



Cognitive underpinnings of nationalistic ideology in the context of Brexit

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Nationalistic identities often play an influential role in citizens' voting behavior and political engagement. Nationalistic ideologies tend to have firm categories and rules for what belongs to and represents the national culture. In a sample of 332 UK citizens, we tested whether strict categorization of stimuli and rules in objective cognitive tasks would be evident in strongly nationalistic individuals. Using voting behavior and attitudes from the United Kingdom's 2016 EU referendum, we found that a flexible representation of national identity and culture was linked to cognitive flexibility in the ideologically neutral Wisconsin Card Sorting Test and Remote Associates Test, and to self-reported flexibility under uncertainty. Path analysis revealed that subjective and objective cognitive inflexibility predicted heightened authoritarianism, nationalism, conservatism, and system justification, and these in turn were predictive of support for Brexit and opposition to immigration, the European Union, and free movement of labor. This model accounted for 47.6% of the variance in support for Brexit. Path analysis models were also predictive of participants' sense of personal attachment to the United Kingdom, signifying that individual differences in cognitive flexibility may contribute toward ideological thinking styles that shape both nationalistic attitudes and personal sense of nationalistic identity. These findings further suggest that emotionally neutral "cold" cognitive information processing—and not just "hot" emotional cognition—may play a key role in ideological behavior and identity.

cognitive flexibility | nationalism | ideology | political psychology | Brexit

Throughout modern history, nationalism has played a prominent role in citizens' voting behavior and political engagement. Indeed, recent slogans such as "Make America Great Again" and "Take Back Control" have been used by political campaigns to attract voters. The potency of nationalistic identity was particularly evident in the United Kingdom's June 2016 EU referendum, in which voting patterns crossed political party lines and family traditions, surprising pollsters and political analysts. There has been a long and rich tradition of research on nationalism, patriotism, and voting behavior in social psychology and political science (1–10), as well as a large body of empirical work in political psychology (for reviews, see refs. 11 and 12) showing psychological differences between individuals of varying political orientations (13–15).

Despite the significant contributions of this work, there is still a need for further empirical work on the cognitive processes that underlie individuals' adoption of nationalistic attitudes. Although nationalism is typically correlated with right-wing (as opposed to left-wing) orientation, nationalistic attachment is, in principle, distinct from political ideology. While many diverse issues are often clustered into party politics or conservative versus liberal orientations, including views on economic policies, religion, inequality, environmental protection, and civil rights, nationalism tends to focus primarily on perceptions of national superiority and idealization of the nation and its dominance or history (2–4). Thus, it is important to explore how the findings from political psychology—which have identified differences

between conservatives and liberals in their personalities (16, 17), need for order and structure (13, 18, 19), cognitive control and inhibition (20), and physiological reactivity (15, 21, 22)—translate into the study of nationalistic ideology.

Since the publication of *The Authoritarian Personality* in the 1950s (1), psychologists have hypothesized that right-wing and xenophobic attitudes are related to a cognitive style characterized by psychological rigidity (11). However, when cognitive processes have been studied in relation to political ideologies, there has often been disagreement over the definition and measurement of "cognitive style" (23, 24). Many studies rely on self-report questionnaires (e.g., refs. 25 and 26) rather than objective tests measuring cognitive function. Indeed, a recent study revealed significant differences in the magnitude of the relationship between cognitive style and political ideology according to whether the measure of cognitive style was based on behavior or self-report [with self-report scales yielding stronger relationships with right-wing attitudes (23)]. The present study therefore examines the relationship between the strength of individuals' nationalistic identities, their nationalistic attitudes, and their cognitive performance, using validated tests from cognitive neuropsychology, as well as self-reported psychological traits, to address the following question: Do individual differences in cognitive characteristics predict nationalistic attitudes and identity?

The EU referendum in the United Kingdom probed citizens' commitment to separating from the European Union and their support for the recreation of economic, legal, and physical boundaries

Significance

Belief in rigid distinctions between the nationalistic ingroup and outgroup has been a motivating force in citizens' voting behavior, as evident in the United Kingdom's 2016 EU referendum. We found that individuals with strongly nationalistic attitudes tend to process information in a more categorical manner, even when tested on neutral cognitive tasks that are unrelated to their political beliefs. The relationship between these psychological characteristics and strong nationalistic attitudes was mediated by a tendency to support authoritarian, nationalistic, conservative, and system-justifying ideologies. This suggests flexible cognitive styles are related to less nationalistic identities and attitudes.

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to reduce multiculturalism and reinstate “control” that had been “taken away” from the “British people” (27, 28). The outcome of the referendum depended on the breadth versus narrowness of citizens’ definitions of “British people” and “British society.” And in the months following the result, numerous arguments were made about the characteristics and motives of Leave and Remain supporters, with some speculating that Leave supporters were motivated by a sense of British nationalism and ideology. To date, there is very little direct empirical evidence available about the impact that nationalism or nationalistic identity might have had in the EU referendum. However, we can draw from psychological theory and research to develop hypotheses about which psychological factors may have influenced voters’ decisions.

Social-psychological theories have long contended that categorization of individuals into groups is a key process in social identity formation (29, 30). Indeed, at the heart of nationalistic ideologies are strict categories and rules for what is or is not part of the nation or national culture. We hypothesized that nationalistic thinking may be an instance of a general tendency to rigidly categorize information and to process information in an inflexible manner, such that cognitive inflexibility would be predictive of support for Brexit in the context of the United Kingdom’s 2016 EU referendum. While upholding tight, impermeable mental boundaries between concepts can be beneficial for mechanistic thinking, it can also lead to challenges in adapting to change or uncertainty.

To objectively assess implicit cognitive flexibility, two cognitive tasks were used: (i) the classic Wisconsin Card Sorting Test [WCST (31, 32)], which measures individuals’ adaptability to changes in newly learned rules and reward contingencies, and therefore how easily they can switch between categories when it is maladaptive to persist with a previously rewarded category. This measures “reactive” flexibility and can indicate a persisting versus adapting cognitive processing style, and has been used extensively to study clinical populations such as patients with frontal-lobe damage (33), obsessive-compulsive disorder (34), and schizophrenia (35). Furthermore, (ii) the Remote Associates Test [RAT (36)], which measures individuals’ capacity to flexibly retrieve semantic associations between remote conceptual representations, was also administered to provide a complementary index of a “flexibility” construct (37, 38). Participants are presented with three words (e.g., cracker, fly, fighter) and must generate the compound word that links these three words (e.g., fire). It is therefore a verbal measure of “generative” flexibility. Performance indicates participants’ associative flexibility and the extent to which their semantic networks tend to categorize concepts more loosely (which would facilitate detection of connections between remote concepts) or rigidly (which would make such retrieval difficult). These tasks and measures lack any ideological or emotional content, employing generally emotionally neutral stimuli.

To compare the psychology of nationalistic and political ideologies, and to address the methodological debate regarding self-report and behavioral measures of cognition (23), self-reported psychological flexibility was also assessed. This was measured through participants’ intolerance for uncertainty and dependence on routines and traditions in their daily lives, which act as proxies for subjective behavioral flexibility in contexts of ambiguity and volatility. We hypothesized that individuals who report subjective inflexibility would tend to prefer the traditionalism and certainty offered by strong nationalistic ideologies.

Given the current political climate in Europe and the United States, there is an urgent need to investigate the cognitive roots of nationalistic attitudes. Cognitive and subjective flexibility were examined in relation to four ideological orientations: nationalism, right-wing conservatism, system justification, and authoritarianism. These psychological and ideological dimensions were studied in relation to individuals’ voting behavior in the EU referendum, as well as their Brexit-related attitudes toward the

European Union and immigration, and measures of nationalistic identity. Hence, the aim of this study was to explore the cognitive and psychological factors that underlie individuals’ adoption of nationalistic ideologies, beyond demographic variables and family traditions, and to investigate the pathways between inflexible cognition, ideological thinking, and nationalistic attitudes.

Results

The sample consisted of 332 UK citizens recruited through Prolific Academic (47.1% female; age: $M = 37.96$, $SD = 13.69$) who voted in the EU referendum in June 2016. Correlations among Brexit-related attitudes (support for Brexit and opposition to immigration, the European Union, and free movement of labor) were mostly moderate to large, as expected, with r s ranging from $|0.28|$ to $|0.80|$, all P s < 0.001 (Table 1), confirming that these attitudes are related but that they also tap different views. Furthermore, support for Brexit was quite strongly correlated with all four ideological variables (authoritarianism, nationalism, conservatism, and system justification); here r ranged from $|0.33|$ to $|0.65|$, all P s < 0.001 , suggesting that pro-Brexit attitudes were related to heightened authoritarianism, nationalism, conservatism, and system justification (Table 1). Notably, the intercorrelations among the ideological orientation measures were moderate to large in magnitude (r ranged from $|0.19|$ to $|0.53|$, all P s < 0.01), indicating that while these variables are related, there is more than one separable ideological construct involved.

The correlation between the two objective cognitive flexibility measures (WCST and RAT accuracy; $r = 0.19$, $P = 0.007$) was modest, and between the two subjective flexibility measures ($r = 0.62$, $P < 0.001$) was high. The cognitive and subjective flexibility measures were modestly or not significantly related. Intolerance for uncertainty was negatively related to the WCST accuracy rate ($r = -0.15$, $P = 0.029$) but not to the RAT accuracy rate ($r = 0.02$, $P > 0.250$), and there was no correlation between dependence on routines and the cognitive tests. Taken together, these results suggest that the cognitive and subjective flexibility measures are independent facets of flexible cognition.

In terms of the demographic variables, there were no differences between men and women in any of the psychological flexibility variables (P s > 0.05). There was also no correlation between age and performance in the WCST or RAT, or in terms of self-reported intolerance for uncertainty and dependence on routines. There were significant correlations between educational attainment and RAT performance ($r = 0.14$, $P = 0.013$), intolerance for uncertainty ($r = -0.12$, $P = 0.036$), and dependence on routines ($r = -0.13$, $P = 0.021$) but not with WCST performance ($r = -0.13$, $P = 0.056$). Remain and Leave voters did not differ in terms of gender, but participants who voted Remain were younger than Leave voters [Remain: $M = 36.52$, $SD = 13.131$; Leave: $M = 40.37$, $SD = 13.943$; $F(1,284) = 5.560$, $P = 0.019$] and had higher educational attainment [Remain: $M = 2.85$, $SD = 0.647$; Leave: $M = 2.41$, $SD = 0.887$; $F(1,295) = 24.041$, $P < 0.001$; see *Materials and Methods* for details on how educational attainment was categorized]. Given these associations, educational attainment and age were included as covariates in all subsequent analyses, unless otherwise specified.

Correlations Between Brexit Attitudes and Psychological Flexibility.

The links between psychological flexibility and support for Brexit are reflected in the cross-correlations between these two classes of measure. The results revealed significant negative correlations between cognitive flexibility on the WCST and RAT and positive feelings toward Brexit (Fig. 1 and Table 1) and negative feelings toward immigration, the European Union, and free movement of labor (Fig. 1 and Table 1). This pattern of associations converged with those observed for the subjective flexibility findings, which showed significant positive correlations between subjective inflexibility (reported reliance on daily routines and uncertainty

Table 1. Correlations between all measures of psychological flexibility, ideological orientation, and nationalistic identity and attitudes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 WCST % accuracy	-	0.185**	-0.099	-0.148*	-0.192*	-0.161*	-0.172*	-0.111	-0.150*	-0.265***	0.211**	0.259***	0.210**	0.223***	0.259***	-0.165*
2 RAT % accuracy		-	0.016	0.043	-0.024	-0.068	-0.165**	-0.161*	-0.095	-0.119*	0.065	0.113*	0.167**	0.033	0.143*	-0.217***
3 Dependence on routines			-	0.620***	0.414***	0.184**	0.238***	0.098	0.284***	0.210**	-0.276***	-0.208**	-0.264***	-0.173**	-0.220***	0.220***
4 Uncertainty intolerance				-	0.310***	0.043	0.140*	-0.011	0.137*	0.132*	-0.232***	-0.136*	-0.142*	-0.141*	-0.162*	0.161**
5 Authoritarianism					-	0.257***	0.445***	0.191**	0.418***	0.454***	-0.492***	-0.478***	-0.456***	-0.454***	-0.323***	0.349***
6 Nationalism						-	0.508***	0.526***	0.557***	0.550***	-0.423***	-0.536***	-0.501***	-0.391***	-0.332***	0.428***
7 Conservatism							-	0.369***	0.422***	0.497***	-0.492***	-0.460***	-0.454***	-0.328***	-0.378**	0.325***
8 System justification								-	0.376***	0.333***	-0.158*	-0.288***	-0.305***	-0.176**	-0.141	0.253***
9 Nationalistic identity fusion									-	0.648***	-0.555***	-0.643***	-0.586***	-0.476***	-0.434***	0.431***
10 Pro-Brexit attitude										-	-0.649***	-0.840***	-0.706***	-0.615***	-0.700***	0.523***
11 Proimmigration attitude											-	0.684***	0.586***	0.541***	-0.409***	
12 Pro-European Union attitude												-	0.734***	0.707***	0.642***	-0.514***
13 Pro-free movement of labor													-	0.699***	0.542***	-0.461***
14 Pro-access to EU Single Market														-	0.454***	-0.401***
15 "The Government has a right to remain in the EU if the costs are too high" agreement															-	-0.279***
16 "Citizen of the world is a citizen of nowhere" agreement																-

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

intolerance) and pro-Brexit, antiimmigration, anti-European Union, and anti-free movement of labor attitudes (Fig. 1 and Table 1). In accordance with Gignac and Szodorai's (39) categorizations, the effect sizes of these correlations can be considered moderate to large.

Interestingly, across all of the psychological measures, subjective and objective cognitive flexibility were positively correlated with agreement that the UK government ought to be flexible with its implementation of Brexit in light of potential costs (Fig. 1 and Table 1), indicating that psychological flexibility in nonideological domains may be a trait underpinning flexibility in policy evaluation. Furthermore, subjective and objective cognitive flexibility were significantly negatively correlated with agreement with the idea that "a citizen of the world is a citizen of nowhere," a quote by UK Prime Minister Theresa May (Fig. 2 and Table 1). This quote may be interpreted as reflecting a highly specific and narrow definition of citizenship, as well as some negativity toward globalization; the negative correlation might

therefore indicate that psychological flexibility could be linked to how broadly versus narrowly identity boundaries are drawn.

To complement these results, we also examined the correlations between these psychological flexibility measures and the ideological orientation variables. Overall, individuals with high scores on these ideological factors exhibited reduced subjective and objective cognitive flexibility. As evident in Table 1, objective cognitive flexibility measured by the WCST was negatively correlated with authoritarianism, nationalism, conservatism, and nationalistic identity fusion. Notably, RAT performance was not correlated with authoritarianism, nationalism, or nationalistic identity fusion, but was negatively correlated with conservatism and system justification. This suggests that different ideological orientations may relate to different facets of cognitive flexibility. Consistent with the pattern of results observed for the objective cognitive flexibility measures, individuals with higher self-reported flexibility in the context of uncertainty and ambiguity in their daily lives reported lower authoritarianism and conservatism. Furthermore, individuals with higher subjective flexibility were less strongly fused to the

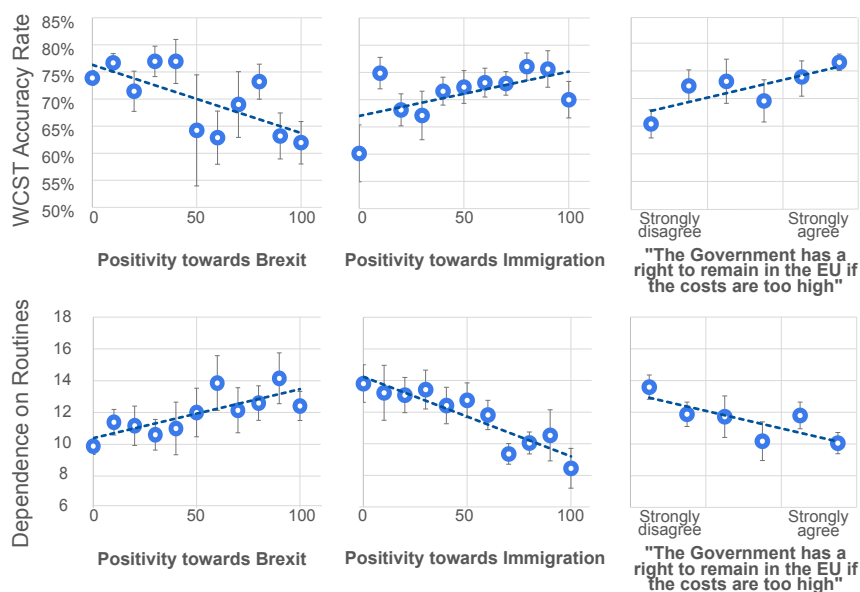


Fig. 1. WCST accuracy rate and dependence on routines according to Brexit-related attitudes. Error bars reflect $1 \pm SE$; dashed lines reflect significant linear correlations.

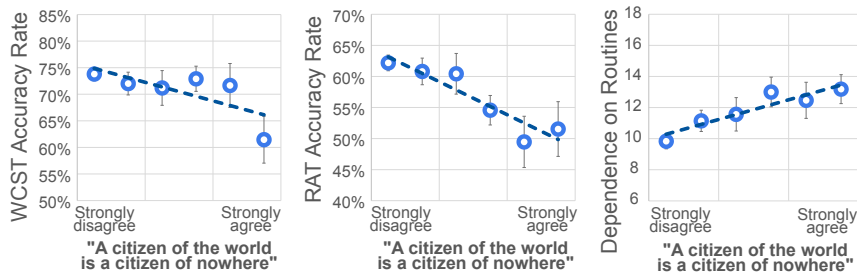


Fig. 2. Cognitive flexibility (WCST and RAT performance) and dependence on routines in relation to beliefs about citizenship. Error bars reflect $1 \pm SE$; dashed lines reflect significant linear correlations.

United Kingdom relative to Europe (Table 1). Both measures of subjective flexibility were uncorrelated with system justification, and dependence on routines was positively correlated with nationalism while uncertainty intolerance was not.

Structural Equation Models. To develop a more comprehensive understanding of how psychological flexibility contributes to an ideological orientation that promoted support for the United Kingdom’s exit from the European Union, we specified a type of structural equation model called “path models” to investigate whether the ideological variables (authoritarianism, nationalism, conservatism, and system justification) mediate the relationships between the psychological flexibility variables and support for Brexit. To test this prediction, we fit a three-level model whereby level 1 consisted of the four psychological flexibility measures (two objective cognitive flexibility measures—WCST and RAT—and two subjective flexibility measures—intolerance for uncertainty and dependence on routines). Level 2 consisted of the four ideological orientation measures: authoritarianism, nationalism, conservatism, and system justification. In our specification, psychological variables in level 1 directly affected the ideological variables in level 2, which in turn affected the pro-Brexit attitudes in level 3 (Fig. 3). In all models, we allow for residual covariances within, but not between, levels. Age, gender, and educational attainment were also included as covariates of interest of Brexit

attitudes, and we allowed for residual covariance between the demographic variables.

First, we tested a model in which Brexit attitudes were directly determined by both psychological and ideological variables. This model showed adequate fit to the data [$\chi^2 = 53.146$, $df = 24$, $P = 0.001$, $n = 332$, root mean square error of approximation (RMSEA) = 0.060 [0.038, 0.082], standardized root mean square residual (SRMR) = 0.059, comparative fit index (CFI) = 0.948, Yuan–Bentler scaling correction factor = 0.996]. Next, we compared this model, in which direct effects of the psychological flexibility on Brexit attitude pathways were estimated freely, to a more parsimonious model in which psychological variables affected ideological variables, which in turn affected Brexit attitudes. This model captures the assumption that all of the influence that psychological flexibility has on Brexit attitudes is mediated via the ideological variables (Fig. 3). This model had good fit to the data ($\chi^2 = 58.475$, $df = 28$, $P = 0.001$, $n = 332$, RMSEA = 0.057 [0.037, 0.078], SRMR = 0.060, CFI = 0.950, Yuan–Bentler scaling correction factor = 1.006). Notably, a likelihood ratio test suggested no significant decrease in model fit ($\Delta\chi^2 = 5.5276$, $\Delta df = 4$, $P = 0.2373$), suggesting the more parsimonious model with no direct pathways between the psychological variables and Brexit attitudes (i.e., assuming a full mediatory role for the ideological variables) was preferred.

As shown in Fig. 3, this model explains 47.6% of the variance in pro-Brexit attitudes ($R^2 = 43.6%$ without the demographic

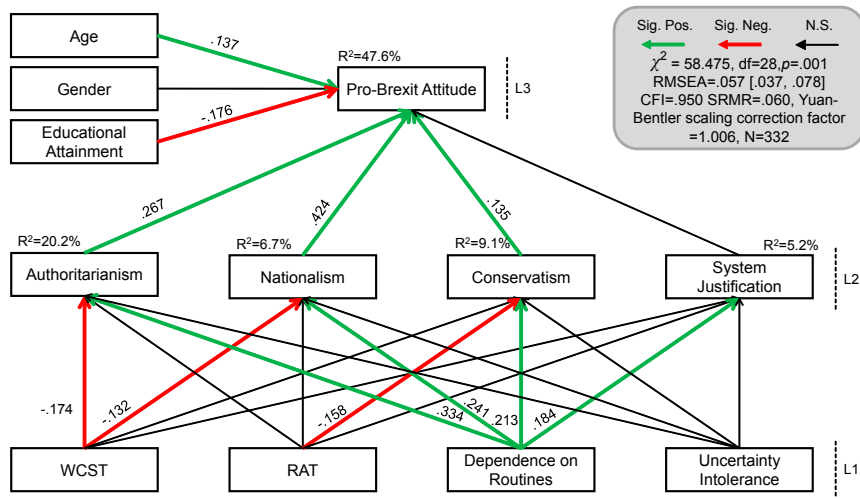


Fig. 3. Structural equation model predicting support for Brexit. All parameters shown are fully standardized. For unstandardized estimates, SEs, and confidence intervals, see [Dataset S1](#). Significant parameter estimates are shown in green and red bolded lines. Residual covariances between psychological variables and between ideological variables are allowed, but not shown for simplicity ([Dataset S1](#)). Significance level was $P < 0.05$. L1, level 1 (psychological flexibility variables); L2, level 2 (ideological orientation variables); L3, attitude outcome variable; N.S., not significant; RAT, Remote Associates Test accuracy; Sig. Neg., significant negative pathway; Sig. Pos., significant positive pathway; WCST, Wisconsin Card Sorting Test accuracy. Figure design was inspired by Kievit et al. (83, 84).

covariates). The model suggests that reduced cognitive and subjective flexibility contribute toward a more authoritarian, conservative, nationalistic ideological orientation, which in turn is predictive of support for the United Kingdom's exit from the European Union. Out of the ideological orientation variables in level 2, the strongest predictors (as indexed by standardized pathways) of Brexit support were nationalism, authoritarianism, and conservatism. Each of these variables made significant, and complementary, contributions to the prediction of Brexit support, and each ideological variable in turn was predicted by a unique combination of the cognitive and subjective flexibility variables. A stronger dependence on daily routines was a significant predictor of all of the ideological variables in level 2, indicating that reduced subjective flexibility may contribute to an ideological orientation that is more authoritarian, nationalistic, conservative, and system-justifying. Notably, while poor WCST performance significantly predicted authoritarianism and nationalism, poor RAT performance significantly predicted conservatism. This indicates that these cognitive flexibility measures have selective and specific effects on different ideological variables, and so certain types of cognitive inflexibility may contribute to particular forms of ideological thinking.

In this model, system justification was not a significant predictor of Brexit support. To examine this further, we fit a model in which the pathways between pro-Brexit attitude and authoritarianism, nationalism, and conservatism were constrained to 0, while the pathway between pro-Brexit attitude and system justification was estimated freely. This suggested that system justification is predictive of support for Brexit (unstandardized estimate = 1.022, $SE = 0.186$, standardized estimate = 0.340, $P < 0.001$) but its variance is accounted for by the other ideological variables, such that it is associated with Brexit support but does not predict above and beyond authoritarianism, nationalism, and conservatism.

To validate and extend this model further, we fit the original parsimonious model (Fig. 3) but with different Brexit-related attitudes, including opposition to immigration, the European Union, and free movement of labor (Figs. S1, S2, and S3, respectively). Across all these attitude measures, a model in which the effects of the psychological variables on the attitude outcome variable were mediated through the ideological measures had good model fit to the data and was more parsimonious and had equivalent model fit to a model which allowed direct pathways between the psychological variables and the attitude to be freely estimated (see Figs. S1–S3 for fit indices). These models revealed the same pathway patterns between the psychological, ideological, and attitude outcome variables as in the original model predicting Brexit support (Fig. 3), with only slight variations in the parameter estimates. Overall, all three models found that cognitive and subjective inflexibility were predictive of a more authoritarian and nationalistic ideological orientation, which in turn significantly predicted Brexit-related attitudes (R^2 varied between 40.4 and 45.5% with the demographic covariates, and between 39.0 and 43.2% without the demographic covariates). The only differences between the models were the predictive power of the demographic variables (e.g., age was not a significant predictor of opposition to the European Union and freedom of labor movement), the predictive power of conservatism (conservatism was predictive of Brexit support and opposition to immigration, but not of opposition to the European Union and freedom of labor movement), and the significance levels of the pathway between WCST performance and nationalism (which varied between $P = 0.043$ and $P = 0.055$, suggesting at best a borderline effect).

Furthermore, to establish that the fit of these models was not merely due to a general feature of the variable covariance matrix, we conducted control analyses to assess the hierarchical structure of these models. An additional model was fitted in which level 1 and level 2 were reversed, and so pro-Brexit attitude was regressed on the psychological variables, which in turn were

regressed on the ideological variables. This control model therefore consisted of the same information as the original model (depicted in Fig. 3), and has equivalent complexity, but assumes a different structural relationship between the variables. As in the original model, residual covariances were allowed within levels but not between levels, and there were no direct pathways between the ideological variables and the Brexit attitude measure. The original model fit the data significantly better than this inverted model [ΔAIC (Akaike Information Criterion) = 129.175]. Notably, the original model structure was also a consistently better fit than the inverted model when the outcome variables were opposition to immigration ($\Delta AIC = 97.341$), the European Union ($\Delta AIC = 117.468$), and free movement of labor ($\Delta AIC = 92.729$).

So far, the fitted structural equation models demonstrated the contribution of psychological flexibility to ideological orientations that support Brexit and oppose immigration, the European Union, and free movement of labor. In addition to these policy-oriented attitudes, it is valuable to test whether this model would predict participants' sense of nationalistic identity and how personally "fused" they feel with the concept of the United Kingdom. We therefore followed the same analytic procedure and fitted the original model structure to participants' nationalistic identity fusion scores. First, we fit a three-level model in which the direct paths between the psychological variables and nationalistic identity fusion were freely estimated, and residual covariances were allowed within levels but not between levels. This model demonstrated good fit to the data ($\chi^2 = 52.882$, $df = 24$, $P = 0.001$, RMSEA = 0.060 [0.038, 0.082], SRMR = 0.058, CFI = 0.950, Yuan–Bentler scaling correction factor = 0.998). Next, we constrained the direct paths between the psychological variables and the nationalistic identity fusion to 0, such that the model structure assumed the effect of the psychological variables on identity fusion was fully mediated through the ideological variables. This model also possessed good model fit ($\chi^2 = 54.816$, $df = 28$, $P = 0.002$, RMSEA = 0.054 [0.032, 0.075], SRMR = 0.059, CFI = 0.953, Yuan–Bentler scaling correction factor = 1.014) and accounted for 42.6% in the variance in nationalistic identity fusion (Fig. 4). Comparison of these two models showed no significant difference in model fit ($\Delta\chi^2 = 2.5181$, $\Delta df = 4$, $P = 0.6414$), and so the latter, more parsimonious model, which assumed no direct pathway between the psychological variables and identity fusion, was preferred. Moreover, when this parsimonious model was compared with a control inverted model in which level 1 (the psychological variables) and level 2 (the ideological variables) were reversed, the original parsimonious model possessed a more favorable model fit and structure than its inverted counterpart ($\Delta AIC = 108.228$).

As evident in Fig. 4, the pattern of results for the model predicting nationalistic identity fusion was similar to the models predicting policy-oriented Brexit attitudes, as poor performance on the objective cognitive flexibility measures and a stronger dependence on daily routines predicted a more ideological thinking style which in turn contributed to participants' sense of identity fusion and "oneness" with the United Kingdom relative to Europe. Consequently, policy preferences as well as sense of identity are shaped by ideological orientation and cognitive styles.

Discussion

The present study found that adoption of strongly nationalistic attitudes in the context of the EU referendum was related to reduced psychological flexibility across multiple objective and subjective measures (Figs. 1 and 2 and Table 1). Support for Brexit was associated with ideological orientations that were significantly more authoritarian, nationalistic, conservative, and system-justifying. Moreover, structural equation modeling revealed that reduced subjective and objective cognitive flexibility contribute toward more authoritarian, nationalistic, and conservative ideological orientations, which in turn predict support for

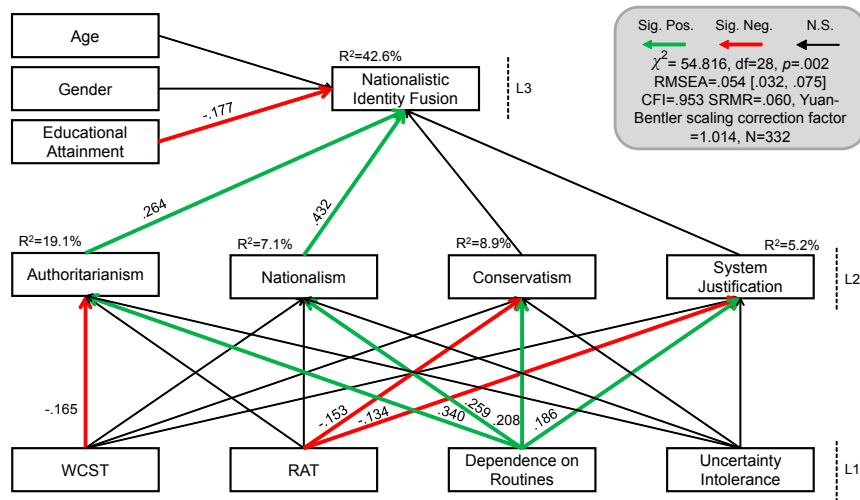


Fig. 4. Structural equation model predicting nationalistic identity fusion. All parameters shown are fully standardized. For unstandardized estimates, SEs, and confidence intervals, see Dataset S1. Significant parameter estimates are shown in green and red bolded lines. Residual covariances between psychological variables and between ideological variables are allowed, but not shown for simplicity (Dataset S1). Significance level was $P < 0.05$. Figure design was inspired by Kievit et al. (83, 84).

Brexit and opposition to immigration, the European Union, and free movement of labor. The models accounted for a significant proportion of variance in pro-Brexit attitudes (44.3% on average across the measured attitudes; Fig. 3 and Figs. S1–S3). Building on the reemergence of nationalistic sentiments in Europe and the United States in 2016 and 2017, this investigation was able to offer a novel outlook on the psychology behind nationalistic identity in the context of Brexit. From a methodological perspective, assessing cognitive flexibility using objective performance-based neuropsychological measures, and complementing these with self-report measures, allowed us to explore the psychological processes underpinning ideological cognition and voting behavior. Interestingly, this path analysis model structure also accounted for participants' sense of identity fusion with the United Kingdom (Fig. 4), as assessed via a pictorial measure. Consequently, cognitive and subjective inflexibility contribute toward ideological thinking styles that shape both policy-oriented nationalistic attitudes and sense of personal nationalistic identity.

Notably, the two objective cognitive flexibility tasks were ideologically and emotionally neutral, and so did not tap information processing specific to nationalistic ideologies or any form of social cognition. Although nationalism and voting have long been coupled with emotional processing (40, 41), and many studies in political psychology have investigated individuals' responses to negative and threatening stimuli (42–44), it may not only be “hot” cognition—that is, emotion-dependent information processing (45, 46)—that is relevant to the adoption of ideologies. In this study, we showed that “cold” cognition—that is, information processing that is emotionally neutral—can also be implicated in individual differences in adherence to ideologies. This provides empirical support to the idea that the rigidity of our belief systems is not purely a matter of emotion and attitude-confirming biases but can also be related to cognitive information-processing styles that are not explicitly linked to our moral foundations, beliefs, and values.

Indeed, this builds upon earlier work demonstrating links between neurocognitive functioning and political ideologies. For example, Amodio et al. (20) illustrated that neurocognitive sensitivity to response conflict is correlated with a more liberal political orientation, and Shook and Fazio (47) provided evidence that learning strategies in the exploration of novel non-ideological stimuli were related to political ideology. Hence,

there is value in expanding the use of cognitive methods for studying the psychological roots of ideology.

The present findings also reveal notable specificities in the pathways between psychological flexibility and Brexit attitudes. As evident in Fig. 4, the effect of WCST performance on pro-Brexit attitudes is mediated by its effect on nationalism and authoritarianism, while the effect of RAT performance is mediated through heightened conservatism. This signifies that the pathways between objective cognitive flexibility, ideological orientations, and nationalistic policy attitudes vary according to the facet of cognitive flexibility under investigation. Consequently, certain facets of psychological inflexibility are associated with specific types of conservative-leaning ideologies. This yields two valuable insights: First, cognitive flexibility is a multidimensional construct that both social and cognitive psychology researchers will need to further unpack. Second, there are subtle differences in the cognitive correlates of different types of ideological thinking, and so future research will need to address the mechanisms underlying these differential relationships and explore what these psychological correlates can tell us about the differences between authoritarianism, nationalism, conservatism, and system justification, among other ideological orientations. Furthermore, while dependence on routines and traditions in daily life was predictive of all four ideological orientations, intolerance for uncertainty was not a significant predictor of any of these. This suggests that a preference for habits and repetitive routines may foster a preference for ideologies that emphasize traditionalism and predictability. However, it is also conceivable that immersing oneself in strongly ideological environments may encourage psychological inflexibility and promote a preference for routines and traditions. Nevertheless, more research is necessary to understand the nature of cognitive flexibility and the various ways in which it manifests in relation to ideological thinking.

This research program builds on and complements previous work in four overarching theoretical frameworks: (i) the nature of nationalistic attachment, (ii) political conservatism as motivated social cognition, (iii) system justification theory, and (iv) identity fusion theory. Previous studies of nationalistic attachment have typically distinguished multiple dimensions of nationalism (48), such as a distinction between nationalism and patriotism (2, 49, 50), between blind and constructive patriotism (4, 5), and between collective narcissism and positive group regard (51, 52). Future research should therefore fractionate nationalism further and

investigate whether patriotism conceptualized as love of one's country, rather than nationalistic views on separateness and superiority, has different cognitive correlates.

Furthermore, these findings are relevant for the literature on the relationship between right-wing conservatism and cognitive style (11, 13, 23, 53), as the results indicate negative relationships between right-wing conservatism and objective cognitive flexibility in the WCST and RAT (Fig. 3 and Table 1). Interestingly, in the structural equation models (Figs. 3 and 4), conservatism was predicted by RAT (and not WCST) performance and greater dependence on routines, and so it is important to address the specificities in the relationship between right-wing conservatism and objectively assessed cognitive flexibility.

Recent interpretations of system justification theory (54) have posited that national attachment may be a means of attaining the system-justifying goal of defending existing social systems against criticism (55). Indeed, the present study found significant correlations between system justification and nationalistic attitudes and attachment (Table 1). However, system justification did not account for nationalistic attitudes above and beyond the other ideological orientation variables in the model (authoritarianism, conservatism, and nationalism), and was in fact a significant negative predictor of antiimmigration attitudes (Fig. S1). Additionally, system justification theory proposes that justifying the prevailing systems is psychologically appealing because it facilitates the attainment of certainty and coherence, and reduces feelings of threat and inconsistency (56, 57). Here, system justification was negatively correlated with RAT performance (Fig. 4 and Table 1), signifying that these epistemic motivations may operate more deeply than the social-psychological level, and may be related to cognitive predispositions toward inflexible thinking that could make some individuals more susceptible to these epistemic and existential motivations.

Finally, these findings are also relevant for identity fusion theory (58). Extending previous work showing that strong identity fusion is related to extreme progroupp actions (59) and sacrificial behaviors across different cultures (60–62), here we find that identity fusion also captures individual variation in normative intragroup and intergroup attitudes and is related to psychological flexibility. Most interestingly, the results indicate that heightened fusion with the nationalistic ingroup is related to poorer WCST performance (Table 1), suggesting that more cognitively flexible individuals have a reduced tendency to selectively fuse with their national ingroup. Moreover, Whitehouse and Lanman (63) proposed that rituals are key components of identity fusion, and correspondingly we found that individuals who reported depending on rituals and routines in their daily lives, and who believed that rituals are important even when unpleasant, were more fused to their nation (Table 1). Note that the rituals and routines that participants reported about were personal rather than collective, suggesting that dispositional propensities toward ritual engagement may play an essential role in shaping susceptibility to identity fusion.

The finding that both behavioral and self-report measures of psychological flexibility made significant unique and independent contributions to ideological thinking and Brexit-related attitudes supports other empirical work on prejudice (e.g., ref. 64) and methodological considerations about how best to measure these constructs (11, 23, 24). Furthermore, this study was not meant to be an exhaustive investigation of all of the facets of psychological flexibility or cognitive style (for further discussions into the cognitive flexibility construct, see refs. 65–68), and so there is room for further elucidation of the relationships between various ideological orientations and flexibility.

By investigating the cognitive roots of ideological thinking and nationalistic attitudes and behavior, this study has sought to connect the realm of cognition with that of ideology. Ideologically neutral cognitive flexibility was found to be an important correlate of ideological identity and behavior, suggesting that flexibility of thought may have far-reaching consequences for

social and political attitudes. The way the brain constructs internal boundaries between conceptual representations and adapts to changes in environmental contingencies has been shown here to be linked to individuals' desire for external boundaries to be imposed on national entities and for greater homogeneity in their cultural environment. This illustrates that information-processing styles in relation to perceptual and linguistic stimuli may also be drawn upon when dealing with political and ideological information. Thus, it is not only emotional processing or "psychological needs" that underlie individuals' adoption of nationalistic ideologies; cold cognitive information-processing styles also play a key role in ideological behavior and identity. Nevertheless, these findings do not rule out the possible effects of immersing oneself in ideologies on psychological flexibility and cognition, and so future research will need to address these complex causal relationships and interactions (69). Acknowledging the importance of linking individual differences at the level of perception and cognition with differences at the level of identity and political behavior will help to further inform our understanding of the cognitive underpinnings of ideology.

Materials and Methods

Participants. A total of 391 participants was recruited through Prolific Academic, an established platform for online research (70) (for more information about Prolific Academic, see <https://www.prolific.ac>), and financially compensated for their participation. Participants provided their informed consent before participation by indicating their agreement to share information about their ideological views and demographic variables and to perform several psychological tasks. All survey items were optional or allowed the participant to indicate that they "prefer not to respond" to a particular question. Participants were able to leave feedback at the end of the experiment. The experimental and consent procedures were approved by the University of Cambridge's Department of Psychology Ethics Committee. After removing participants who were not UK residents or had dual citizenship ($n = 59$), the final overall sample was 332 (47.1% female; age: $M = 37.96$, $SD = 13.69$). Within the United Kingdom, participants identified with England (84.3% of sample), Scotland (9.0%), Wales (5.4%), and Northern Ireland (1.2%). With respect to voting behavior in the 2016 EU referendum, 62.5% of the sample voted to Remain and 37.5% voted to Leave the European Union.

Measures and Procedure. Participants were redirected from Prolific Academic to an online survey hosted by Qualtrics Survey Software for completion of all of the self-reported items and the RAT, and later redirected again to Inquisit 5 by Millisecond Software to temporarily download software that allows for accurate measure of performance and reaction times in the WCST. Participants were asked about their UK residency status, voting behavior in the June 2016 EU referendum, political party affiliations, and other demographic variables such as age, gender, and educational attainment. Participants were also asked about their Big Five personality traits, the results of which are reported in *Supporting Information*.

Educational attainment was categorized along five groups: (i) participants with no formal educational qualifications (1% of sample), (ii) participants who completed a General Certificate of Secondary Education or equivalent qualifications (9.5% of sample), (iii) participants who completed two or more A levels or an apprenticeship (19.0% of sample), (iv) participants who completed a bachelor's degree or equivalent (63.3% of sample), and (v) participants who completed a doctoral degree or equivalent (7.2% of sample). It is noteworthy that the present sample has a higher proportion of Remain voters than Leave voters, and participants in general had high levels of educational attainment, so it would be valuable to replicate these findings in a more demographically representative sample.

Cognitive Flexibility.

Wisconsin Card Sorting Test. The WCST (31) was administered with Inquisit 5 by Millisecond Software in standard fashion (32). Participants are presented with four key cards and a deck of response cards that vary on three dimensions (color, shape, and number of geometric figures) and are asked to match a fifth card from the sequentially presented response cards to one of the four key cards. There are various potential rules that can underpin the classification, for instance matching the cards by shape, number, or color. Participants are required to identify and apply the correct card classification rule in accordance with the feedback they receive after each trial. Participants

are informed at the start of the task that the card classification rule can change without warning. Correspondingly, after participants correctly respond to 10 consecutive trials the classification rule changes, requiring a flexible set shift. The task terminates after participants complete six categories (twice for each of the three classification rules) or after 128 trials. Participants' performance is indexed through the accuracy rate during the task.

Compound Remote Associate Test. The compound RAT (36) consisted of 20 compound remote associate problems, in which participants are presented with three cue words (e.g., fly, cracker, fighter) and are asked to generate the compound word solution that links these three words (e.g., fire). Participants were given 20 s to provide an answer to each problem. Problems of varying difficulty levels were selected from a bank of validated remote associate items (71). See [Supporting Information](#) for further details.

Subjective Flexibility.

Intolerance for uncertainty. Intolerance for uncertainty was assessed with Carleton et al.'s (72) 12-item scale (Cronbach's alpha = 0.90), which included items such as "unforeseen events upset me greatly," "when I am uncertain I can't function very well," "the smallest doubt can stop me from acting," and "I must get away from all uncertain situations." Items were rated on a Likert scale from 1 (not at all characteristic of me) to 5 (entirely characteristic of me).

Dependence on routines. Participants' dependence on routines in their daily lives was measured with a 7-item Likert scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me) (Cronbach's alpha = 0.78). Example items included: "I hate it when my routines are disrupted," "traditions are important to me," and "rituals are important even if they are not enjoyable." See [Supporting Information](#) for all items and details.

Ideological Orientation Variables.

Authoritarianism. Authoritarian beliefs were measured with a four-item set of child-rearing questions developed by Hetherington and Weiler (73), which asks "which one do you think is more important for a child to have?" and then requires participants to choose one in the following pairs: "independent or respectful," "curious or well-mannered," "obedient or self-reliant," and "considerate or well-behaved." Each item is coded 0 for the nonauthoritarian answer (independent, curious, self-reliant, and well-behaved) and 1 for the authoritarian answer, and a summed total is used as a measure of authoritarian beliefs.

Nationalism scale. Nationalism was measured using items adapted to the United Kingdom from an established nationalism scale (48, 74, 75) consisting of six items, each rated by participants on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) (Cronbach's alpha = 0.79). Example items: "Generally, the more influence the UK has on other nations, the better off they are" and "we should do anything necessary to increase the power of our country, even if it means war." See [Supporting Information](#) for further details.

Political conservatism. Political ideology was assessed by asking participants to indicate their political party affiliation in the United Kingdom, and participants responded to the question "which of the following political parties best represents your views?" To quantify these party affiliations along a left-right political conservatism spectrum, we consulted a research report by YouGov, a specialist in polling demographically representative samples, published September 29, 2017. Each participant's level of conservatism was

therefore matched to the estimation of their political party's right-wing conservatism. See [Supporting Information](#) for further details.

System justification. System justification was measured using a version of Kay and Jost's (76) measure, adapted to British society. Cronbach's alpha was 0.88, and example items included: "In general, the British political system operates as it should" and "in the UK, everyone has a fair shot at wealth and happiness." See [Supporting Information](#) for further details.

Nationalistic Identity.

Attitudes toward Brexit-related issues. Based on the format of Everett's (77) Social and Economic Conservatism Scale, participants were asked about their feelings of positivity versus negativity toward a number of issues linked to Brexit on a Likert scale between 0 and 100. The issues included: (i) Brexit, (ii) the European Union, (iii) immigration, (iv) access to the EU Single Market, and (v) free movement of labor. In addition, participants were asked to rate their agreement with the following two statements: "The UK government has a right to remain in the EU if the risks are too high" and "if you are a citizen of the world, you are a citizen of nowhere" (the latter of which was borrowed from Prime Minister Theresa May's speech to the Conservative Party in October 2016).

Identity fusion. To measure participants' feeling of "oneness" with the United Kingdom and the European Union, participants were presented with a validated measure of identity fusion, the Dynamic Identity Fusion Index [DIFI (78)], consisting of a continuous pictorial representation that allows participants to move a small circle representing "the self" by clicking and dragging it toward or away from a large circle representing "the group." The distance between the centers of the two circles has been shown to indicate the extent to which individuals feel their personal identity is fused with a collective identity (78). It has temporal stability, as well as convergent and discriminant validity, and can predict the endorsement of progroup behaviors (78). In this study, participants were presented with the DIFI twice; once where the group was the "United Kingdom" and another when the group was "Europe." A difference score was then computed on the distance scores of UK and Europe fusion to identify the extent to which participants' group fusion was specifically nationalistic.

Structural Equation Models. All models were estimated in the Lavaan software package [version 0.5-23 (79)] in R (R Development Core Team, 2016) using full information maximum likelihood with robust SEs to account for multivariate nonnormality and missingness. Overall model fit was assessed with the χ^2 test, RMSEA and its confidence interval (acceptable: 0.05 to 0.08), the comparative fit index (acceptable: 0.95 to 0.97), and SRMR (acceptable: 0.05 to 0.10), and the Yuan-Bentler scaling factor was reported for each model (80, 81). Models were compared using a χ^2 test when the models were nested, and using the AIC in all other cases [in accordance with guidelines by Burnham and Anderson (82)].

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