Article

Studying the Cognitive Map of the U.S. States: Ideology and Prosperity Stereotypes Predict Interstate Prejudice

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Abstract

What are the spontaneous stereotypes that U.S. citizens hold about the U.S. states? We complemented insights from theory-driven approaches to this question with insights from a novel data-driven approach. Based on pile sorting and spatial arrangement similarity ratings for the states, we computed two cognitive maps of the states. Based on ratings for the states on ~20 candidate dimensions, we interpreted the dimensions that spanned the two maps (Studies 1 and 2). Consistent with the **a**gency/socioeconomic success, conservative-progressive **b**eliefs, and **c**ommunion (ABC) model of spontaneous stereotypes, these dimensions that participants spontaneously used to rate the states' similarity included prosperity (A) and ideology (B) stereotypes (states seen as more liberal and atheist were seen as more educated and wealthy). Study 3 showed that states seen as more average on A and B were stereotyped as more likable. Additionally, Study 3 showed that interstate similarity in stereotypic ideology and prosperity mattered, as it predicted interstate prejudice.

Keywords

spontaneous stereotypes, U.S. states, ideology, prosperity, ABC model

To orient in the ever more explored and populated world, people use maps that show the cities, states, and countries that can be found from north to south and west to east. Comprehensive orientation, however, goes well beyond the four cardinal directions. For example, people also need to know what landscape(s); climate; population; and culture of thoughts, feelings, and behaviors to expect from regions. To cope with nowadays' enormous amount of orientation-relevant information, people form and use cognitive maps that may feature spontaneous regional stereotypes (Tolman, 1948). In this data-driven research, we used participant-generated candidate dimensions to reveal the spontaneous stereotypes featured in U.S. citizens' cognitive map of the U.S. states. Furthermore, we showed that these spontaneous stereotypes observed in two independent samples of participants predicted interstate prejudice as estimated by a third independent sample.

Spontaneous Stereotypes About the U.S. States

The stereotype content model (SCM; Fiske, Cuddy, Glick, & Xu, 2002) claims that people mentally organize social groups, states (Kervyn, Fiske, & Yzerbyt, 2013), and even brands (Kervyn, Fiske, & Malone, 2012) along the two stereotype dimensions competence (aka agency) and warmth (aka communion). However, despite a plethora of research on these Big Two (Abele & Wojciszke, 2014), there is a lack of evidence that people *spontaneously* use competence and warmth stereotypes to make sense of groups, states, and brands. One reason for this is that participants in the respective studies did not rate groups/states/brands on other dimensions. For example, in one study, Europeans rated European states on stereotypic warmth, competence, status, and competition with other European states (Cuddy et al., 2009). This theory-driven preselection of dimensions prevented participants from spontaneously using stereotype dimensions other than warmth, competence, status, and competition. Thus, given free choice, U.S. citizens might spontaneously use stereotype dimensions other than warmth and competence to mentally organize the U.S. states.

In fact, recent data-driven research supported a different model. According to this ABC model, people spontaneously use the two stereotype dimensions agency/socioeconomic success (A) and conservative–progressive beliefs (B) to mentally organize groups (Koch, Imhoff, Dotsch, Unkelbach, & Alves,

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2016). People might spontaneously use status and power information (A stereotypes) to satisfy the needs for effective/efficient communication and cooperation, personal achievement, and social advancement (Magee & Galinsky, 2008). Learning whether others are conservative or progressive (B stereotypes) helps to balance exploiting current resources of certain quality and exploring alternative resources of uncertain but possibly better quality (Inzlicht, Schmeichel, & Macrae, 2014). In the ABC studies, warmth or communion (C) was not used as a third independent dimension. Instead, impressions of C peaked at impressions of average A (Imhoff & Koch, 2017) and B. In light of this contradiction between the theoretically developed SCM and the data-driven ABC model, it seems worthwhile to refrain from theoretical assumptions about relevant U.S. state stereotypes and let the data speak for themselves. Accordingly, the aim of this research was to clarify U.S. citizens' spontaneous stereotypes about the U.S. states.

The Present Research

We report two data-driven studies in which participants used pile sorting (Study 1; e.g., Shaver, Schwartz, Kirson, & O'Connor, 1987) and a more sensitive spatial arrangement method (SpAM; Study 2; e.g., Hout & Goldinger, 2016; Hout, Goldinger, & Ferguson, 2013; Koch, Alves, Krüger, & Unkelbach, 2016; Lammers, Koch, Conway, & Brandt, in press) to rate the similarity of all states. Why similarity ratings? Because similarity allowed participants to spontaneously use any stereotype dimensions to mentally organize the states. To illustrate, participants were free to construe interstate similarity in terms of stereotypic prosperity. If so, they would rate New York and California as similar, and they would rate Maryland and West Virginia as dissimilar. However, participants were also free to construe interstate similarity in terms of longitude, and in this case, they would rate New York and California as dissimilar and Maryland and West Virginia as similar.

Importantly, if most participants would rate the similarity of most states with respect to the same dimensions, these spontaneously used dimensions could be identified by computing and interpreting a cognitive map that visualized the pattern of similarity ratings (see Studies 1 and 2). Based on participant-generated candidate dimensions, Study 1 explored the dimensions that spanned the cognitive map of the U.S. states. Study 2 confirmed that these dimensions included spontaneous prosperity and ideology stereotypes. Study 3 found that these spontaneous stereotypes mattered, as states seen as more similar to participants' own state in prosperity and ideology were stereotyped as more likable. Consistent with the ABC model of spontaneous stereotypes about groups (Koch, Imhoff, Dotsch, Unkelbach, & Alves, 2016), Study 3 also found that states seen as more average on prosperity and ideology were stereotyped as more likable.

Throughout these studies, we report all conditions and measures. We do not report data exclusions because there were none. We have made all data publicly available via the Open Science Framework (OSF; https://osf.io/8bvza/?view_only=3fac8305969c4ea4be17f56fc304a40d). In all studies, we analyzed mean ratings for, or the geographic coordinates of, the 48 U.S. mainland states. Thus, our stimulus sample size was fixed at 48. The amount of data points per mean varied from study to study (10+ in Study 3 to 200+ in Study 1). For each new data set, we justify our choice of data points per mean (i.e., our participant sample size).

Studies 1 and 2

In Studies 1 and 2, we computed and interpreted two U.S. cognitive maps based on similarity ratings for the 48 U.S. mainland states. The standard similarity assessment method is to rate the similarity of all $n \times (n - 1)/2$ pairs that can be formed with n stimuli of interest. For 48 states, this makes 1,128 ratings—way too much for a participant. Since the algorithm by which we computed the cognitive maps can handle missing data, one solution could have been that participants complete random subsets of trials. This solution was not ideal, however, because similarity (e.g., the similarity of two states in a subset of states) is a function of context (e.g., the other states in that subset; Goldstone, Medin, & Halberstadt, 1997). Sorting all states into piles (e.g., Shaver et al., 1987) kept context constant and was a more efficient solution, as sorting a state into a pile simultaneously rated the similarity between that and all other states in a binary way (i.e., the same pile meant similar and separate piles meant dissimilar). An equally efficient but more sensitive solution was sorting more similar states closer together on the screen (the SpAM; Hout et al., 2013). The drawback of SpAM was that participants could not use more than two orthogonal dimensions to sort the states on the screen because it is planar (trading some accuracy of representation for higher dimensionality they could, however, use more than two orthogonal dimensions in an *imperfect* way; see Hout & Goldinger, 2016; Hout et al., 2013). To test whether participants would spontaneously use more than two orthogonal dimensions to rate the states' similarity, in Study 1, they sorted them into piles. Participants' pile sorting could be described satisfactorily by two orthogonal dimensions—that is, in a 2-D cognitive map in which states were represented as points and similarity between states was given by their proximity. Thus, in Study 2, we enabled participants to rate the states' similarity in a two dimensional but more nuanced way, namely, by sorting more similar states closer together on the screen (i.e., by using SpAM). The two 2-D cognitive maps computed in Studies 1/2 were almost identical.

Next, to build a 2-D model of the dimensions that participants had used to sort the states into piles (Study 1)/to spatially arrange the states (Study 2), a third sample of participants labeled all dimensions that run through the two 2-D cognitive maps. With the most frequent labels, we formed 19 bipolar candidates such as "religious–atheist." A fourth participant sample rated all states on all candidates. Finally, we modeled the distribution of the states in the maps based on the distributions of the states on the candidates (i.e., we fitted the candidates to the maps). To build 2-D models of the maps, we searched for pairs of orthogonal candidates that fitted well.

Method and Results

Study 1: Pile Sorting of the U.S. States

We had no prior experience with pile sorting as a (categorical and thus rough-grained) similarity measure. Therefore, we collected 200+ data points per pile sorting similarity mean to ensure reliable similarity means. We paid 215 U.S. citizens from 40 states (MTurkers; 78 women, 137 men; $M_{age} = 31.47$) a small amount of money. Participants were presented with a deck of 48 randomly ordered cards in the lower left corner of the screen. Each card showed the name of a state. The task was to sort the states into minimum three and maximum ten fields (i.e., piles) at the top of the screen. At the beginning, the fields were empty, and there were no labels in the fields or attached to the fields. That is, there were no clues whatsoever about how to sort the states, except that states perceived as similar had to be sorted into the same pile, whereas states perceived as dissimilar had to be sorted into separate piles (for the verbatim instructions, see Online Supplemental Material, part 1). Once participants had dragged and dropped all states onto minimum three piles (the states could be dragged from pile to pile anytime during the task, a "Finish" button appeared (see Online Supplemental Material, part 2). Upon pressing this button, participants provided labels for each of their piles (we did not analyze this data). For each pair of states, we recorded a 0 (for "dissimilar") if the two states had been sorted onto different piles and a 1 (for "similar") if the two states had been sorted onto the same pile. Averaging this value across participants yielded a mean probability of having been sorted onto the same pile for each pair of states (i.e., pile sorting similarity).

Study 2: Spatial Arrangement of the U.S. States

Following Koch and colleagues' (2016) example of 50+ data points per spatial arrangement similarity mean, we paid 75 U.S. citizens from 30 states (MTurkers; 23 women, 52 men; $M_{age} = 31.47$) a small amount of money to sort the 48 U.S. mainland states on a blank screen. Participants were instructed to sort more similar states closer together and to sort more different states further apart (for the verbatim instructions, see Online Supplemental Material, part 3). The states' names appeared in the middle of the screen in boxes randomly ordered in six columns and eight rows. To sort the states, participants dragged them to different positions. Once participants had repositioned each state at least once (see Online Supplemental Material, part 4), they could press a button. Upon pressing, we recorded the spatially arranged beeline between each state and each other state (i.e., the shortest, straight way from state to state measured in screen pixels) as a proportion of the greatest possible beeline—the amount of pixels along the screen diagonal. Averaging this value across participants yielded a mean beeline for each pair of states (i.e., SpAM similarity).

Computing Two 2-D Cognitive Maps of the U.S. States

We subjected the Study 1 similarity data to multidimensional scaling (MDS; for an introduction, see Online Supplemental Material, part 5, and Hout, Papesh, & Goldinger, 2012). We used the ALSCAL procedure (Young, Takane, & Lewyckyj, 1978); assuming an interval scale, we estimated coordinates for the states in six cognitive maps. The dimensionality of these maps (k) varied from 1-D to 6-D. The goodness of fit to the similarity data was S (stress; $\sim 1 -$ proportion of retained similarity variance) = .15, .10, .05, .04, .03, and .03 for the 1-D, 2-D, 3-D, 4-D, 5-D, and 6-D map, respectively. $S \leq .20$, .15, .10, .05, and .025 is poor, sufficient, satisfactory, good, and excellent, respectively (Kruskal & Wish, 1978). Balancing goodness of fit and parsimony of the map (Jaworska & Chupetlovska-Anastasova, 2009), we proceeded with searching for the two orthogonal dimensions that spanned the pile sorting–based 2-D cognitive map of the U.S. states (see Online Supplemental Material, part 6).

Likewise, we subjected the Study 2 similarity data to MDS with the same settings as described above. The fit to the similarity data was $S = .14$, .06, .04, .03, .03, and .02 for the 1-D, 2-D, 3-D, 4-D, 5-D, and 6-D map, respectively. Based on this trend of stress indices, as in Study 1, we proceeded with searching for the two orthogonal dimensions that spanned the SpAM-based 2-D cognitive map of the U.S. states (see Online Supplemental Material, part 7).

The proximities between the states in the pile sorting–based map (Study 1) correlated strongly with the proximities between the states in the SpAM-based map (Study 2), $r = .90$. Thus, participants in Study 2 freely chose to spatially arrange the states on the same two orthogonal dimensions that participants in Study 1 spontaneously used to sort the states into piles. But what was the nature of these dimensions?

Generating Candidate Dimensions

We paid 101 U.S. citizens (MTurkers; 45 women, 56 men; $M_{age} = 35.14$) a small amount of money. We rotated the coordinates of the states in the pile sorting–based 2-D cognitive map clockwise around the center of the map. We rotated them in 18 steps of 20° (= a full rotation of 360°). At each rotation step, we formed a ranking based on the states' current x-coordinates (after nine rotation steps—a half rotation of 180°—each ranking was reversed). We presented participants with the state rankings of nine consecutive rotation steps, one at a time and in a random order. These nine state rankings represented nine dimensions that ran through the map in a way that the maximum rotation angle between them and other dimensions was 10°. A rotation angle of 10° corresponded to a correlation of $r > .98$. Thus, the nine dimensions covered all dimensions that participants in Study 1 spontaneously used to sort the states into piles.

To understand their task, participants were first presented with an example in which the animal characteristic based on which "giraffe, elephant, horse, deer, dog, mouse, and bee" were ranked one atop the other was labeled "tall" and/or "big." Then, participants were presented with the states one atop the other in the order of their x-coordinates on the respective dimension, and they labeled the state characteristic based on which they thought the states were ranked (see Online Supplemental Material,

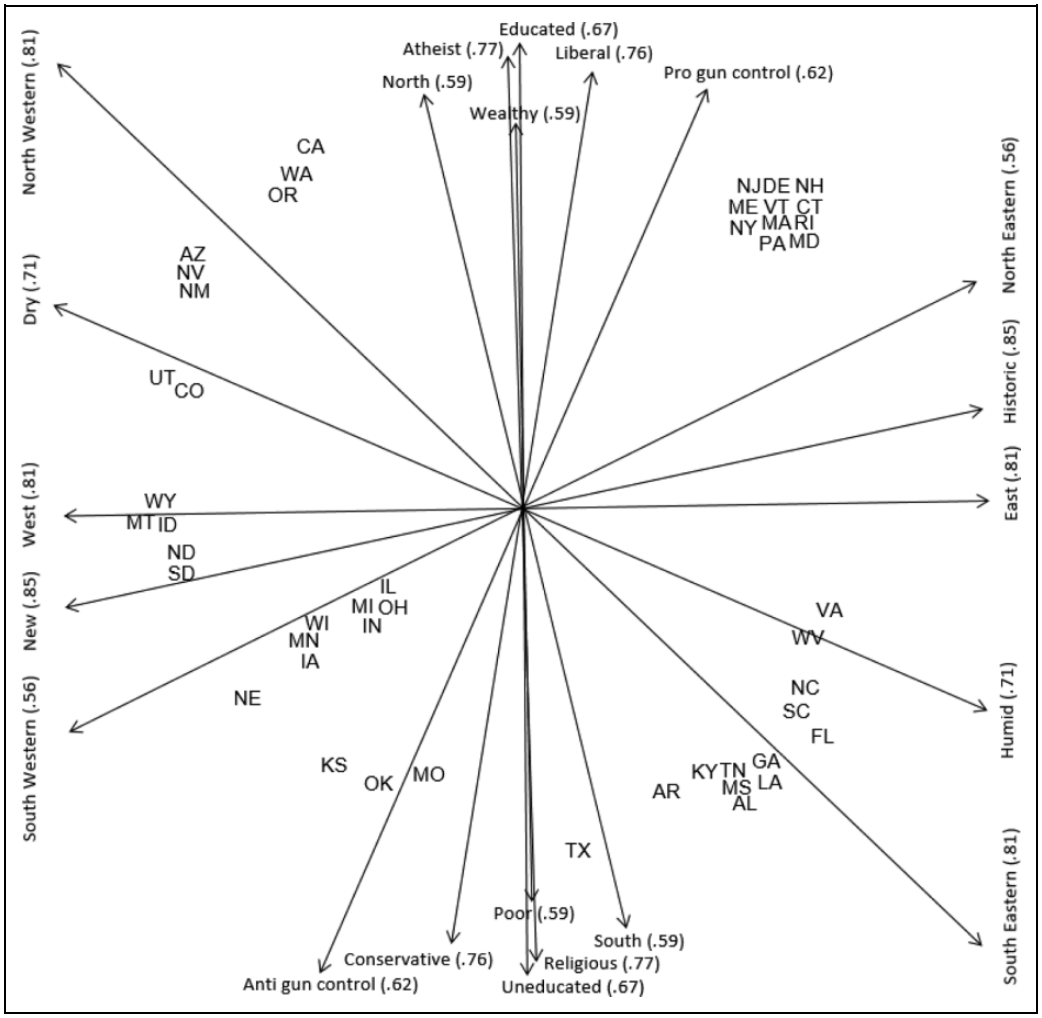

Figure 1. Study 1's 2-D cognitive map of the 48 U.S. mainland states with amount of explained state mean rating variance (R^2) given in parentheses separately for each dimension.

part 8). After labeling the first state ranking, participants labeled eight other state rankings. Following Koch and colleagues' (2016), for each of the state rankings, we obtained $\sim$50 labels and proceeded with the two most frequently entered labels. Next, we eliminated duplicates and formed 15 bipolar candidate dimensions by pairing the remaining labels with their antonyms (e.g., "conservative–liberal").

The 102 additional U.S. citizens (MTurkers; 41 women, 61 men; $M_{age} = 33.58$) labeled nine state rankings that together represented all dimensions that ran through Study 2's spatial arrangement–based 2-D cognitive map (i.e., all dimensions that participants in Study 2 spontaneously used to spatially arrange the states). Eliminating duplicates and pairing the remaining labels with their antonyms resulted in four additional bipolar candidate dimensions.

Interpreting the Cognitive Maps of the U.S. States

We paid 380 additional U.S. citizens (MTurkers; 128 women, 252 men; $M_{age} = 35.57$) a small amount of money. Their instructions were "Dear participant, as viewed by society, how [e.g., conservative] versus [e.g., liberal] are the 48 mainland states?" Participants used 0–10 slider scales to rate the states in a random order on the same screen (see Online Supplemental Material, part 9). We recruited 380 participants because we aimed for $\sim$20 raters per dimension (same as in Koch et al., 2016). Accordingly, there were between 16 and 23 raters per dimension. Raters' agreement about the states was high, ICC(2, k) $\geq$ .80, for all 19 dimensions, indicating that 16–23 raters were adequate participant sample sizes.

Next, we predicted the states' mean ratings on the 19 candidate dimensions based on the states' x- and y-coordinates in Study 1's 2-D cognitive map. The coefficient of determination (R^2) of each of these 19 multiple linear regression analyses (also known as property fitting; Chang & Carroll, 1969) indicated the amount of state variance on the respective dimension explained by the state coordinates in Study 1's 2-D cognitive map. Part 9 of the Online Supplemental Material (see the Study 1 column) shows R^2 for all 19 dimensions. Figure 1 shows the 11 dimensions with the highest R^2 at the rotation angle at which

Table 1. Interpreting the Pile Sorting–Based 2-D Cognitive Map of the U.S. States.

Model	First Dimension	R^2	Second Dimension	R^2	Mean R^2
1	New–Historic	.85	Religious–Atheist	.78	.82
2	Western–Eastern	.81	Religious–Atheist	.78	.80
3	Western–Eastern	.81	Conservative–Liberal	.76	.79
4	New–Historic	.85	Uneducated–Educated	.67	.76
5	Western–Eastern	.81	Uneducated–Educated	.67	.74
6	New–Historic	.85	Poor–Wealthy	.60	.68
7	New–Historic	.85	Southern–Northern	.60	.68
8	Western–Eastern	.81	Poor–Wealthy	.60	.66
9	Western–Eastern	.81	Southern–Northern	.60	.66
10	Dry–Humid	.70	Anti–Pro gun control	.63	.67
11	Poor–Wealthy	.59	North Eastern–South Western	.56	.58

the corresponding vector of state perpendiculars explained R^2 of the state mean rating variance on the respective dimension.

To account for the entire state coordinate variance in the 2-D cognitive map, two orthogonal dimensions with R^2 approaching 1 needed to be found. Table 1 lists all pairs of Figure 1 dimensions with a rotation angle of $75° \leq \alpha \leq 105°$ in the order of their suitability as a model of the two independent dimensions that participants spontaneously used to sort the states into piles (see mean R^2 for suitability as a model).

Next, we predicted the states' mean ratings on the 19 candidate dimensions based on the states' x- and y-coordinates in Study 2's 2-D cognitive map. Part 10 of the Online Supplemental Material (see the Study 2 column) shows R^2 for all 19 dimensions. Figure 2 shows the 11 dimensions with the highest R^2 at the rotation angle at which the corresponding vector of state perpendiculars explained R^2 of the state mean rating variance on the respective dimension.

Again, two orthogonal dimensions with R^2 approaching 1 needed to be found. Table 2 lists all pairs of Figure 2 dimensions with a rotation angle of $75° \leq \alpha \leq 105°$ in the order of their suitability as a model of the two independent dimensions that participants spontaneously used to spatially arrange the states (see mean R^2 for suitability as a model).

Discussion

Studies 1 and 2 showed that U.S. citizens spontaneously used the ideology stereotypes "religious–atheist," "conservative–liberal," "republican–democrat," and "anti–pro gun control," and the prosperity stereotypes "uneducated–educated" and "poor–wealthy" to mentally organize the U.S. states. This is consistent with the recent finding that people mentally organize social groups (artists, elderly, managers, homeless, etc.) based on their stereotypic agency/socioeconomic success (A) and conservative–progressive beliefs (B; Koch et al., 2016). In the studies that brought forth the ABC model, groups' stereotypic prosperity was weakly predictive of their stereotypic progressiveness (M_r across four sets of groups = 0.24). Thus, prosperity and progressiveness qualified (and, in fact, fitted well) as a 2-D model of spontaneous stereotypes about groups. Here, states' stereotypic prosperity (uneducated–educated and poor–wealthy) was strongly predictive of their stereotypic progressiveness (religious–atheist, conservative–liberal, republican–democrat, and anti–pro gun control), $M_r = 0.77$, $SD_r = 0.07$, all ps < .001. Given this overlap, a dimension more or less orthogonal to stereotypic prosperity/ideology was required to form a well-fitting 2-D model of spontaneous perception of the U.S. states. "Western–Eastern" (W–E) was orthogonal to stereotypic prosperity/ideology, $M_r = 0.12$, $SD_r = 0.13$, ps between .01 (anti–pro gun control) and .28–.91 (the other stereotypes), and the same was true for new–historic, $M_r = 0.19$, $SD_r = 0.18$, ps between < .01 (anti–pro gun control) and .08–.40 (the other stereotypes). Thus, stereotypic prosperity/ideology and "W–E" or "New Historic" qualified and, in fact, fitted best, as a 2-D model of spontaneous perception of the U.S. states (see Tables 1 and 2 and Figures 1 and 2).

In sum, Studies 1 and 2 suggested that the ABC model of spontaneous stereotypes (Koch et al., 2016) only generalizes from groups to U.S. states insofar as that people's spontaneous perception of the U.S. states also included prosperity (A) and ideology (B) stereotypes, but not to the extent that these stereotypes were almost orthogonal and together formed the best-fitting 2-D model of spontaneous perception of the U.S. states. Instead, people's spontaneous perception of the U.S. states was best described by combining stereotypic prosperity (A)/ideology (B) with either "W–E" or "New–Historic." Studies 1 and 2 thus suggested that while people may spontaneously use prosperity (A) and ideology (B) stereotypes to mentally organize all sorts of social domains such as groups, states, and countries, the ABC model of spontaneous stereotypes does not generalize across social domains, space, and time. Understanding how people mentally organize different social domains in different space and time contexts thus seems to require separate data-driven investigations such as reported here.

Study 3

People like people like themselves (i.e., homophily; McPherson, Smith-Lovin, & Cook, 2001). There are many respects, however, in which people are similar to one another, and homophily may be stronger for similarity in some compared to other respects. In Study 3, we hypothesized that interstate similarity with respect to the spontaneous prosperity and ideology stereotypes revealed in Studies 1/2 matters in the sense that it predicts interstate prejudice over and above interstate proximity in the cardinal directions.

Method and Results

Measuring Stereotypic Interstate Liking

We paid 497 citizens from the 48 U.S. mainland states (MTurkers; 258 women, 239 men; $M_{age} = 36.55$; $M = 10.35$ citizens per state, $SD = 2.62$, for reasons of economy, we did not recruit more than ~10 citizens per state) a small amount of money. Participants' sole instructions were "Dear

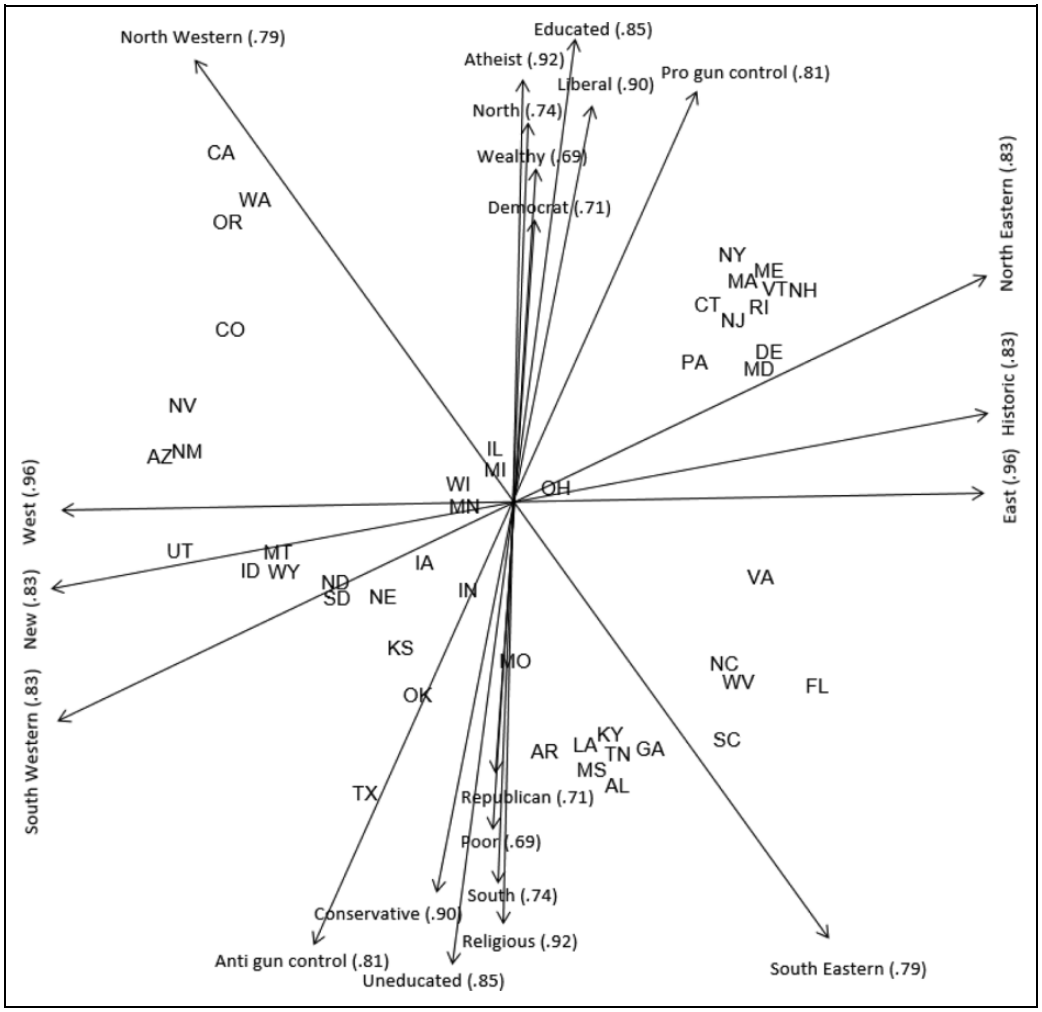

Figure 2. Study 2's 2-D cognitive map of the 48 U.S. mainland states with amount of explained state mean rating variance (R^2) given in parentheses separately for each dimension.

Table 2. Interpreting the Spatial Arrangement–Based 2-D Cognitive Map of the U.S. States.

Model	First Dimension	R^2	Second Dimension	R^2	Mean R^2
1	Western–Eastern	.96	Religious–Atheist	.92	.94
2	Western–Eastern	.96	Conservative–Liberal	.91	.94
3	Western–Eastern	.96	Uneducated–Educated	.85	.91
4	New–Historic	.83	Religious–Atheist	.91	.87
5	Western–Eastern	.96	Southern–Northern	.73	.85
6	Western–Eastern	.96	Republican–Democrat	.71	.84
7	Western–Eastern	.96	Poor–Wealthy	.69	.83
8	North Eastern–South Western	.83	North Western-South Eastern	.79	.81
9	New–Historic	.83	Southern–Northern	.73	.78
10	New–Historic	.83	Republican–Democrat	.71	.77
11	New–Historic	.83	Poor–Wealthy	.69	.76

participant, How much do typical people from your state like typical people from [Alabama . . . Wyoming]?" Participants used 9-point scales ranging from *do not like them* to *like them very much* to rate the states in a random order (see Online Supplemental Material, part 11). Across raters from all states, agreement about the states was sufficient, $M_{\mathrm{ICC}(2,\ k)} = 0.68$, $SD = 0.17$.

Predicting Stereotypic Interstate Liking Based on Interstate Similarity

Based on the ratings collected in Studies 1 and 2, we calculated subjective interstate proximity in "W–E" such that states with smaller mean rating differences in "W–E" were taken as more proximal. Like this, we also calculated subjective interstate proximity in "Southern–Northern" ("S–N").

Next, we regressed the typical Alabama citizens' liking of typical citizens from Alabama, Arizona, . . . Wyoming on two simultaneously entered predictors, namely, subjective proximity in "W–E" between Alabama and Alabama, Alabama and Arizona, . . . Alabama and Wyoming, and subjective proximity in "S–N" between Alabama and Alabama, Alabama and Arizona, . . . Alabama and Wyoming. In the same way, we also

Table 3. Stereotypic Liking Explained With(Out) Similarity in Stereotypic Prosperity/Ideology.

Geographic Model	Additional Stereotype	R^2	ΔR^2	$F(1, 47)$	η_p^2	CI LB	CI UB
Subjective "W–E"/"S–N"		.43 (.17)					
	"Religious–Atheist"	.50 (.17)	.07 (.09)	33.5***	.41	.23	.54
	"Conservative–Liberal"	.50 (.17)	.07 (.09)	27.5***	.36	.18	.50
	"Anti–Pro gun control"	.51 (.16)	.08 (.07)	50.7***	.51	.34	.62
	"Republican–Democrat"	.49 (.17)	.06 (.09)	20.4***	.30	.12	.44
	"Poor–Wealthy"	.51 (.16)	.08 (.08)	47.4***	.50	.32	.61
	"Uneducated–Educated"	.49 (.16)	.06 (.08)	24.6***	.34	.16	.48
Objective "W–E"/"S–N"		.16 (.11)					
	"Religious–Atheist"	.39 (.18)	.23 (.16)	103.9***	.68	.55	.76
	"Conservative–Liberal"	.37 (.18)	.21 (.17)	75.0***	.61	.45	.70
	"Anti–Pro gun control"	.37 (.17)	.21 (.14)	105.3***	.69	.55	.76
	"Republican–Democrat"	.29 (.16)	.13 (.13)	49.9***	.51	.33	.62
	"Poor–Wealthy"	.38 (.16)	.22 (.14)	110.8***	.70	.57	.77
	"Uneducated–Educated"	.37 (.19)	.21 (.17)	78.29***	.62	.46	.71

Note. Standard deviations are given in parentheses. CI LB/UP stands for 90% confidence interval lower bound/upper bound. W–E = Western–Eastern; S–N = Southern–Northern.
***$p \leq .001$.

predicted the typical Arizona . . . Wyoming citizens' stereotypic interstate liking. Next, we averaged explained interstate prejudice variance (i.e., R^2) across the 48 multiple regressions for the Alabama, Arizona, . . . Wyoming participants to obtain an estimate for the extent to which subjective interstate proximity in "W–E" and "S–N" predicted interstate prejudice across citizens from all states: $M_{R^2} = 0.43$, $SD = 0.17$.

Finally, we expanded this subjective geographic explanation of interstate prejudice with one ideology or prosperity stereotype at a time. That is, we predicted stereotypic interstate liking based on subjective proximity not just in "W–E" and "S–N" but also in "religious–atheist," "conservative–liberal," "anti–pro gun control," "Republican–Democrat," "poor–wealthy," or "uneducated–educated." Across the states, every single of these six ideology/prosperity stereotypes explained a sizable, statistically significant surplus of stereotypic interstate liking variance, $M_{\Delta R^2} = 0.09$, $SD = 0.02$ (the upper half of Table 3). We repeated this analysis replacing subjective with objective proximity in "W–E" and "S–N" (states whose centroids have smaller differences in "W–E" and "S–N" were taken as more proximal). Again, every single of these six stereotypes explained a sizable, statistically significant surplus of stereotypic interstate liking variance, $M_{\Delta R^2} = 0.21$, $SD = 0.03$ (see lower half of Table 3).

Discussion

Study 3 showed that the spontaneous ideology and prosperity stereotypes revealed in Studies 1 and 2 mattered, as U.S. interstate similarity in stereotypic ideology and prosperity predicted stereotypic interstate liking over and above both subjective and objective interstate proximity in "S–N" and "W–E." It should be noted that Study 3's participants estimated the likability of stereotypical citizens from the U.S. states as viewed by the stereotypical citizen of their own U.S. state, which neglected perception variance on the side of both people stereotyping and people stereotyped. Examining this variance is an interesting and relevant avenue for future research.

At first glance, Study 3's finding that states' stereotypic likability depended on the stereotypic prosperity/ideology of perceivers' own state was not related to the explanation of likability or communion (C; likability and C are tightly associated; Imhoff & Koch, 2017) given by the ABC model of spontaneous stereotypes (Koch et al., 2016). Consistent with the density hypothesis that positive people, things, and events are more alike than negative people, things, and events (Alves, Koch, & Unkelbach, 2016, 2017a, b; Alves et al., 2015; Koch et al., 2016; Unkelbach, Fiedler, Bayer, Stegmüller, & Danner, 2008), the ABC model explains states' C as a function of their averageness on A (agency/socioeconomic success; ∼prosperity) and B (conservative–progressive beliefs; ∼ideology). At a closer look, however, this explanation could be related to Study 3's finding.

Given that people from states seen as average on prosperity/ideology were stereotyped to like states also seen as average on prosperity/ideology (as shown in Study 3), perhaps states seen as more average on prosperity/ideology were stereotyped as more likable across all states because most states were seen as average on prosperity/ideology. That is, Study 3's finding (i.e., stereotypic interstate liking was a function of interstate similarity in stereotypic prosperity/ideology) plus the assumption of a normal distribution of states' stereotypic prosperity/ideology together would predict exactly the same as the ABC model, namely, that states seen as more average on prosperity/ideology should be stereotyped as more likable across people from all states.

To test this curvilinear relation, for each state, we averaged stereotypic likability across Study 3's people from all states, and we predicted this index of stereotypic likability based on one squared centered prosperity or ideology stereotype at a time. Every single of the six squared centered prosperity/ideology stereotypes explained a sizable, statistically significant

amount of stereotypic likability variance, $M_{R^2} = 0.18$, $SD = 0.12$, all ps < .05 (i.e., proof for the proposed curvilinear relation, for a graphic illustration, see Online Supplemental Material, part 12), whereas five of the six prosperity/ideology stereotypes did not predict stereotypic likability if not squared centered, $M_{R^2} = 0.02$, $SD = 0.17$, ps between .01 ("Anti–Pro gun control") and .11–.97 (the other stereotypes; i.e., no proof for the corresponding linear relation). Thus, consistent with the ABC model of spontaneous stereotypes about groups (Koch et al., 2016), across people from all states seen as more average on prosperity/ideology were stereotyped as more likable.

General Discussion

"I am from . . . ." Place of origin or residence is often one of the first pieces of information that people get about others. As people apply stereotypes especially when they lack (effort, time, or) information about others (Fiske & Neuberg, 1990), and as different stereotypes are followed by different thoughts, feelings, and actions (e.g., Koch, Imhoff, Dotsch, Unkelbach, & Alves, 2017), figuring out the content of spontaneous state stereotypes is a relevant research endeavor. Here, we computed U.S. citizens' cognitive map of the United States to reveal the spontaneous stereotypes they hold about the U.S. states.

The cognitive map turned out to be a distortion of the U.S. geographic map toward the prosperity and ideology stereotypes "poor–wealthy," "uneducated–educated," "religious–atheist," "conservative–liberal," "anti–pro gun control," and "Republican–Democrat" (see Online Supplemental Material, parts 5 and 6). Accordingly, the results of Studies 1/2 ($N = 873$) showed for the first time that in addition to the (inter)cardinal directions, participants spontaneously used these prosperity/ideology stereotypes to mentally organize the states (see Tables 1/2). People's spontaneous prosperity/ideology stereotypes were consistent with the ones that U.S. citizens in recent research spontaneously used to mentally organize U.S. groups, namely, agency/socioeconomic success (A) and conservative–progressive beliefs (B; Koch et al., 2016). Because A and B as found for groups were more or less orthogonal, whereas prosperity and ideology as found for U.S. states correlated strongly, we concluded that the ABC model of spontaneous stereotypes does not generalize across social domains, space, and time.

In Study 3 ($N = 497$), people from each state rated the extent to which citizens from their state like citizens from each state. Confirming the importance of the spontaneous prosperity and ideology stereotypes revealed in Studies 1 and 2, interstate similarity in stereotypic prosperity and ideology predicted stereotypic interstate liking over and above interstate proximity in "S–N" and "W–E." Independent of this state-level similarity breeds liking effect, states stereotyped as more average on prosperity (A) and ideology (B) were stereotyped as more likable across all states. Because liking and communion (C) are interchangeable terms (Imhoff & Koch, 2017), Study 3's results were consistent with the ABC model of spontaneous stereotypes (Koch et al., 2016).

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Supplemental Material

The supplemental material is available in the online version of the article.

References

Abele, A. E., & Wojciszke, B. (2014). Communal and agentic content in social cognition: A dual perspective model. *Advances in Experimental Social Psychology*, *50*, 195–255.

Alves, H., Koch, A., & Unkelbach, C. (2016). My friends are all alike—The relation between liking and perceived similarity in person perception. *Journal of Experimental Social Psychology*, *62*, 103–117.

Alves, H., Koch, A., & Unkelbach, C. (2017a). The "common good" phenomenon: Why similarities are positive and differences are negative. *Journal of Experimental Psychology: General*, *146*, 512–528.

Alves, H., Koch, A. S., & Unkelbach, C. (2017b). Why good is more alike than bad: Processing implications. *Trends in Cognitive Sciences*, *21*, 72–82.

Alves, H., Unkelbach, C., Burghardt, J., Koch, A. S., Krüger, T., & Becker, V. D. (2015). A density explanation of valence asymmetries in recognition memory. *Memory & Cognition*, *43*, 896–909.

Chang, J. J., & Carroll, J. D. (1969). *How to use PROFIT, a computer program for property fitting by optimizing nonlinear or linear correlation*. Murray Hill, NJ: Bell Telephone Laboratories.

Cuddy, A. J., Fiske, S. T., Kwan, V. S., Glick, P., Demoulin, S., Leyens, J. P., . . . Ziegler, R. (2009). Stereotype content model across cultures: Towards universal similarities and some differences. *British Journal of Social Psychology*, *48*, 1–33.

Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology*, *82*, 878–902.

Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. *Advances in Experimental Social Psychology*, *23*, 1–74.

Goldstone, R. L., Medin, D. L., & Halberstadt, J. (1997). Similarity in context. *Memory & Cognition*, *25*, 237–255.

Hout, M. C., & Goldinger, S. D. (2016). SpAM is convenient, but also satisfying: Reply to Verheyen et al. (2016). *Journal of Experimental Psychology: General*, *145*, 383–387.

Hout, M. C., Goldinger, S. D., & Ferguson, R. W. (2013). The versatility of SpAM: A fast, efficient, spatial method of data collection

for multidimensional scaling. *Journal of Experimental Psychology: General*, *142*, 256–281.

Hout, M. C., Papesh, M. H., & Goldinger, S. D. (2012). Multidimensional scaling. *Wiley Interdisciplinary Reviews (WIREs): Cognitive Science*, *4*, 93–103.

Imhoff, R., & Koch, A. (2017). How orthogonal are the Big Two of social perception? On the curvilinear relation between agency and communion. *Perspectives on Psychological Science*, *12*, 122–137.

Inzlicht, M., Schmeichel, B. J., & Macrae, C. N. (2014). Why self-control seems (but may not be) limited. *Trends in Cognitive Sciences*, *18*, 127–133.

Jaworska, N., & Chupetlovska-Anastasova, A. (2009). A review of multidimensional scaling (MDS) and its utility in various psychological domains. *Tutorials in Quantitative Methods for Psychology*, *5*, 1–10.

Kervyn, N., Fiske, S. T., & Malone, C. (2012). Brands as intentional agents framework: How perceived intentions and ability can map brand perception. *Journal of Consumer Psychology*, *22*, 166–176.

Kervyn, N., Fiske, S. T., & Yzerbyt, V. Y. (2013). Integrating the stereotype content model (warmth and competence) and the Osgood semantic differential (evaluation, potency, and activity). *European Journal of Social Psychology*, *43*, 673–681.

Koch, A., Alves, H., Krüger, T., & Unkelbach, C. (2016). A general valence asymmetry in similarity: Good is more alike than bad. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *42*, 1171–1192.

Koch, A., Imhoff, R., Dotsch, R., Unkelbach, C., & Alves, H. (2016). The ABC of stereotypes about groups: Agency/socio-economic success, conservative-progressive beliefs, and communion. *Journal of Personality and Social Psychology*, *110*, 675–709.

Koch, A., Imhoff, R., Dotsch, R., Unkelbach, C., & Alves, H. (2017). Stereotypes about conservative-progressive beliefs serve as guides to regulate the tradeoff between behavioral exploitation and exploration. Manuscript in preparation.

Kruskal, J. B., & Wish, M. (1978). *Multidimensional scaling* (Vol. *11*). London, England: Sage.

Lammers, J., Koch, A. S., Conway, P., & Brandt, M. J. (in press). The political domain appears simpler to the politically extreme than to political moderates. *Social Psychological and Personality Science*.

Magee, J. C., & Galinsky, A. D. (2008). 8 social hierarchy: The self-reinforcing nature of power and status. *The Academy of Management Annals*, *2*, 351–398.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*, 415–444.

Shaver, P., Schwartz, J., Kirson, D., & O'Connor, C. (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology*, *52*, 1061–1068.

Tolman, E. C. (1948). Cognitive maps in rats and men. *Psychological Review*, *55*, 189–208.

Unkelbach, C., Fiedler, K., Bayer, M., Stegmüller, M., & Danner, D. (2008). Why positive information is processed faster: The density hypothesis. *Journal of Personality and Social Psychology*, *95*, 36–49.

Young, F. W., Takane, Y., & Lewyckyj, R. (1978). ALSCAL: A nonmetric multidimensional scaling program with several individual-differences options. *Behavior Research Methods*, *10*, 451–453.

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