in R. *Journal of Open Source Software, 4*(38), 1412.

Macchi, L., & Bagassi, M. (2012). Intuitive and analytical processes in insight problem solving: A psycho-rhetorical approach to the study of reasoning. *Mind & Society, 11*(1), 53–67. https://doi.org/10.1007/s11299-012-0103-3

MacDonald, A. P. (1970). Revised scale for ambiguity tolerance: Reliability and validity. *Psychological Reports*. https://doi.org/10.2466/pr0.1970.26.3.791

MacGregor, J. N., & Cunningham, J. B. (2008). Rebus puzzles as insight problems. *Behav Res, 40*, 263–268. https://doi.org/10.3758/BRM.40.1.263

Maples-Keller, J. L., Hyatt, C. S., Sleep, C. E., Stevens, J. S., Fenlon, E. E., Jovanovic, T., & Michopoulos, V. (2021). DSM–5 alternative model for personality disorders trait domains and PTSD symptoms in a sample of highly traumatized African American women and a prospective sample of trauma center patients. *Personality Disorders: Theory, Research, and Treatment*. https://doi.org/10.1037/per0000477

Marsh, H. W., Lüdtke, O., Trautwein, U., & Morin, A. J. (2009). Classical latent profile analysis of academic self-concept dimensions: Synergy of person-and variable-centered approaches to theoretical models of self-concept. *Structural Equation Modeling: A Multidisciplinary Journal, 16*(2), 191–225. https://doi.org/10.1080/10705510902751010

McGregor, I. (2006). Zeal appeal: The allure of moral extremes. *Basic and Applied Social Psychology, 28*(4), 343–348. https://doi.org/10.1207/s15324834basp2804_7

McLain, D. L. (1993). The mstat-i: A new measure of an individual's tolerance for ambiguity. *Educational and Psychological Measurement., 53*, 183–189. https://doi.org/10.1177/0013164493053001020

McLain, D. L. (2009). Evidence of the properties of an ambiguity tolerance measure: The multiple stimulus types ambiguity tolerance scale–II (MSTAT–II). *Psychological Reports, 105*(3), 975–988. https://doi.org/10.2466/PR0.105.3.975-988

Merrotsy, P. (2013). Tolerance of ambiguity: A trait of the creative personality? *Creativity Research Journal*. https://doi.org/10.1080/10400419.2013.783762

Miyake, A., & Friedman, N. P. (2012). The nature and organization of individual differences in executive functions: Four general conclusions. *Current Directions in Psychological Science., 21*(1), 8–14. https://doi.org/10.1177/0963721411429458

Nilsson, A., Erlandsson, A., & Västfjäll, D. (2019). The complex relation between receptivity to pseudo-profound bullshit and political ideology. *Personality and Social Psychology Bulletin, 45*(10), 1440–1454.

Nimon, K., Oswald, F., & Roberts, and J. K. (2021). *yhat: Interpreting Regression Effects* (2.0–3)

Oberski, D. (2016). *Mixture models: Latent profile and latent class analysis. Modern statistical methods for HCI*. Cham: Springer.

O'Connor, P. (1952). Ethnocentrism, intolerance of ambiguity and abstract reasoning ability. *Journal of Abnormal and Social Psychology, 47*, 526–530.

Oldrati, V., Patricelli, J., Colombo, B., & Antonietti, A. (2016). The role of dorsolateral prefrontal cortex in inhibition mechanism: A study on cognitive reflection test and similar tasks through neuromodulation. *Neuropsychologia, 91*, 499–508. https://doi.org/10.1016/j.neuropsychologia.2016.09.010

Onraet, E., et al. (2015). The association of cognitive ability with right-wing ideological attitudes and prejudice: A meta-analytic review. *European Journal of Personality., 29*, 599–621.

Pastor, D. A., Barron, K. E., Miller, B. J., & Davis, S. L. (2007). A latent profile analysis of college students' achievement goal orientation. *Contemporary Educational Psychology, 32*(1), 8–47. https://doi.org/10.1016/j.cedpsych.2006.10.003

Paulhus, D. L., Harms, P. D., Bruce, M. N., & Lysy, D. C. (2003). The overclaiming technique: Measuring self-enhancement independent of ability. *Journal of Personality and Social Psychology, 84*(4), 890–904. https://doi.org/10.1037/0022-3514.84.4.890

Pennycook, G., Cheyne, J. A., Barr, N., Koehler, D. J., & Fugelsang, J. A. (2015). On the reception and detection of pseudo-profound bullshit. *Judgment and Decision Making, 10*(6), 16.

Pennycook, G., & Rand, D. G. (2020). Who falls for fake news? The roles of bullshit receptivity, overclaiming, familiarity, and analytic thinking. *Journal of Personality, 88*, 185–200.

Perry-Smith, J. E., & Mannucci, P. V. (2017). From creativity to innovation: The social network drivers of the four phases of the idea journey. *Academy of Management Review, 42*(1), 53–79. https://doi.org/10.5465/amr.2014.0462

Phillips, D. L., & Clancy, K. J. (1972). Some effects of "social desirability" in survey studies. *American Journal of Sociology, 77*, 921–940. https://doi.org/10.1086/225231

Priniski, J. H., McClay, M., & Holyoak, K. J. (2021). Rise of QAnon: A Mental Model of Good and Evil Stews in an Echochamber. *arXiv preprint* arXiv:2105.04632.

R Core Team (2019). *R Foundation for Statistical Computing. R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna.

Rajagopal, L., & Hamouz, F. L. (2009). Use of food attitudes and behaviors in determination of the personality characteristic of openness: A pilot study. *International Journal of Intercultural Relations, 33*, 254–258. https://doi.org/10.1016/j.ijintrel.2009.02.004

Robinson, J. P., Shaver, P. R., & Wrightsman, L. S. (1999). *Measures of political attitudes*. Academic Press.

Rollwage, M., Zmigrod, L., de Wit, L., Dolan, R. J., & Fleming, S. M. (2019). What underlies political polarization? A manifesto for computational political psychology. *Trends in Cognitive Sciences, 23*(10), 820–822.

Rosenberg, J. M., Beymer, P. N., Anderson, D. J., Van Lissa, C. J., & Schmidt, J. A. (2019). tidyLPA: An R package to easily carry out latent profile analysis (LPA) using open-source or commercial software. *Journal of Open Source Software, 3*(30), 978. https://doi.org/10.21105/joss.00978

Runco, M. (2004). Personal creativity and culture. In S. Lau, A. N. N. Hui, & G. Y. C. Ng (Eds.), *Creativity: When East meets West* (pp. 9–21). World Scientific.

Salvi, C., Barr, N., Dunsmoor, J. E., & Grafman, J. (2022). Insight problem solving ability predicts reduced susceptibility to fake news, bullshit, and overclaiming. *Thinking & Reasoning*. https://doi.org/10.1080/13546783.2022.2146191

Salvi, C., Beeman, M., Bikson, M., McKinley, R., & Grafman, J. (2020b). TDCS to the right anterior temporal lobe facilitates insight problem-solving. *Scientific Reports, 10*(1), 1–10.

Salvi, C., & Bowden, E. (2020). The relation between state and trait risk taking and problem-solving. *Psychological Research Psychologische Forschung, 84*(5), 1235–1248. https://doi.org/10.1007/s00426-019-01152-y

Salvi, C., Bricolo, E., Kounios, J., Bowden, E., & Beeman, M. (2016a). Insight solutions are correct more often than analytic solutions. *Thinking & Reasoning, 22*(4), 443–460. https://doi.org/10.1080/13546783.2016.1141798

Salvi, C., Costantini, G., Bricolo, E., Perugini, M., & Beeman, M. (2016b). Validation of Italian rebus puzzles and compound remote associate problems. *Behavior Research Methods, 48*(2), 664–685. https://doi.org/10.3758/s13428-015-0597-9

Salvi, C., Costantini, G., Pace, A., & Palmiero, M. (2018). Validation of the Italian remote associate test. *Journal of Creative Behavior*. https://doi.org/10.1002/jocb.345

Salvi, C., Cristofori, I., Grafman, J., & Beeman, M. (2016c). Rapid communication: The politics of insight. *Quarterly Journal of Experimental Psychology, 69*(6), 1064–1072. https://doi.org/10.1080/17470218.2015.1136338

Salvi, C., Iannello, P., Cancer, A., McClay, M., Rago, S., Dunsmoor, J. E., & Antonietti, A. (2021a). Going viral: How fear, socio-cognitive polarization and problem-solving influence fake news detection and proliferation during COVID-19 pandemic. *Frontiers in Communication*. https://doi.org/10.3389/fcomm.2020.562588

Salvi, C., Leiker, E. K., Baricca, B., Molinari, M. A., Eleopra, R., Nichelli, P. F., & Dunsmoor, J. E. (2021b). The effect of dopaminergic replacement therapy on creative thinking and insight problem-solving in Parkinson's disease patients. *Frontiers in Psychology, 12*, 646448.

Salvi, C., Simoncini, C., Grafman, J., & Beeman, M. (2020a). Oculometric signature of switch into awareness? Pupil size predicts sudden insight whereas microsaccades predict problem-solving via analysis. *NeuroImage, 217*, 116933.

Santarnecchi, E., Sprugnoli, G., Bricolo, E., Costantini, G., Liew, S. L., Musaeus, C. S., & Rossi, S. (2019). Gamma tACS over the temporal lobe increases the occurrence of Eureka moments. *Scientific Reports, 9*(1), 5778.

Sargent, M. J. (2004). Less thought, more punishment: Need for cognition predicts support for punitive responses to crime. *Personality and Social Psychology Bulletin, 30*(11), 1485–1493. https://doi.org/10.1177/0146167204264481

Scrucca, L., Fop, M., Murphy, T. B., & Raftery, A. E. (2016). mclust 5: Clustering, classification, and density estimation using Gaussian finite mixture models. *The R Journal, 8*(1), 289.

Shafto, P., Coley, J. D., & Baldwin, D. (2007). Effects of time pressure on context-sensitive property induction. *Psychonomic Bulletin & Review., 14*, 890–894. https://doi.org/10.3758/BF03194117

Shen, W., Hommel, B., Yuan, Y., Chang, L., & Zhang, W. (2018). Risk-taking and creativity: Convergent, but not divergent thinking is better in low-risk takers. *Creativity Research Journal, 30*(2), 224–231. https://doi.org/10.1080/10400419.2018.1446852

Shen, W., Zhao, Y., Hommel, B., Yuan, Y., Zhang, Y., Liu, Z., & Gu, H. (2019). The impact of spontaneous and induced mood states on problem solving and memory. *Thinking Skills and Creativity, 32*, 66–74. https://doi.org/10.1016/j.tsc.2019.03.002

Sprugnoli, G., Rossi, S., Liew, S. L., Bricolo, E., Costantini, G., Salvi, C., & Santarnecchi, E. (2021). Enhancement of semantic integration reasoning by tRNS. *Cognitive, Affective, & Behavioral Neuroscience., 21*, 736–746.

Sterling, J., Jost, J. T., & Pennycook, G. (2016). Are neoliberals more susceptible to bullshit? *Judgment & Decision Making, 11*(4), 352.

Stern, C., West, T. V., Jost, J. T., & Rule, N. O. (2013). The politics of gaydar: Ideological differences in the use of gendered cues in categorizing sexual orientation. *Journal of Personality and Social Psychology, 104*(3), 520. https://doi.org/10.1037/a0031187

Talhelm, T., Haidt, J., Oishi, S., Zhang, X., Miao, F. F., & Chen, S. (2015). Liberals think more analytically (more "WEIRD") than conservatives. *Personality and Social Psychology Bulletin, 41*(2), 250–267. https://doi.org/10.1177/0146167214563672

Tetlock, P. E. (2007). Psychology and politics: The challenges of integrating levels of analysis in social science. In E. T. Higgins & A. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 888–912). Guilford.

Tetlock, P. E., Bernzweig, J., & Gallant, J. L. (1985). Supreme Court decision making: Cognitive style as a predictor of ideological consistency of voting. *Journal of Personality and Social Psychology, 48*, 1227–1239.

Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making, 11*(1), 99–113. https://doi.org/10.1080/1461670X.2018.1423632

Toplak, M. E., West, R. F., & Stanovich, K. E. (2014). Assessing miserly information processing: An expansion of the cognitive reflection test. *Thinking & Reasoning, 20*(2), 147–168.

van der Veer, K., Ommundsen, R., Yakushko, O., Higler, L., Woelders, S., & Hagen, K. A. (2013). Psychometrically and qualitatively validating a cross-national cumulative measure of fear-based xenophobia. *Quality & Quantity, 47*(3), 1429–1444. https://doi.org/10.1007/s11135-011-9599-6

Van Hiel, A., Onraet, E., Crowson, H. M., & Roets, A. (2016). The relationship between right- wing attitudes and cognitive style: A comparison of self-report and behavioural measures of rigidity and intolerance of ambiguity. *European Journal of Personality., 30*, 523–531.

van Prooijen, J. W., & Krouwel, A. P. M. (2020). Overclaiming knowledge predicts anti-establishment voting. *Social Psychological and Personality Science, 11*, 356–363.

van Prooijen, J.-W., Krouwel, A., Boiten, M., & Eendebak, L. (2015a). Fear among the extremes: How political ideolo- gy predicts negative emotions and outgroup derogation. *Personality and Social Psychology Bulletin, 41*, 485–497.

Van Prooijen, J. W., Krouwel, A. P., & Emmer, J. (2018). Ideological responses to the EU refugee crisis: The left, the right, and the extremes. *Social Psychological and Personality Science, 9*(2), 143–150.

van Prooijen, J. W., Krouwel, A. P. M., & Pollet, T. V. (2015b). Political extremism predicts belief in conspiracy theories. *Social Psychological and Personality Science*. https://doi.org/10.1177/1948550614567356

Vannoy, J. S. (1965). Generality of cognitive complexity±simplicity as a personality construct. *Journal of Personality and Social Psychology, 2*, 385–396.

Zmigrod, L. (2020). The role of cognitive rigidity in political ideologies: Theory, evidence, and future directions. *Current Opinion in Behavioral Sciences, 34*, 34–39. https://doi.org/10.1016/j.cobeha.2019.10.016

Zmigrod, L., Rentfrow, P. J., & Robbins, T. W. (2018). Cognitive underpinnings of nationalistic ideology in the context of Brexit. *Proceedings of the National Academy of Sciences, 115*(19), E4532–E4540. https://doi.org/10.1073/pnas.1708960115

Zmigrod, L., Rentfrow, P. J., & Robbins, T. W. (2019). Cognitive inflexibility predicts extremist attitudes. *Frontiers in Psychology, 10*, 989. https://doi.org/10.3389/fpsyg.2019.00989

Zmigrod, L., Rentfrow, P. J., & Robbins, T. W. (2020). The partisan mind: Is extreme political partisanship related to cognitive inflexibility? *Journal of Experimental Psychology: General, 149*(3), 407.

Zmigrod, L. (2022). Individual-Level Cognitive and Personality Predictors of Ideological Worldviews: The Psychological Profiles of Political, Nationalistic, Dogmatic, Religious, and Extreme Believers. PsyArXiv. https://doi.org/10.31234/osf.io/srgup.