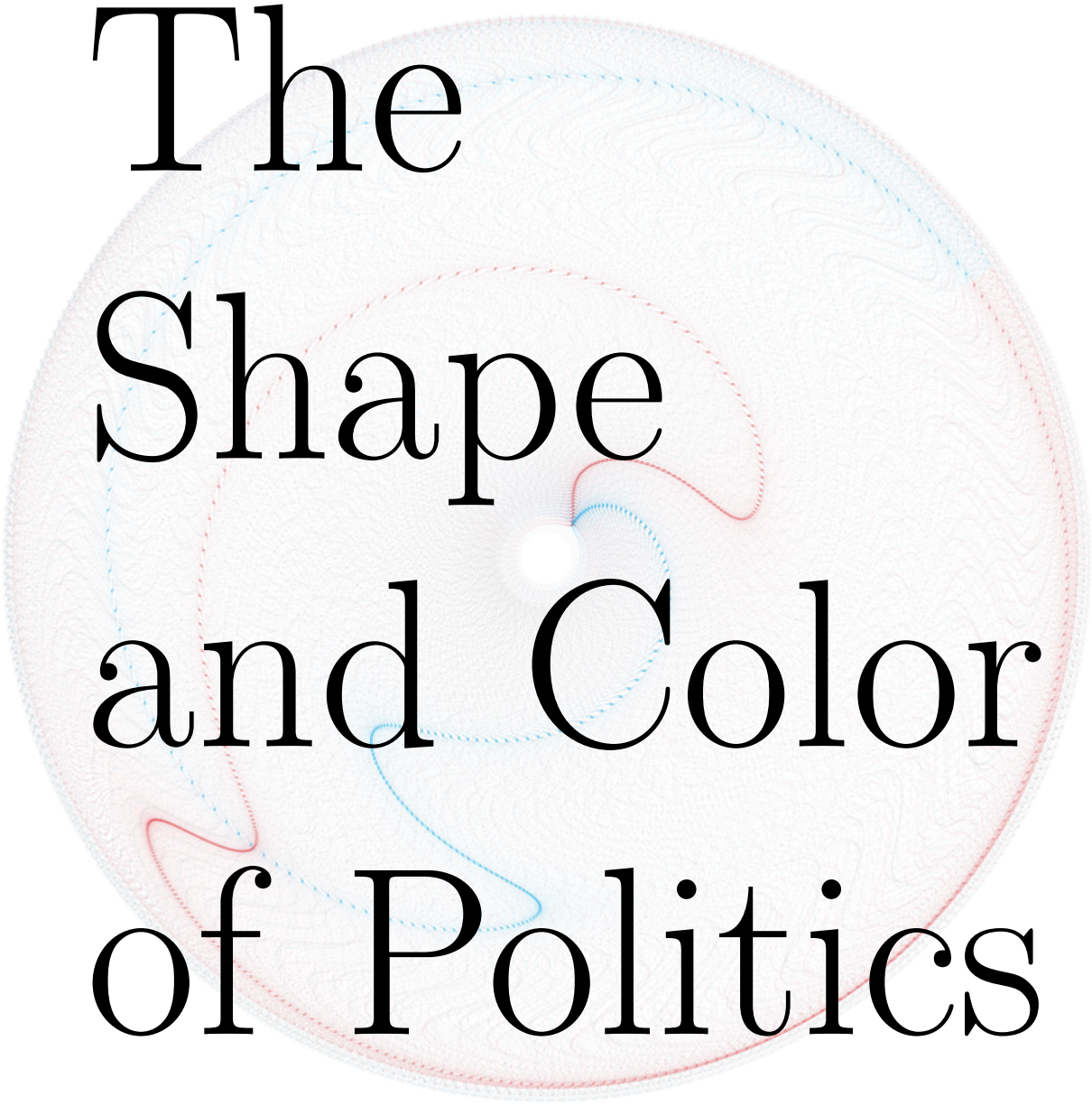
The Shape and Color of Politics



Damon C. Roberts

The Shape and Color of Politics

How citizens process political information and its consequences

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Table of contents

List of Figures

List of Tables

1. Introduction

1.1. How do we think people process political information?

1.2. Why does visual information processing matter?

1.3. Developing a snap-judgement model of visual political information processing

1.4. Outline of the project

2. Does color convey political information?

2.1. Introduction

(a) Republicans pre-2000

(b) Democrats pre-2000

(c) Republicans 2023

(d) Democrats 2023

Figure 2.1.: Party logos

2.2. What do we know about color, politics, and attitude formation?

2.3. Building an intuition for color's effect on politics

2.4. Study 1

The purpose of Study 1 is to examine whether the color choices on an almost ubiquitus form of campaign branding – yard signs – influence people's perceptions of political candidates. Evidence suggests that yard signs *do* matter in shaping political attitudes (Makse, Minkoff,

and Sokhey 2019), vote intentions (Makse, Minkoff, and Sokhey 2019), and even electoral outcomes (Green et al. 2016). As they are simple, cheap, intrusive, and common forms of campaign branding, they provide a conservative test of the effects of color in campaign branding. Using yard signs in this study, I test the first four hypotheses I derive from the snap-judgment model. First, Study 1 tests the claim that individuals do indeed notice the color of electoral yard signs. Next, it tests the claim that these colors that individuals detect influence the viewer's evaluations of the yard sign and the candidate represented on it. Study 1 then tests the claim that the effects on perception are moderated by how consistent the color is with the more complex information displayed on the yard sign. Finally, Study 1 examines whether positive information that contains consistency is processed quicker than negative or inconsistent information. That is, do partisans quickly detect and encode information from a clearly co-partisan political candidate?

2.4.1. Research design

I recruit participants from Prolific.[1] After providing informed consent to participate in the study, Prolific redirects subjects to Pavlovia[2] and are provided with a demographics and political attitudes questionnaire. As I am concerned about priming effects introduced by these questions, while I am simultaneously concerned about bias introduced by post-treatment control (Montgomery, Nyhan, and Torres 2018), I randomly select half of the participants to receive the questionnaire post-treatment and the other half receive it pre-treatment. This questionnaire includes common questions about the participant's ascriptive and descriptive characteristics and about the participant's political ideology, partisan identification, interest in politics, patriotism, and political knowledge.

I include those questions in the questionnaire due to expectations that they may act as confounds in my hypotheses. As political knowledge intertwines with the strength to which an individual identifies with a political party (Delli Carpini and Keeter 1996), I expect that political knowledge is an important confounder in my tests of H_2, H_3, and H_4. Therefore, I include a standard battery (the American National Election Study's battery) for assessing political knowledge.[3] As political knowledge is shaped by levels of interest in politics as well (Delli Carpini and Keeter 1996), I include the American National Election Study's question to assess levels of self-reported interest in politics. I additionally include some questions collecting information on participants' ascriptive and descriptive characteristics such as

[1] I pay subjects a rate of $12.00 per hour. On top of the price per participant, Prolific charges a 30% servicing fee.

[2] Pavolovia allows for researchers to host and run open source experiments for about $0.20 per participant (to cover their server costs). I use it primarily to integrate the JavaScript components from the jsPsych package (Leeuw 2015) for my experimental design.

[3] A table including the wording of this, and all, measures are included in the Supplementary Information.

age, education, gender identity, and racial identity, as a number of these are correlates with partisan identification (see Campbell et al. 1960; Mason 2018).

Additionally, I include a question about the respondent's sex assigned at birth and about whether they have received a diagnosis of any color blindness. As some individuals may possess undiagnosed colorblindness, asking about their sex assists in covariate balance. I additionally include an open-ended question asking participants to describe their "first memory of a political event." The use of an open-ended question helps provide an attention check and identify duplicated responses for those spoofing IP addresses with a VPN (see Kennedy et al. 2021). Given estimates using these exclusion criteria, I would expect that upwards of 40% of my original sample will fail these attention checks (Kennedy et al. 2021); thus, the large sample size.

I then present participants with an instruction screen informing them of the task for the experiment. In the first trial of the experiment, participants I randomly presented participants with two of three possible yard signs, one at a time. These yard signs are simple with the text "Riley Ready to Lead" and a solid background color of either "Republican Red," "Democratic Blue," or White.[4] There is an added component to this, however.

Rather than use eye-tracking devices and software, I instead use Mouseview.js (see Anwyl-Irvine, Armstrong, and Dalmaijer 2022), which either blocks out or blurs a large portion of the participant's screen and encourages them to move their mouse to view different parts of the screen in isolation. As the participants move their cursor around the screen, it tracks the coordinates of the cursor along with the "dwell" time of the cursor in that particular coordinate. One primary benefit of Mouseview.js is that it allows researchers to field their experiments outside of a lab-based setting – while providing results that robustly correlate with the results from a design employing eye-tracking hardware (Anwyl-Irvine, Armstrong, and Dalmaijer 2022). This allows researchers to rely less on convenience samples, which are common with eye-tracking studies. For my design, I am particularly concerned about reliance on a convenience sample due to variations in participants' ability to detect and process color in the U.S. population relative to a student sample. This means that Mouseview.js is a handy tool for my study. A published pilot version of the experiment used in Study 1 on Pavlovia.

When viewing each yard sign in the first trial, there is a blur over a substantial portion of the screen. At any given point in time, participants can view only 8% of the image without an obstruction, which simulates the observation that we typically foveate on about 8% of our available visual field at any given time (Wedel and Pieters 2008).[5] Participants move their cursor to explore the yard sign. I allot 5000 ms to perform the exploration until the

[4]See the supplementary information to view all of the stimuli used in Study 1.

[5]I include a screenshot providing an example of what the participants are able to see with the blur included in the supplementary materials.

image goes away to encourage a consistent and short duration to explore the image.[6] After exploring each image, I asked participants what colors were on the yard sign and whether they felt that the candidate represented on the yard sign was a Democrat, a Republican, or Neither. After viewing both images, I ask subjects to indicate their preference among the two images. To ensure that participants have a standardized initial placement of their cursor, I display a blank page before viewing the yard sign that requires participants to click a "Next" button. Immediately after clicking "Next," participants are shown the yard sign. The goal is to ensure that variation in where participants explore the image is not dependent on a non-standard starting point for their cursor. I additionally utilize a gaussian blur for the overlay of the image rather than a solid overlay obstructing the participant's view. This gaussian blur allows participants to see a blurred visual field beyond the cursor. This allows participants to see enough to take purposeful action to explore blurred parts of the image that attract them (Anwyl-Irvine, Armstrong, and Dalmaijer 2022). The use of the gaussian blur requires that participants use a web browser other than Safari because of a known issue (Anwyl-Irvine, Armstrong, and Dalmaijer 2022). This will require participants to either switch browsers or to not participate in the study if they are using Safari at the time they are recruited by Prolific to participate in the study. As this requirement is enforced *before* joining the study, this should not have an effect on the number of excluded participants from my original sample.

There are three more trials that are much like the first trial. What is different between the two other trials is that I vary the amount of color that is on the yard signs (trials 2 and 3). I provide more textual information that deviates from the association of Republicans with red and Democrats with blue (trial 4). Examples of all of these yard signs are included in the supplementary materials.

Table 2.1 presents some characteristics of the sample on the whole.

2.4.2. Do individuals notice color in political branding?

To address this first question, I use two measures of a participant's attention toward the colors on the yard sign. I collected the first measure through a question posed to the participant after viewing each yard sign, "what color was the yard sign?". The second measure is more implicit than the first: it accounts for the time someone's mouse hovered over the non-text elements of the yard sign relative to how long their mouse hovered over the text. The self-reported measure allows us to examine the conscious detection of color,

[6] In marketing research, some studies give participants about 6000 milliseconds in eye-tracking studies to examine a brand and to formulate an intention to purchase a product or not (Wedel and Pieters 2008). With Mouseview.js, a study examining the tool's correlation with optical responses to viewing disgust-and-pleasure-evoking images uses 10000 milliseconds; but is intended to be an extended amount of time (Anwyl-Irvine, Armstrong, and Dalmaijer 2022).

Table 2.1.: Descriptive statistics of Prolific sample

	Unique (#)	Missing (%)	Mean	SD	Min	Median	Max
Age	59	2	36.5	12.1	18.0	34.0	77.0
Color blind	3	2	0.0	0.1	0.0	0.0	1.0
Female	3	2	0.4	0.5	0.0	0.0	1.0
White	3	2	0.7	0.5	0.0	1.0	1.0
Hispanic	3	2	0.1	0.3	0.0	0.0	1.0
Black	3	2	0.1	0.3	0.0	0.0	1.0
Party ID	8	2	−1.1	1.9	−3.0	−2.0	3.0

Data source: Pavlovia.

Sample characteristics.

while the more implicit measure allows us to examine where individuals' attention goes: toward the color or the text.

This is primarily a descriptive exercise, and I intend to compare the differences in measures between the "non-partisan" (white) yard signs and the partisan (red and blue) yard signs. I will examine the differences in measures between the partisan yard signs among self-identified partisan respondents. I additionally include additional models that interact partisanship with age and political knowledge. As the consistent usage by the parties to use the colors red and blue did not occur until the 2000 presidential election, those that were in their early adult years during that time experienced partisan politics where colors were not a strong cue. I additionally expect that those who are more politically knowledgeable should rely on these partisan cues more as they tend to be stronger partisans (Delli Carpini and Keeter 1996).

2.4.3. Do colors shape perceptions of political objects?

To address the following question of whether the colors affect perceptions of the candidate and the yard sign, I ask participants to report whether they perceived the candidate to be a partisan – either Republican, Democrat, or as non-partisan immediately after viewing each image. Everything on the yard signs remains constant except for the color. As representations of ideology are associated with more than just political views but things like space (Mills et al. 2016) and color (Maestre and Medero 2022), differences between respondents on the perceived political affiliations of the candidate should be more than "by chance" differences. However, differences occur based on the associations between red and blue with partisanship and the lack of political information that the color white conveys.

2. Does color convey political information?

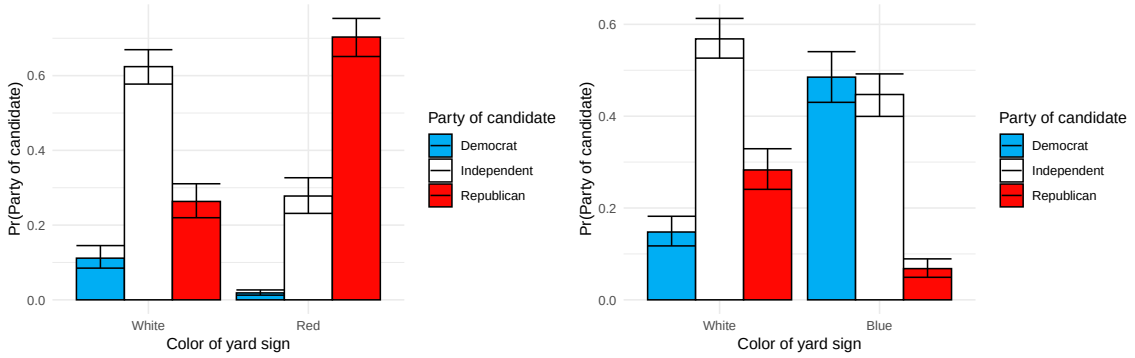
I examine differences in respondents' reported perceptions of the candidate's partisan affiliation. As participants are asked this question for each treatment they view, the estimand of interest reflects the difference in perceptions of the candidate's partisan affiliation between the yard sign that they saw averaged across respondents. I estimate two ordered logistic regression where the main independent variables of interest are two indicator variables for whether respondents received the "red yard sign" or the "blue yard sign" in each round of Trial 1. The baseline category for both of those indicator variables is if they instead saw the "white yard sign".

My defined priors for both of these models' coefficients are Normally distributed with a mean of zero and a standard deviation of one. This reflects me starting from the position that my data need to provide evidence in support of my hypotheses rather than disproving them. The priors do allow for me to express uncertainty with this as I do have a belief that there is a chance my hypotheses are correct. Both models return $\hat{R}$ values of 1 indicating convergence and I confirm model performance by reporting the distributions of predicted values implied by my posterior distribution. These posterior predictive checks are included in the appendix.

Figure 2.2 present the predicted probabilities of a subject reporting the candidate was either a Democrat, Independent, or Republican when viewing the different yard signs. The error bars reflect the high density credible interval for 95% of my posterior draws. Each bar reflects the predicted probability of an outcome – listing the candidate is either a Democrat, Independent, or Republican. When interpreting the error bars, you will want to look at the difference in the error bars *between* yard sign treatments rather than *within* treatment. We see that the models indicate statistically meaningful differences between the yard sign treatments for each outcome. That is, the red and blue yard signs did shift people's perceptions of the partisanship of the candidate relative to the white yard sign. The credible intervals of these models are reported in the appendix in the table containing the rest of the results from these models.

Digging in a little bit more about what these perceptions were, the predicted probability that subjects perceive the candidate with a Red yard sign to be Republican is almost 70%, whereas it is only about 30% when viewing a white yard sign. When given a red yard sign, the predicted probability the candidate is marked to be an independent is less than 30% and less than 5% to be a Democrat. However, when viewing a blue yard sign, the predicted probability of a subject perceiving the candidate to be a Democrat is at about 50% whereas it is less than 20% with a white yard sign. When viewing a blue yard sign, the predicted probability of subjects perceiving the candidate to be a Republican is less than 10% and about 45% to be an Independent. The tables for the models are included in the appendix.

As the consistency by which the parties have used either the color red or blue has increased since the 2000's, I suspect that the age of my subjects may moderate this relationship. That



(a) Red treatment (b) Blue treatment

Figure 2.2.: The partisanship of candidates change depending on the color of the yard sign

is, the tendency for subjects to label red yard signs as a Republican candidate versus a different color may be stronger for those who are younger as the consistency in branding is the political environment they have been around more. I expect this particular relationship may be weaker for older subjects as they may place current branding strategies in a larger political context where this was not always the case.

I fit two ordered logistic regressions where the independent variables are indicator variables reporting whether the participant received the red (the first model) or they recieved the blue treatment (the second model). Those included in the baseline category for both models are those who received the white yard sign treatment. Since I believe that age may moderate this effect, I include an interaction term for both of these models that multiplies these treatment indicator variables with age.

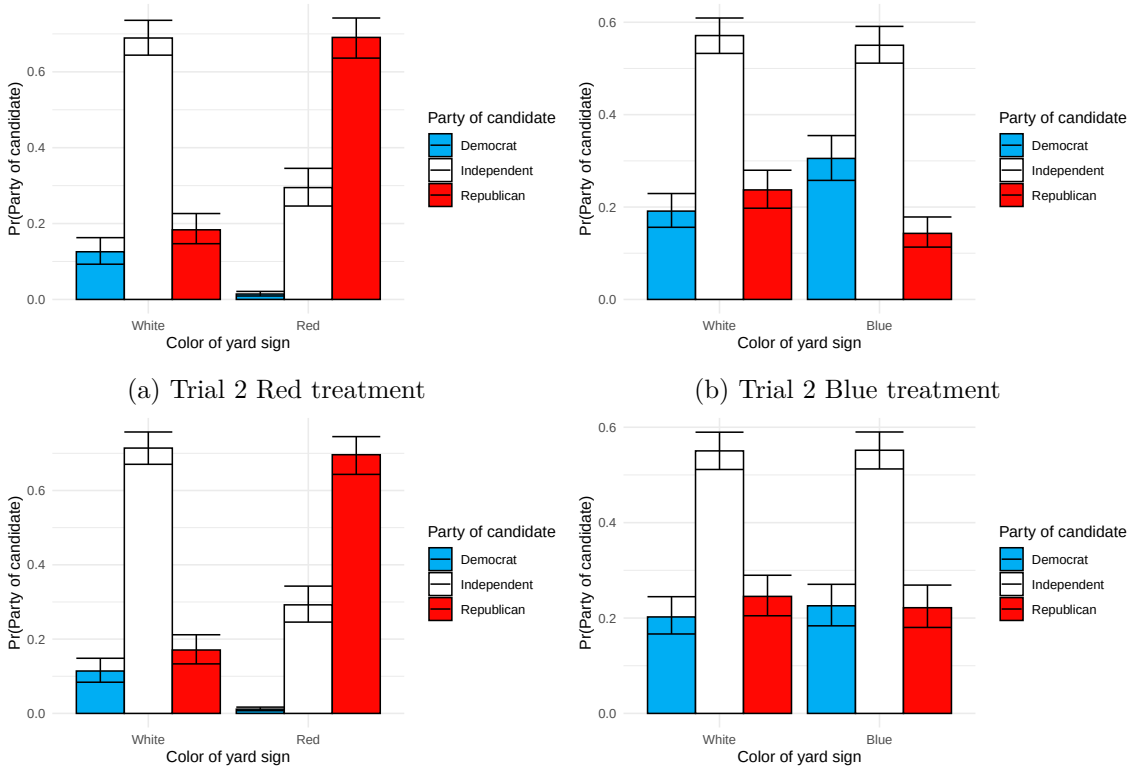
Though my pre-registered expectations were that age would moderate this effect, these models suggest that there are not substantive or statistically meaningful differences in how older and younger participants responded to these treatments. The results of these models are included in the appendix.

2.4.4. Do these perceptions require consistency between information types?

Another hypothesis derived from the snap-judgment model suggests that inconsistency in the yard sign's visual information will lead to more mixed perceptions of the candidate's political stances. The design of the latter trials in the study presents yard signs with mixtures of non-partisan and out-partisan colors. For example, primarily red and presumably Republican yard signs, but has some blue or white in them.

2. Does color convey political information?

I should expect that the trials that use less "consistent" visual information demonstrate more ambivalence among respondents in their reported perceptions of the politician's positions. Specifically, I expect that participants will perceive the yard signs that have both red and blue on them as more moderate and that the higher proportion of the color red or blue among the two colors will lead respondents, on average, to be more likely to believe that the candidate leans more Republican or Democratic. This is not to say that I expect the results to change significantly, but rather that the certainty by which I can predict individuals' guesses of the candidate's partisan affiliation to be weaker.



(a) Trial 2 Red treatment

(b) Trial 2 Blue treatment

(c) Trial 3 Red treatment

(d) Trial 3 Blue treatment

Figure 2.3.: Mixing red and blue in a yard sign increases uncertainty about partisanship

2.4.5. Do partisans process co-partisan branding faster?

The other analytical tasks do not examine expectations derived from the motivated reasoning portion of the model. That is, do people process in-group information faster than out-group information? There is evidence of these tendencies in political circumstances

(Lodge and Taber 2013).

To examine whether motivated reasoning is also active with the processing of politically-relevant color, I examine the difference between the amount of time between the start of viewing a stimulus and clicking "Next" to stop viewing the stimulus among those who were viewing a presumed co-partisan yard sign relative to those viewing a presumed out-partisan yard sign. As motivated reasoning tends to be more prevalent among strong partisans and those highly knowledgeable and interested in politics (Lodge and Taber 2013), I control for responses to the pre-treatment knowledge, interest, and partisan strength batteries.

2.5. Study 2

3. How does visual information influence social interactions?

4. Does visual political information influence perceptions of your environment?

5. Conclusion

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A. Chapter 2 Appendix

A.1. Measures

A.2. Hypothesis 1

A.2.1. Models

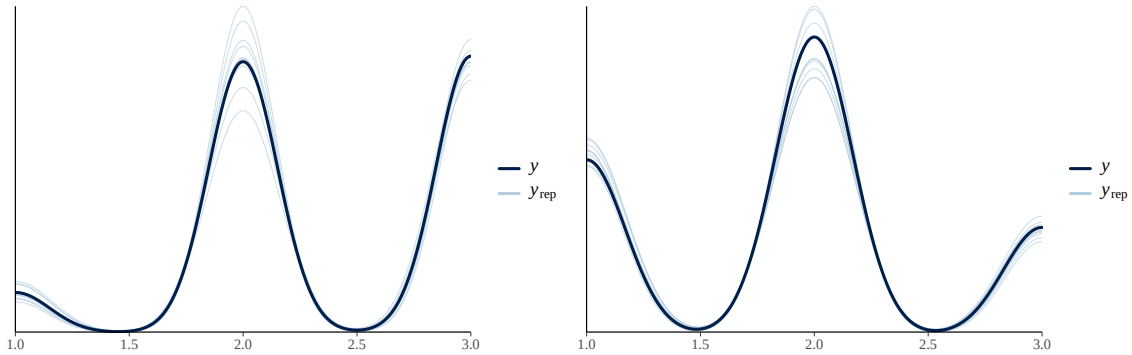
A.2.2. Posterior Predictive Checks

A.3. Hypothesis 2

A.3.1. Models

A.3.2. Posterior Predictive Checks

A.4. Hypothesis 3



(a) Red treatment

(b) Blue treatment

(c) Red treatment (Moderated)

(d) Blue treatment (Moderated)

Figure A.1.: Posterior predictive checks of models in H_2

Table A.1.: Full results for models in H_2

	Red treatment	Blue treatment
Red yard sign	1.891	
	[1.562, 2.221]	
Blue yard sign		−1.690
		[−2.019, −1.370]
Intercept 1	−2.075	−1.753
	[−2.378, −1.773]	[−2.016, −1.503]
Intercept 2	1.029	0.930
	[0.797, 1.267]	[0.712, 1.149]
Num.Obs.	646.0	653.0
R^2	0.19	0.16
WAIC	1020.19	1216.24

Data source: Pavlovia

Positive coefficients reflect the logged-odds of claiming candidate is Republican.

Numbers inside brackets reflect the 5th and 95th percentile of the draws from the posterior distribution.

Table A.2.: Full results for models in H_2 (cont.)

	Moderated - Red treatment	Moderated - Blue treatment
Red yard sign	1.704	
	[0.816, 2.598]	
Blue yard sign		−1.444
		[−2.357, −0.613]
Age	0.000	0.008
	[−0.016, 0.017]	[−0.007, 0.024]
Red yard sign × Age	0.005	
	[−0.018, 0.029]	
Blue yard sign × Age		−0.007
		[−0.029, 0.017]
Intercept 1	−2.067	−1.453
	[−2.763, −1.409]	[−2.101, −0.831]
Intercept 2	1.033	1.234
	[0.377, 1.689]	[0.612, 1.869]
Num.Obs.	643.0	651.0
R^2	0.19	0.16
WAIC	1021.64	1216.98

Data source: Pavlovia

Positive coefficients reflect the logged-odds of claiming candidate is Republican.

Numbers inside brackets reflect the 5th and 95th percentile of the draws from the posterior distribution

Table A.3.: Full results for models in H_3

	Trial 2 - Red treatment	Trial 2 - Blue treatment	Trial 3 - Red treatment	Trial 3 - Blue treatment
Red yard sign	2.297		2.412	
	[1.956, 2.653]		[2.065, 2.776]	
Blue yard sign		−0.622		−0.137
		[−0.906, −0.327]		[−0.453, 0.185]
Intercept 1	−1.940	−1.442	−2.049	−1.372
	[−2.279, −1.637]	[−1.687, −1.212]	[−2.390, −1.747]	[−1.610, −1.127]
Intercept 2	1.493	1.169	1.581	1.123
	[1.228, 1.759]	[0.946, 1.402]	[1.315, 1.872]	[0.897, 1.357]
Num.Obs.	623.0	658.0	638.0	636.0
R^2	0.25	0.02	0.27	0.00
WAIC	940.52	1286.81	923.61	1274.71

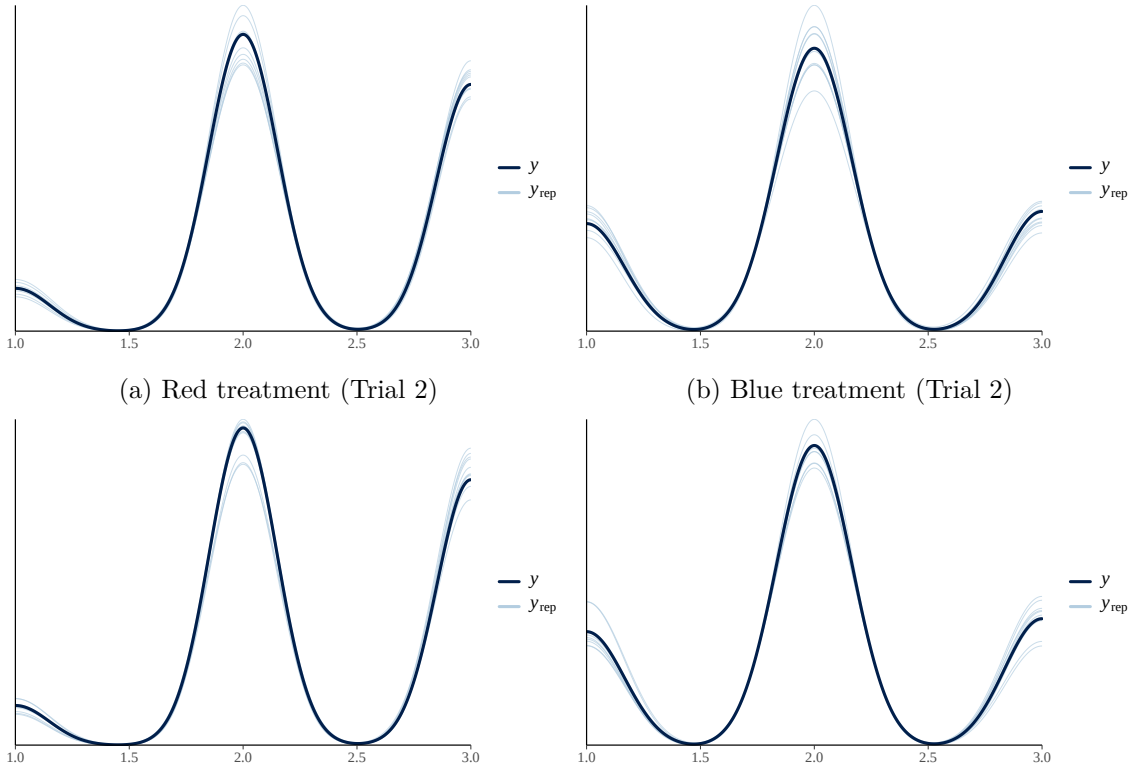
Data source: Pavlovia

Positive coefficients reflect the logged-odds of claiming candidate is Republican.

Numbers inside brackets reflect the 5th and 95th percentile of the draws from the posterior distribution.

A.4.1. Models

A.4.2. Posterior Predictive Checks



(a) Red treatment (Trial 2)

(b) Blue treatment (Trial 2)

(c) Red treatment (Trial 3)

(d) Blue treatment (Trial 3)

Figure A.2.: Posterior predictive checks of models in H_2

A.5. Hypothesis 4

A.5.1. Models

A.5.2. Posterior Predictive Checks