nature human behaviour

SUPPLEMENTARY INFORMATION

https://doi.org/10.1038/s41562-017-0248-5

In the format provided by the authors and unedited.

Amygdala structure and the tendency to regard the social system as legitimate and desirable

H. Hannah Nam[1*], John T. Jost[2], Lisa Kaggen[2,3], Daniel Campbell-Meiklejohn[4] and Jay J. Van Bavel[2,5]

[1]Department of Political Science, Stony Brook University, Stony Brook, NY, USA. [2]Department of Psychology, New York University, New York, NY, USA. [3]Graduate School of Education, Stanford University, Stanford, CA, USA. [4]School of Psychology, University of Sussex, Brighton, UK. [5]Center for Neural Science, New York University, New York, NY, USA. *e-mail: hannah.nam@stonybrook.edu

Supplementary Information Guide

Supplementary Methods

Regression model comparisons of bilateral amygdala volume

We extracted ROI values of grey matter volume within masks for the left and right amygdalae that have >20% probability of reflecting amygdala volume (based on the Harvard-Oxford subcortical structural atlas implemented in the Oxford University Centre for Function MRI of the Brain Software Library [http://www.fmrib.ox.ac.uk]). Using these ROI values, we tested several regression models on bilateral amygdala volume. Because both the left and right amygdalae were significantly associated with system justification in the whole brain and small volume-corrected analyses, we computed the mean ROI value of the left and right amygdalae and report regression models on mean bilateral amygdala volume (see Supplementary Table 3; and see Supplementary Tables 4 and 5 for summaries of model comparisons for the ACC and left insula, respectively).

Across all models, because the ROI values tended to be small, we entered ROI variables (i.e., amygdala, ACC, and left insula variables) that were multiplied by a factor of 100 in order to obtain non-zero computed estimates of unstandardized regression coefficients and standard errors. (Note that this does not affect standardized coefficients nor significance testing.) All models were also adjusted for mean-centered age, gender, and global brain volume as in the whole brain analyses in SPM. In addition, the residuals from each model (across amygdala volume, ACC, and left insula) were consistently roughly normally distributed and homoscedastic, reasonably allowing for inferences based on the estimated standard errors.

The various multiple regression models followed the general form of an ordinary least squares (OLS) model in various combinations:

$$\hat{y} = b_0 + b_1{*}x_1 + b_2{*}x_2 + \ldots + b_n{*}x_n + \varepsilon$$

where

- $\hat{y}_{S1}$ = predicted GM volume in bilateral amygdalae (Study 1)
- $\hat{y}_{S2}$ = predicted GM volume in bilateral amygdalae (Study 2)
- b_0 = constant (intercept)
- b_n = unstandardized regression coefficients (slope)
- x_1 = political ideology
- x_2 = ideological extremity
- x_3 = general system justification
- x_4 = economic system justification
- x_5 = general system justification extremity
- x_6 = economic system justification extremity
- ε = error term

We first describe the preferred model (model 3 in Supplementary Table 3) and then the alternative models:

$$\hat{y}_{S1} = 16.74 + .348{*}x_3 + \varepsilon \qquad \text{(model 3)}$$

$$\hat{y}_{S2} = 5.84 + 1.043{*}x_3 + \varepsilon.$$

Model 3 indicated that greater system justification was associated with larger grey matter volume in the bilateral amygdalae (adjusting for the effects of age, sex, and global brain volume), for both Study 1 (b = .348, SE = .169, β = .14, t = 2.06, p = .045) and Study 2 (b = 1.043, SE = .233, β = .33, t = 4.48, p < .001).

We examined the potential additional effect of political ideology in Model 3a, adding ideology as a regressor in addition to system justification:

$$\hat{y}_{S1} = 16.78 - .015*x_1 + .359*x_3 + \varepsilon \qquad \text{(model 3a)}$$

$$\hat{y}_{S2} = 7.39 - .273*x_1 + 1.252*x_3 + \varepsilon.$$

Model 3a indicated that in Study 1, system justification was a marginally significant predictor of amygdala volume (b = .359, SE = .185, β = .14, t = 1.94, p = .059), but ideology was not (b = -.015, SE = .100, β = -.01, t = -0.16, p = .88). In Study 2, both system justification (b = 1.252, SE = .244, β = .39, t = 5.12, p < .001) and ideology (b = -.273, SE = .129, β = -.15, t = -2.11, p = .04) were associated with amygdala volume.

To assess whether political ideology by itself was associated with amygdala volume (as was found by Kanai et al.[1], we included ideology as the regressor of interest in model 1:

$$\hat{y}_{S1} = 15.93 + .059*x_1 + \varepsilon. \qquad \text{(model 1)}$$

$$\hat{y}_{S2} = 6.93 - .005*x_1 + \varepsilon.$$

Model 1 indicated that ideology was not significantly associated amygdala volume in Study 1 (b = .059, SE = .095, β = .04, t = .62, p = .54), nor in Study 2 (b = -.005, SE = .151, β = -.003, t = -.03, p = .97).

To examine the possibility that ideological extremity was a factor in addition to ideology, Model 2 included ideological extremity, which was measured by the absolute value of the distance from the midpoint of the scale:

$$\hat{y}_{S1} = 15.96 + .064*x_1 + .027*x_2 + \varepsilon \qquad \text{(model 2)}$$

$$\hat{y}_{S2} = 5.42 + .233*x_1 + .403*x_2 + \varepsilon.$$

Model 2 revealed that neither political ideology nor ideological extremity was associated with GM volume in the amygdala in Study 1 (ideology: b = .064, SE = .105, β = .05, t = .62, p = .54; ideological extremity: b = .027, SE = .202, β = .01, t = .14, p = .89), nor in Study 2 (ideology: b = .223, SE = .233, β = .12, t = .96, p = .34; ideological extremity: b = .403, SE = .316, β = .15, t = 1.28, p = .21).

To assess whether specific motivations to justify the economic system would be associated with brain structure, in Models 4 and 4a we tested the potential effect of economic system justification[2], in addition to general system justification (model 4) and general system justification and ideology (model 4a):

$$\hat{y}_{S1} = 17.13 + .495 * x_3 - .185 * x_4 + \varepsilon \quad \text{(model 4)}$$

$$\hat{y}_{S2} = 5.23 + .932 * x_3 + .180 * x_4 + \varepsilon$$

$$\hat{y}_{S1} = 17.13 - .002 * x_1 + .495 * x_3 - .182 * x_4 + \varepsilon \quad \text{(model 4a)}$$

$$\hat{y}_{S2} = 6.51 - .295 * x_1 + 1.088 * x_3 + .295 * x_4 + \varepsilon.$$

Models 4 and 4a both suggested that general system justification was consistently a significant predictor of amygdala volume across both studies, to a greater extent than economic system justification and political ideology. Model 4 revealed that greater general system justification was associated with larger amygdala volume (Study 1: $b = .495$, $SE = .244$, $\beta = .19$, $t = 2.03$, $p = .049$; Study 2: $b = .932$, $SE = .302$, $\beta = .29$, $t = 3.09$, $p = .004$), whereas economic system justification was not (Study 1: $b = -.185$, $SE = .263$, $\beta = -.07$, $t = -.70$, $p =. 49$; Study 2: $b = .180$, $SE = .307$, $\beta = .05$, $t = .59$, $p = .56$). In Model 4a, the effect of general system justification was again largest (Study 1: $b = .495$, $SE = .247$, $\beta = .19$, $t =2.00$, $p = .052$; Study 2: $b = 1.088$, $SE = .295$, $\beta = .34$, $t = 3.69$, $p = .001$), economic system justification was not associated with amygdala volume (Study 1: $b = -.182$, $SE = .293$, $\beta = -.06$, $t = -.62$, $p = .54$; Study 2: $b = .295$, $SE = .296$, $\beta = .09$, $t = 1.00$, $p = .33$), and the effect of ideology was inconsistent across studies (Study 1: $b = -.002$, $SE = .115$, $\beta = -.002$, $t = -.02$, $p = .98$; Study 2: $b = -.295$, $SE = .131$, $\beta = -.16$, $t = -2.25$, $p = .03$).

In Model 5 we more directly examined the association between economic system justification and amygdala volume. Model 5a assessed the effect of both economic system justification and political ideology.

$$\hat{y}_{S1} = 15.97 + .182 * x_4 + \varepsilon \quad \text{(model 5)}$$

$$\hat{y}_{S2} = 3.78 + .774 * x_4 + \varepsilon$$

$$\hat{y}_{S1} = 15.86 + .013 * x_1 + .167 * x_4 + \varepsilon \quad \text{(model 5a)}$$

$$\hat{y}_{S2} = 4.42 - .182 * x_1 + .906 * x_4 + \varepsilon.$$

In Study 1, economic system justification was not significantly associated with amygdala volume in either Model 5 ($b = .182$, $SE = .198$, $\beta = .06$, $t = .92$, $p = .36$) or in Model 5a ($b = .167$, $SE = .244$, $\beta = .06$, $t =.69$, $p = .50$), in which ideology was also not a significant predictor ($b = .013$, $SE = .118$, $\beta = .01$, $t =.11$, $p = .92$). However, in Study 2, economic system justification was positively associated with amygdala volume in both Model 5 ($b = .774$, $SE = .263$, $\beta = .23$, $t = 2.94$, $p = .005$) and Model 5a ($b = .906$, $SE = .282$, $\beta = .26$, $t = 3.21$, $p = .003$), in which ideology continued not to be a significant predictor ($b = -.182$, $SE = .147$, $\beta = -.10$, $t = -1.24$, $p = .22$).

Model 6 tested for the effect of general system justification extremity in addition to general system justification, and Model 6a added ideology.

$$\hat{y}_{S1} = 17.37 + .285*x_3 - .345*x_5 + \varepsilon \qquad \text{(model 6)}$$

$$\hat{y}_{S2} = 5.84 + .955*x_3 - .149*x_5 + \varepsilon$$

$$\hat{y}_{S1} = 17.34 + .020*x_1 + .268*x_3 - .361*x_5 + \varepsilon \qquad \text{(model 6a)}$$

$$\hat{y}_{S2} = 7.38 - .273*x_1 + 1.165*x_3 - .147*x_5 + \varepsilon.$$

In Study 1, no effects reached conventional levels of statistical significance, although general system justification approached marginal significance (b = .285, SE = .176, β = .11, t = 1.62, p = .11), whereas system justification extremity did not (b = -.345, SE = .281, β = -.09, t = -1.23, p = .23) in Model 6, as well as in Model 6a (general system justification: b = .268, SE = .199, β = .11, t = 1.35, p = .18; system justification extremity: b = -.361, SE = .295, β = -.09, t = -1.22, p = .23; ideology: b = .020, SE = .103, β = .01, t = .19, p = .85). In Study 2, general system justification emerged as positively associated with amygdala volume (b = .955, SE = .345, β = .30, t =2.77 p =.009) to a greater extent than system justification extremity (b = -.149, SE = .423, β = -.04, t = -.35, p =.73) in Model 6 as well as 6a (general system justification: b = 1.165, SE = .346, β = .37, t = 3.37, p = .002; system justification extremity: b = -.147, SE = .406, β = -.03, t = -.36, p = .72; ideology: b = -.273, SE = .131, β = -.14, t = -2.09, p = .04).

Finally, in Model 7 we tested for the effects of economic system justification and economic system justification extremity, and in Model 7a we added ideology.

$$\hat{y}_{S1} = 15.94 + .218*x_4 + .337*x_6 + \varepsilon \qquad \text{(model 7)}$$

$$\hat{y}_{S2} = 3.77 + .775*x_4 + .002*x_6 + \varepsilon.$$

$$\hat{y}_{S1} = 15.93 + .002*x_1 + .215*x_4 + .337*x_6 + \varepsilon \qquad \text{(model 7a)}$$

$$\hat{y}_{S2} = 4.21 - .190*x_1 + .973 *x_4 + .124*x_6 + \varepsilon$$

Study 1 revealed that no effects were significantly associated with amygdala volume in Model 7 (economic system justification: b = .218, SE = .201, β = .08, t = 1.08, p = .29; economic system justification extremity: b = .337, SE = .322, β = .08, t = 1.05, p =.30), nor in Model 7a (economic system justification: b = .215, SE = .248, β = .08, t = .87, p = .39; economic system justification extremity: b = .337, SE = .328, β = .08, t = 1.03, p = .31; ideology: b = .002, SE = .119, β = .002, t = .02, p = .99). In Study 2 we found slightly different results, with economic system justification emerging as positively associated with amygdala volume (b = .775, SE = .362, β = .23, t = 2.14, p = .04), although economic system justification extremity was not (b = .002, SE = .495, β < .001, t = .004, p > .99) in Model 7, as in Model 7a (economic system justification: b = .973, SE = .393, β = .28, t = 2.48, p = .02; economic system justification extremity: b =.124, SE = .501, β = .02, t = .25, p = .81; ideology: b = -.190, SE = .151, β = -.10, t = -1.25, p = .22).

Supplementary Discussion

Social dominance orientation and amygdala structure

Dominance has been associated with amygdala structure in macaques[3,4], but it is possible that the relationship is more complex in humans. The small literature on dominance and the amygdala in humans has been mixed, with some finding that the amygdala is related to learning and perceiving important features of dominance in humans[5,6], whereas other work has failed to reveal a link between social dominance perception and amygdala activity[7]. As a preliminary exploration, we obtained social dominance orientation measures (SDO)[8]—that is, a preference for intergroup hierarchy and dominance—for a subset (N = 37) of our Study 1 participants. As expected, SDO was strongly positively associated with system justification, $r(35) = .42$, $p = .009$, suggesting that those who prefer hierarchy and group dominance are also those who are more likely to justify existing social systems with those features. However, SDO did not reach conventional levels of significance in predicting amygdala volume (adjusting as in all our other analyses for age, sex, and global brain volume), $b = .23$, $SE = .15$, $\beta = .13$, $t = 1.51$, $p = .14$. Indeed, when SDO and system justification were both entered as predictors in a regression model of amygdala volume, system justification was a marginally significant predictor of amygdala volume ($b = .41$, $SE = .22$, $\beta = .17$, $t = 1.84$, $p = .08$) whereas SDO was not ($b = .09$, $SE = .17$, $\beta = .05$, $t = .52$, $p = .60$).

Conservatism and amygdala structure

Although we did not find a significant relationship between political ideology and amygdala volume as reported by Kanai and colleagues[1] in their British sample, we raise the possibility that system justification could be a common, underlying psychological basis for a relationship between ideology and brain structure. It should be noted that the 95% confidence intervals of the correlation coefficients of our studies included the correlation of $r(88) = .23$ reported by Kanai et al.[1] in our first sample ($r(46) = .094$, $p = .53$, 95% CI: {-.20, .37}) and our second sample ($r(43) = -.005$, $p = .97$, 95% CI: {-.30, .29}), suggesting that these findings are not inconsistent with one another. We also explored whether a correlation between amygdala volume and political ideology would emerge in a larger sample by collapsing across our two samples and examining the relationship (covarying out the effects of sample, age, sex, and global brain volume). In the combined sample, we observed a non-significant relationship between amygdala volume and ideology, $r(91) = .03$, $p = .76$, 95% CI: {-.17, .23}, which again includes the correlation reported by Kanai et al.[1] and further supports the possibility that these findings are not inconsistent.

It is of course conceivable that political conservatism is construed somewhat differently in the UK than in the USA—for example, British conservatism could be more tightly linked to system-justifying preferences. Previous work suggests that people's system justification motivation often supports conservative ideology[9], but can also support the perceived status quo in the absence of explicit ideological framing[10]. Further investigations across cultures and different political systems could specify potential moderators of the relationship between ideology, system justification, and brain structure.

Supplementary Tables

Supplementary Table 1. All significant clusters for a system justification contrast in small volume and whole brain analyses in Study 1. All regions thresholded at $p < .001$, 20 voxels. Brain region labels are primary regions (>1% cluster) associated within 10 mm radius of peak MNI coordinates (identified using SPM toolbox Automated Anatomical Labeling [AAL]). Note: L indicates left; R, right; Sup, superior; Inf, inferior; Orb, orbital; Ant, anterior; Post, posterior; Med, medial; Mid, middle.

Analysis	Contrast	Hemisphere	Cluster size (k_E)	MNI peak coordinates (mm) (x,y,z)	*t* value	Brain region (% cluster)
Small volume (Amygdala)	*System justification*	L	10	-36, -9, -17	3.82	**Amygdala**
		R	71	27, 12, -21	4.58	**Amygdala**
				23, 8, -21	3.57	
Whole brain	*System justification*	L	1297	-17, 23, -12	4.88	Frontal Inf Orb (36.22) OFC med (17.78) OFC post (14.96) Insula (11.16) Putamen (7.52) Olfactory (2.59) Cingulate Ant (1.46) Caudate (1.05)
				-17, 17, -24	4.30	Olfactory (29.43) OFC post (25.87) Insula (23.44) OFC med (8.16) Rectus (2.83)
				-35, 17, -11	4.14	Putamen (53.92) OFC post (16.49) Frontal Inf Orb (13.66) Insula (11.40)
		R	699	27, 14, -21	4.61	Insula (22.96) ParaHippocampal (17.70) Olfactory (16.73) Rectus (8.89) **Amygdala** (7.44) OFC post (4.85) OFC med (1.94) Temporal Pole Sup (1.29)
		L	142	-39, -7, -17	4.23	Insula (52.71) Temporal Pole Sup (16.81) **Amygdala** (10.27) Temporal Inf (9.86) Hippocampus (3.64) Temporal Mid (2.26) Temporal Sup (1.62)
		R	177	8, -43, -12	3.64	Vermis (33.39; 28.54) Cerebellum (13.90; 6.87) Parahippocampal (1.86 Vermis (1.46)

Supplementary Table 2. All significant clusters for a system justification contrast in small volume and whole brain analyses in Study 2. All regions thresholded at $p < .001$, 20 voxels. Brain region labels are primary regions (>1% cluster) associated within 10 mm radius of peak MNI coordinates (identified using SPM toolbox Automated Anatomical Labeling [AAL]). Note: L indicates left; R, right; Sup, superior; Inf, inferior; Orb, orbital; Ant, anterior; Post, posterior; Med, medial; Mid, middle.

Analysis	Contrast	Hemisphere	Cluster size (k_E)	MNI peak coordinates (mm) (x,y,z)	t value	Brain region (% cluster)
Small volume (Amygdala)	*System justification*	L	930	-11, -1, -26	3.84	**Amygdala**
		R	2270	20, 8, -14	4.68	**Amygdala**
Whole brain	*System justification*	R	3695	21, -19, -36	5.30	Parahippocampal (93.61) Fusiform (5.09)
				23, 14, -14	5.12	Olfactory (23.77) Temporal Pole Sup (21.75) Rectus (14.79) Parahippocampal (11.88) OFC med (8.97) OFC post (6.79) Insula (5.66) Putamen (3.31) Caudate (1.62)
				27, 2, -29	4.43	**Amygdala** (45.59) Fusiform (17.87) Temporal Pole Mid (12.05) Hippocampus (9.70) Temporal Pole Sup (5.42) Parahippocampal (4.77)
		L	1667	-20, -19, -35	4.64	Parahippocampal (75.59) Fusiform (15.20) Cerebellum (7.11)
				-23, 12, -12	4.10	Temporal Pole Sup (28.94) Olfactory (25.63) **Amygdala** (19.16) Rectus (10.75) Insula (8.33) OFC med (3.40) OFC post (3.15)
				-11, 0, -26	3.92	Olfactory (63.62) **Amygdala** (31.29) Parahippocampal (2.51) Temporal Pole Sup (1.78)
		L	520	-47, -18, -24	4.01	Temporal Inf (22.47) Fusiform (8.73) Temporal Mid (1.70)
		L	135	-35, -55, -14	3.71	Temporal Inf (78.42) Lingual (9.05) Cerebellum (3.31) Fusiform (2.59)
				-36, -45, -18	3.36	Temporal Inf (69.44) Cerebellum (18.19) Parahippocampal (4.20)

Supplementary Table 3. Model comparisons on amygdala volume (Studies 1 & 2). Regressor variables were mean-centered, and extremity variables were the absolute value distance from the midpoint of the scale. All models adjusted for age, gender, and global brain volume.

Model	Regressor	Study 1					Study 2				
		b	*SE (b)*	*β*	*t*	*p*	*b*	*SE (b)*	*β*	*t*	*p*
1	Ideology	.059	.095	.043	.619	.539	-.005	.151	-.003	-.034	.973
2	Ideology	.064	.105	.047	.616	.541	.223	.233	.118	.957	.344
	Ideological extremity	.027	.202	.011	.136	.893	.403	.316	.153	1.277	.209
3	General system justification (GSJ)	.348	.169	.139	2.061	.045	1.043	.233	.327	4.478	< .001
3a	GSJ	.359	.185	.143	1.941	.059	1.252	.244	.392	5.123	< .001
	Ideology	-.015	.100	-.011	-.155	.878	-.273	.129	-.145	-2.113	.041
4	GSJ	.495	.244	.191	2.030	.049	.932	.302	.292	3.090	.004
	Economic system justification (ESJ)	-.185	.263	-.065	-.703	.486	.180	.307	.053	.589	.560
4a	GSJ	.495	.247	.192	2.002	.052	1.088	.295	.341	3.685	.001
	ESJ	-.182	.293	-.064	-.623	.537	.295	.296	.086	.996	.326
	Ideology	-.002	.115	-.002	-.021	.984	-.295	.131	-.156	-2.252	.030
5	ESJ	.182	.198	.064	.917	.364	.774	.263	.226	2.944	.005
5a	ESJ	.167	.244	.059	.685	.497	.906	.282	.264	3.214	.003
	Ideology	.013	.118	.009	.108	.915	-.182	.147	-.096	-1.243	.221
6	GSJ	.285	.176	.114	1.621	.113	.955	.345	.299	2.769	.009
	GSJ extremity	-.345	.281	-.086	-1.231	.225	-.149	.423	-.035	-.351	.727
6a	GSJ	.268	.199	.107	1.350	.184	1.165	.346	.365	3.369	.002
	GSJ extremity	-.361	.295	-.090	-1.222	.229	-.147	.406	-.034	-.362	.719
	Ideology	.020	.103	.014	.189	.851	-.273	.131	-.144	-2.089	.044
7	ESJ	.218	.201	.077	1.084	.285	.775	.362	.226	2.141	.039
	ESJ extremity	.337	.322	.077	1.046	.302	.002	.495	<.001	.004	.997
7a	ESJ	.215	.248	.076	.868	.390	.973	.393	.284	2.478	.018
	ESJ extremity	.337	.328	.077	1.027	.310	.124	.501	.024	.248	.805
	Ideology	.002	.119	.002	.019	.985	-.190	.151	-.100	-1.253	.218

Supplementary Table 4. Model comparisons on ACC volume (Studies 1 & 2). Regressor variables were mean-centered, and extremity variables were the absolute value distance from the midpoint of the scale. All models adjusted for age, gender, and global brain volume.

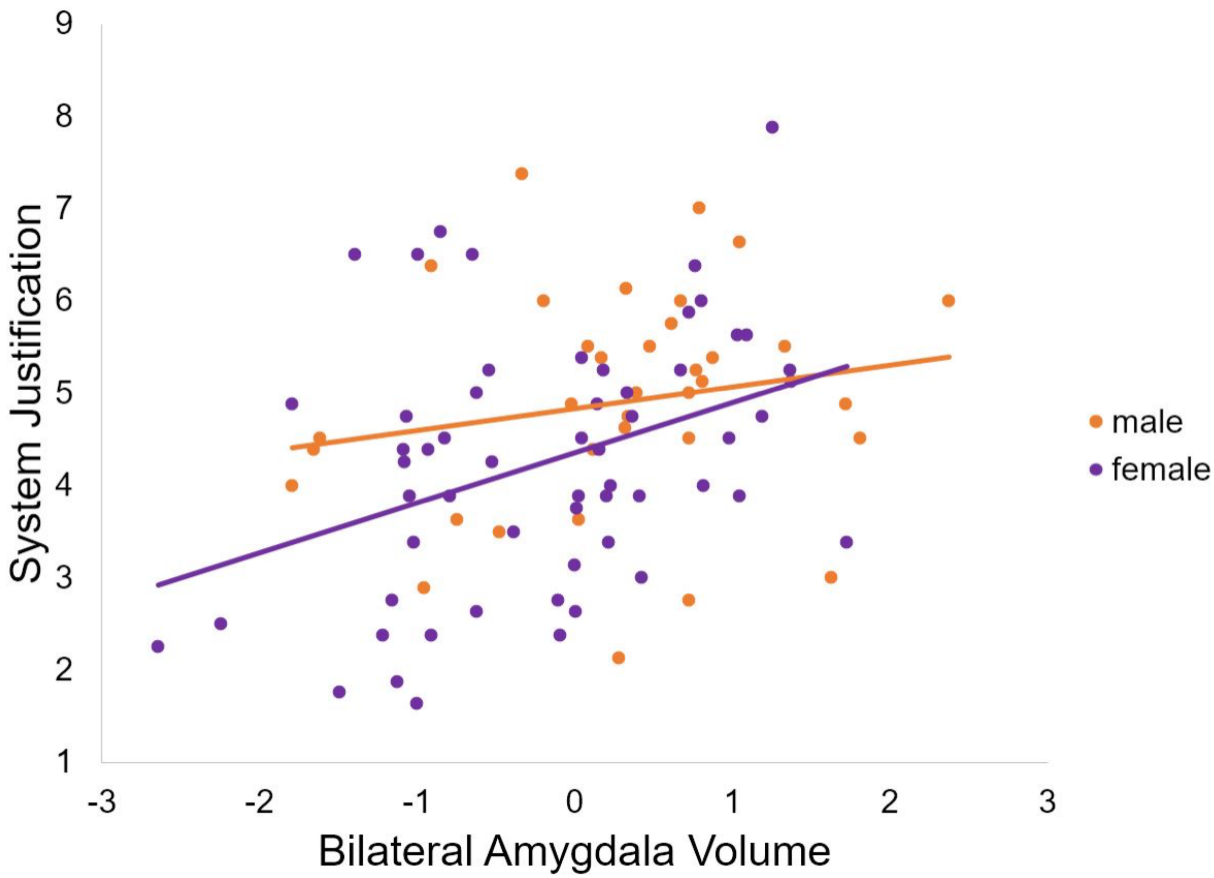
		Study 1					Study 2				
Model	Regressor	*b*	*SE (b)*	*β*	*t*	*p*	*b*	*SE (b)*	*β*	*t*	*p*
1	Ideology	-.105	.152	-.055	-.689	.494	-.133	.166	-.082	-.805	.426
2	Ideology	-.131	.166	-.069	-.790	.434	-.126	.261	-.078	-.482	.632
	Ideological extremity	-.132	.321	-.037	-.413	.682	.013	.354	.006	.037	.970
3	General system justification (GSJ)	-.208	.281	-.060	-.742	.462	-.635	.300	-.232	-2.120	.040
3a	GSJ	-.157	.307	-.045	-.512	.611	-.637	.332	-.233	-1.921	.062
	Ideology	-.072	.166	-.038	-.435	.666	.003	.175	.002	.017	.986
4	GSJ	-.761	.388	-.213	-1.960	.057	-.529	.389	-.194	-1.362	.181
	Economic system justification (ESJ)	.716	.419	.183	1.709	.095	-.171	.395	-.058	-.434	.667
4a	GSJ	-.737	.390	-.206	-1.890	.066	-.538	.405	-.197	-1.329	.192
	ESJ	.896	.461	.229	1.944	.059	-.178	.406	-.061	-.438	.664
	Ideology	-.170	.180	-.089	-.941	.352	.017	.180	.010	.092	.927
5	ESJ	.152	.315	.039	.484	.631	-.509	.311	-.173	-1.636	.110
5a	ESJ	.377	.382	.096	.988	.329	-.480	.340	-.163	-1.414	.165
	Ideology	-.192	.186	-.101	-1.037	.306	-.039	.177	-.024	-.223	.824
6	GSJ	-.276	.295	-.079	-.936	.355	-.302	.438	-.111	-.691	.494
	GSJ extremity	-.369	.471	-.066	-.782	.439	.559	.537	.152	1.040	.305
6a	GSJ	-.243	.333	-.070	-.727	.471	-.305	.464	-.111	-.657	.515
	GSJ extremity	-.337	.496	-.061	-.680	.500	.559	.544	.152	1.027	.311
	Ideology	-.039	.174	-.021	-.227	.822	.003	.175	.002	.015	.988
7	ESJ	.052	.310	.013	.167	.868	-.424	.428	-.144	-.991	.328
	ESJ extremity	-.936	.497	-.154	-1.881	.067	.172	.584	.039	.294	.770
7a	ESJ	.248	.379	.063	.654	.517	-.370	.473	-.126	-.783	.439
	ESJ extremity	-.897	.500	-.148	-1.792	.081	.205	.603	.046	.341	.735
	Ideology	-.164	.181	-.086	-.905	.371	-.052	.182	-.032	-.283	.779

Supplementary Table 5. Model comparisons on left insula volume (Studies 1 & 2). Regressor variables were mean-centered, and extremity variables were the absolute value distance from the midpoint of the scale. All models adjusted for age, gender, and global brain volume.

		Study 1					Study 2				
Model	Regressor	*b*	*SE (b)*	*β*	*t*	*p*	*b*	*SE (b)*	*β*	*t*	*p*
1	Ideology	-.073	.101	-.054	-.722	.474	-.125	.123	-.063	-1.021	.313
2	Ideology	-.087	.110	-.065	-.785	.437	.029	.191	.015	.154	.879
	Ideological extremity	-.069	.213	-.028	-.325	.746	.274	.259	.099	1.058	.297
3	General system justification (GSJ)	.268	.183	.109	1.463	.151	.408	.226	.122	1.802	.079
3a	GSJ	.374	.196	.153	1.912	.063	.603	.239	.180	2.526	.016
	Ideology	-.150	.106	-.112	-1.420	.163	-.254	.126	-.128	-2.017	.051
4	GSJ	.326	.266	.129	1.228	.226	.670	.287	.200	2.338	.025
	Economic system justification (ESJ)	-.043	.287	-.016	-.150	.881	-.425	.291	-.118	-1.459	.153
4a	GSJ	.355	.260	.140	1.364	.180	.791	.287	.236	2.758	.009
	ESJ	.173	.308	.062	.562	.577	-.336	.288	-.093	-1.170	.249
	Ideology	-.204	.121	-.151	-1.690	.099	-.229	.127	-.115	-1.796	.080
5	ESJ	.198	.210	.072	.947	.349	.002	.239	.001	.009	.993
5a	ESJ	.424	.250	.153	1.694	.098	.108	.258	.030	.420	.677
	Ideology	-.193	.122	-.143	-1.586	.120	-.146	.134	-.074	-1.094	.281
6	GSJ	.155	.184	.064	.843	.404	.394	.336	.118	1.175	.247
	GSJ extremity	-.612	.295	-.156	-2.076	.044	-.023	.411	-.005	-.057	.955
6a	GSJ	.240	.206	.098	1.161	.252	.590	.338	.176	1.745	.089
	GSJ extremity	-.534	.307	-.136	-1.737	.090	-.022	.397	-.005	-.055	.957
	Ideology	-.098	.107	-.073	-.916	.365	-.254	.128	-.128	-1.991	.054
7	ESJ	.201	.215	.073	.935	.355	-.059	.329	-.017	-.181	.857
	ESJ extremity	.026	.345	.006	.075	.941	-.124	.450	-.023	-.277	.784
7a	ESJ	.434	.258	.157	1.684	.100	.092	.359	.025	.255	.800
	ESJ extremity	.072	.341	.017	.213	.833	-.031	.458	-.006	-.067	.947
	Ideology	-.195	.123	-.145	-1.580	.122	-.145	.138	-.073	-1.046	.302

Supplementary Figure

Supplementary Figure 1. The relationship between system justification and average bilateral amygdala volume (adjusted for age, global brain volume, and sample, and standardized such that $M = 0$, $SD = 1$) split by gender (male = orange; female = purple). This scatterplot combines the data for both Studies 1 and 2 ($N = 93$) to explore the relationship between amygdala volume and system justification as a function of gender. The relationship between system justification and amygdala volume was not significantly different among women ($r(56) = .38$, $p = .004$) compared to men ($r(33) = .19$, $p = .28$), $z = .92$, $p = .36$.



Supplementary References

1. Kanai, R., Feilden, T., Firth, C. & Rees, G. Political orientations are correlated with brain structure in young adults. *Curr. Biol.* **21,** 677-680 (2011).
2. Jost, J. T. & Thompson, E. P. Group-based dominance and opposition to equality as independent predictors of self-esteem, ethnocentrism, and social policy attitudes among African Americans and European Americans. *J. Exp. Soc. Psychol.* **36,** 209-232 (2000).
3. Rosvold, H. E., Mirsky, A. F. & Pribram, K. H. Influence of amygdalectomy on social behavior in monkeys. *J. Comp. Physiol. Psych.* **47,** 173-178 (1954).
4. Noonan, M. P. et al. A neural circuit covarying with social hierarchy in macaques. *PLoS Biol.* **12(9),** e1001940 (2014).
5. Kumaran, D., Melo, H. L. & Duzel, E. The emergence and representation of knowledge about social and nonsocial hierarchies. *Neuron* **76,** 653-666 (2012).
6. Zink, C. F. et al. Know your place: neural processing of social hierarchy in humans. *Neuron* **58,** 273-283.
7. Chiao, J. Y. et al. Knowing who's boss: fMRI and ERP investigations of social dominance perception. *Group Process. Interg.* **11,** 201-214 (2008).
8. Pratto, F., Sidanius, J., Stallworth, L. M., & Malle, B. M. Social dominance orientation: a personality variable predicting social and political attitudes. *J. Pers. Soc. Psychol.* **67,** 741-763 (1994).
9. Jost, J. T. & Hunyady, O. Antecedents and consequences of system-justifying ideologies. *Curr. Dir. Psychol. Sci.* **14,** 260-265 (2005).
10. Kay, A. C. et al. Inequality, discrimination, and the power of the status quo: Direct evidence for a motivation to see the way things are as the way they should be. *J. Pers. Soc. Psychol.* **97,** 431-434 (2009).