

# Actual Experience, Partisan Distortion and Recall of Wildfire Events

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## Abstract

We provide an individual-level account of how people recall wildfire experiences and how it affects their policy views. We contend that recall of actual climatic events consists of two components: fact and partisan distortion. When asked about their experience with wildfire, Republicans are less likely than Democrats to recall experiencing smoke and wildfires. The difference is partly attributable to partisan distortion that is rooted in differential beliefs about global climate change. Proximity to wildfires and exposure to dense wildfire smoke diminish partisan distortions in recalling personal experiences with wildfires. Proximity to wildfires also increases Republican support for wildfire adaptive policies that involve public funding, a core issue that typically divides Democrats and Republicans. As global climate change induces more frequent and intense climatic events, the frequency of objectively personal experiences with extreme weather related events like wildfires may help to reduce partisan gaps over climate policy.

## Keywords

Wildfire; personal experience; climatic event; partisan perceptual distortion; recall bias

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## Introduction

Hazlett and Mildenberger (2020) identified an intriguing phenomenon. Looking at precinct-level data in California, they observed that wildfire exposure increases pro-environment voting within Democratic but not Republican areas. Their finding raises several critical questions about the role that partisan biases play in determining how citizens experience extreme weather events. It also suggests that partisan biases have an asymmetric impact on Democrats and Republicans. Democrats may have a stronger response to personal experience with extreme climatic events than Republicans, and may be more likely to translate personal experience into policy preferences and voting choices. If such a partisan gap exists, this would dampen any hope that the frequency and intensity of future extreme weather events might reduce the large gap between Democrats and Republicans on the causes of and solutions to climate change. In addition, such findings would also contradict previous empirical evidence that personal experiences help to reduce partisan division over contentious political issues (Cain, Gerber and Hui 2020; Zanoocco et al. 2018; Demski et al. 2017).

Since an individual-level theory based on aggregated-level data raises concerns of ecological fallacy, we develop an individual-level account of how intense personal experience with wildfire affects people's policy choices using survey data matched with contextual data about smoke and proximity to wildfire events. In particular, at the individual level, we ask: do people recall wildfire experience differently based on their partisanship? Does personal experience with wildfire change people's policy preferences? And if so, does it affect partisan groups in the same way and to the same degree?

## **Partisan Recall and Perceptual Distortion**

Lodge and Hamill (1986) developed a theory about “partisan schema”. They contend that people with strong partisan schemas are much more able to sort out the political orientation of campaign statements and recall policy stances of politicians. These people, however, are also more likely to suffer from “consistency bias” where they tend to recall statements that are consistent with their party identification than statements that are inconsistent. The “restructuring” of memory is especially pronounced among ones with strong partisan schemas and they exhibit serious bias in processing political information.

Since then numerous works have emerged on the theme of “partisan-motivated reasoning” (Taber and Milton 2006; Strickland, Taber and Lodge 2011; Bolsen, Druckman, Cook 2014; Leeper and Slothuus 2014; Kraft, Lodge and Taber 2015; Slothuus and Vreese 2010). Studies have repeatedly found that people engage in bias-information processing: they perceive the world in a manner consistent with their political views. When beliefs deviate from reality, perpetual bias occurs (Jerit and Barabas 2012; Nir 2011). For example, when asked about current economic conditions, supporters of the president’s party often report more positive conditions than its opponents (Lebo and Cassino 2007; Schaffner and Roche 2017). Bisgaard (2015, 2019) note that even when partisans are forced to acknowledge the same reality, they align undeniable realities with their party loyalties by attributing blame to the opposite political party.

There is evidence of motivated reasoning in environmental politics as the issues have been politicized over time (McCright, Xiao and Dunlap 2014; Fisher, Waggle and Leifeld 2013;

McCright and Dunlap 2011). Democrats or liberals are more likely to believe human activity is a primary cause of climate change than Republicans or conservatives. Such perceptual bias occurs through directional motivated reasoning where individuals reject new information that contradicts with their standing beliefs (Druckman and McGrath 2019). One ramification of such perceptual bias is that partisan identity and politicization can stunt the effect of a scientific consensus statement about climate change and weaken reception of scientific messages (Bolsen and Druckman 2018; Hart and Nisbet 2012; Kahan et al. 2012; Pasek 2017).

One question, then, is where is the root of such perceptual bias? Studies concur perceptual bias exists in people's subconsciousness, as part of a person's identity, and manifests itself through knee-jerk reactions to surrounding environmental stimuli without much analytical thinking (Pennycook and Rand 2019; Redlawsk 2002; Kahneman 2011). Partisan perceptual bias tends to be more exaggerated on topics with intense and divisive media coverage (Jerit and Barabas 2012; Levendusky 2013; Prior 2013; Stroud 2010). It also tends to be more exaggerated when issues get personal and emotional (Weeks 2015; Asker and Dinas 2019). However, studies also concur that citizens do not necessarily intend to be cognitively biased --- they may strive for accuracy but differ in what they consider to be credible evidence (Druckman 2012; Druckman and McGrath 2019). When pressed or incentivized to give accurate answers about some facts, partisan differences reduced (Prior, Sood and Khanna, 2015).

## **Data**

In order to gauge the extent of partisan perceptual bias in recalling wildfire experience, we conducted an online survey through a commercial vendor, YouGov. YouGov maintains its

own panel of survey respondents in the U.S. Respondents were randomly selected from the panel to participate in our surveys. Previous study finds that YouGov has consistently outperformed other polling companies on a variety of performance metrics (Pew 2016)<sup>2</sup>. The wildfire questions were part of a bigger regional poll conducted in the American West. The survey was in the field between August 15 and September 6, 2019. Within the regional sample, we had a sample of 1,042 respondents in California.<sup>3</sup>

We asked respondents about their partisanship. They were asked to self-identify as “Democrats”, “Republicans” and “Independents” or “others”. We combined the last two categories as “Independent/others”. In addition to asking about their personal experience with wildfire and smoke, we also included several batteries of questions about their support for various wildfire adaptive policies.

One of the batteries asked respondents about their opinion toward using public funds to subsidize four adaptive strategies: namely, using public funds to subsidize private home owners to 1) upgrade the protection of their properties; 2) buy wildfire insurance; 3) to retreat and relocate; 4) to buyout all properties in potentially hazardous zones.<sup>4</sup>

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<sup>2</sup> <https://www.pewresearch.org/methods/2016/05/02/evaluating-online-nonprobability-surveys/>

<sup>3</sup> The YouGov respondents were matched to a sampling frame on gender, age, race, and education. The frame was constructed by stratified sampling from the western states of the 2016 American Community Survey (ACS) 1-year sample with selection within strata by weighted sampling with replacements (using the person weights on the public use file). The matched cases were weighted to the sampling frame using propensity scores. The matched cases and the frame were combined and a logistic regression was estimated for inclusion in the frame. The propensity score function included age, gender, race/ethnicity, years of education, and region. The propensity scores were grouped into deciles of the estimated propensity score in the frame and post-stratified according to these deciles. The weights were then post-stratified on 2016 Presidential vote choice, and a four-way stratification of gender, age (4-categories), race (4-categories), and education (4-categories), to produce the final weight.

<sup>4</sup> We also have the same battery of questions asking people about using public funds to subsidize commercial properties and low-income families. The results are similar to the ones reported in the paper.

Howe et al. (2019) conducted a meta-analysis of over 70 studies on the relationship between climate change experiences and public opinion. Overall, they found mixed evidence that weather shapes climate opinions. They noted that self-reported versus objective weather data matters in measuring the impact on climate opinions. Hence, following their suggestion, in addition to two self-reported questions, we also obtained data about their actual encounters with wildfire.

We obtained actual fire data from the CALFire website. The data are available in shapefiles with records of wildfires (of at least 0.001 acres or 44 square feet) from 1878 to 2019. We extracted the wildfire records between August 2018 and September 2019, since our questions explicitly asked about their experiences in the past twelve months. Using GIS, we measured the number of wildfires a respondent experienced within 3, 5, and 10-mile buffers from his/her zip code's centroid.

Our measure of smoke density is constructed from satellite-based estimates of smoke plumes from NOAA's Hazard Mapping System (HMS) Fire and Smoke Product. Polygons showing the extent of smoke plumes are generated by trained analysts, who analyze imagery using true color imagery from geostationary satellites and manually delineate plume boundaries at locations where fires are detected. From these, we computed the density of the plume and separated them into three categories: "thin", "medium" and "thick". We then overlaid them with the Census zip code file to count how many days each zip code region experienced these three types of plumes.

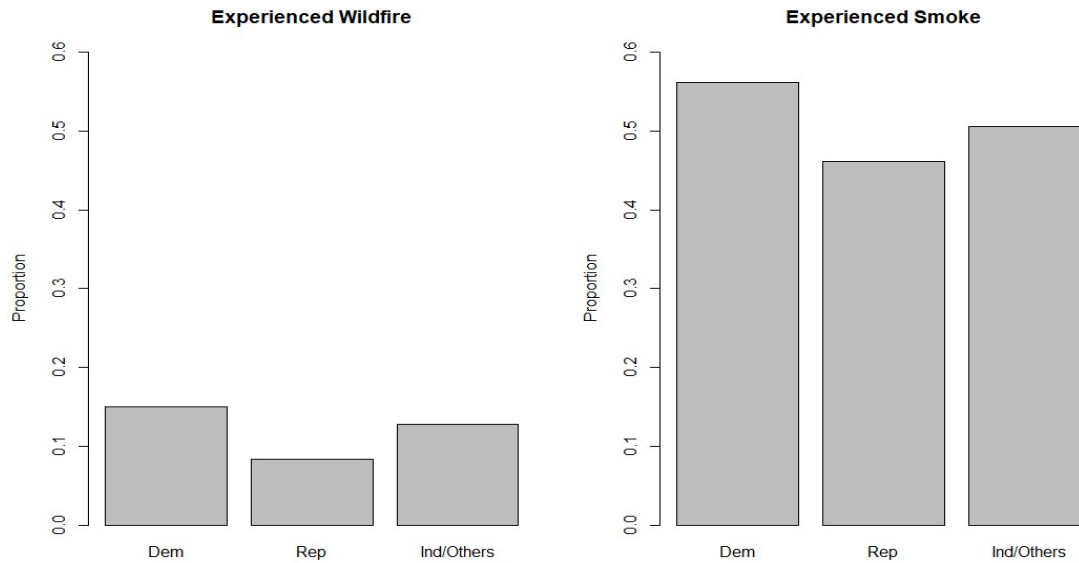
## Results

### 1. Partisan Recall Distortion?

We begin with the question: is there partisan distortion in their recall of wildfire experience? In our survey, respondents were asked two self-reported questions: “Within the past 12 months, did you experience any wildfires?” and “Within the past 12 months, did you experience any smoke from wildfires?”

The responses were binary and recoded as “1” if a respondent said yes and “0” otherwise. Figure 1 displays the weighted mean proportion of respondents, by partisanship, who recalled experiencing a wildfire or smoke. There were many fewer respondents who experienced wildfires than the smoke that emanates from them (13% and 52% of the sample respectively). Note that in both bar plots, respondents who self-identified as Republicans were less likely to report both experiences, as compared to Democrats and Independents.

Figure 1. Proportion of Respondents who Experienced Wildfire or Smoke from Wildfire, by Partisanship



*Note: On average, Republican respondents are less likely to report experiencing wildfire and smoke than Democrats and Independents/Others.*

There are two competing explanations for such partisan discrepancies. First, partisan perceptual screening may cause Democrats and Republicans to recall these extreme wildfire events differently. Alternatively, it could be that because Democrats and Republicans reside in different geographic clusters around the state, Republican respondents reside, on average, in areas that are further away from wildfires than Democrats. To take this latter consideration into account, we matched the survey responses by the centroid to the actual number of wildfires within 3, 5 and 10 miles of the centroid of the zip code and the number of days that area experienced low, medium and high density of smoke plumes.

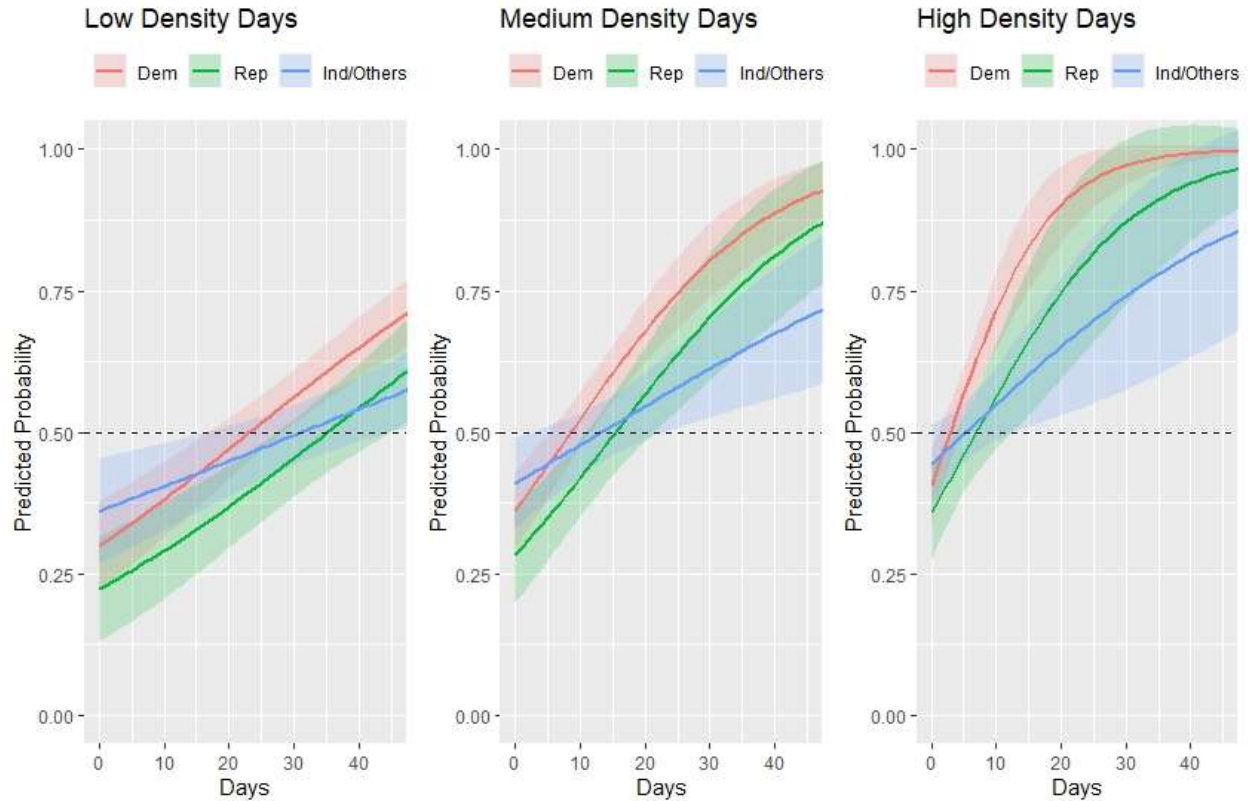
To decipher the effect of partisan perceptual distortion from actual experience, we ran the following equation:



$$Y = \beta_0 + \beta_1 \text{PartyID} \times \beta_2 \text{Actual Experience} + \epsilon$$

$Y$  is self-reported wildfire (or smoke) experience. It is binary in nature (1 if answered “yes”, 0 otherwise). In Figure 2, we plot the predicted probability of an affirmative answer given a respondent’s partisanship and actual experience. Figure 2 has three panels, one for low, medium and high-plume density days. Note that in the first panel, when x-axis equals 0, notable partisan difference in reporting exists, with Republicans less likely to report affirmative. However, comparing across panel 1,2 and 3, as plume density and the number of exposure days increased, the probability of reporting a personal experience with wildfires increases for all three groups. Although the error bars are wider as the highest number of days increases in the last two panels, there is some evidence that the perceptual gap between Democrats and Republicans diminishes, particularly at the highest smoke density level (panel 3).

Figure 2. Comparing Partisan Differences in Reporting by Actual Number of Smoke Days Experienced

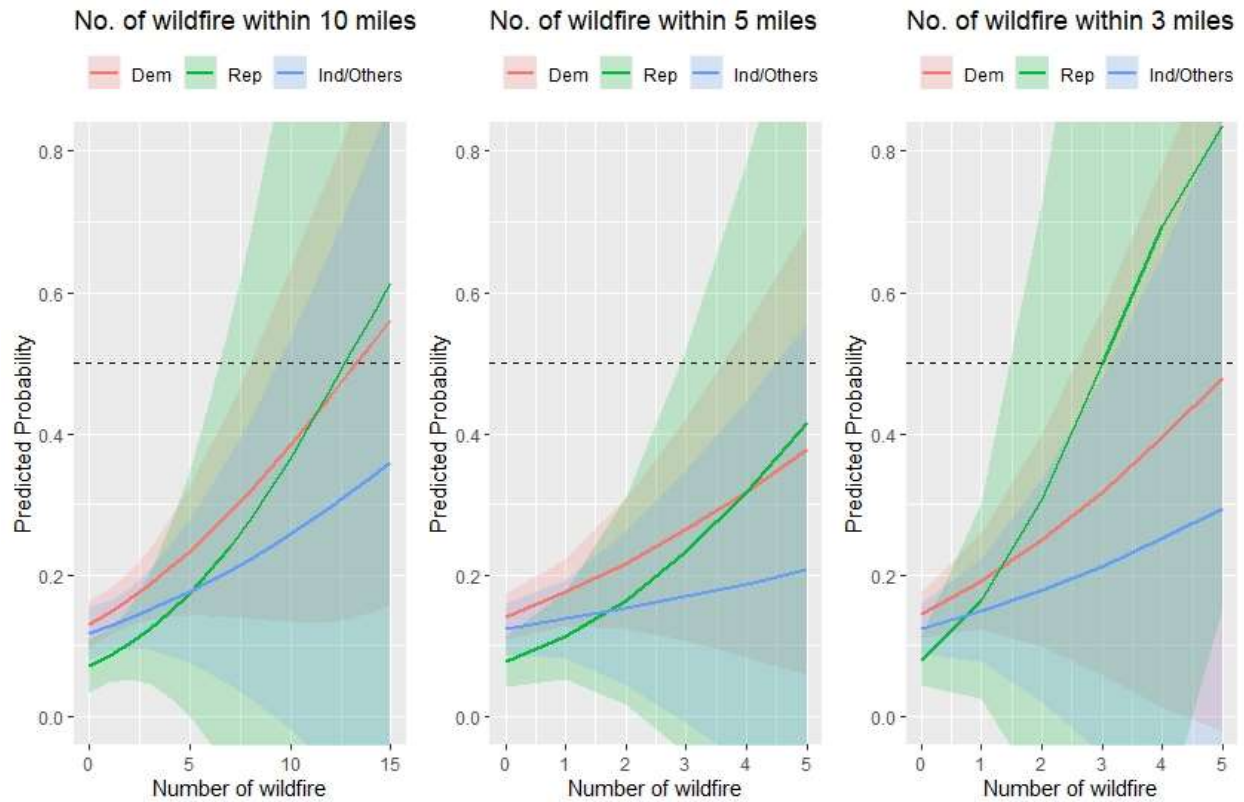


*Note: We plot the number of low, medium and high smoke days on the x-axis. On the y-axis, we plot the predicted probability of reporting having experienced smoke (1=yes; 0=otherwise). When smoke got more intense, the partisan report gap diminished.*

Turning to actual proximity to wildfires, which is less extensive but more traumatic due to worries about life and property, we notice a much smaller partisan distortion to begin with in Figure 3. Once again the partisan gap diminishes with the number of exposures. The sharpest distinction can be found in the third panel in Figure 3. When a hypothetical Republican respondent experienced more than 1 wildfire within 3-miles buffer – the pattern reverses-- he/she becomes more likely to report experiencing a wildfire than a Democratic respondent. This must be interpreted with caution. As discussed, only 13% of the respondents reported

experiencing any wildfire. When respondents are further divided into partisan groups, the small sample size explains the wide confidence intervals.

Figure 3. Comparing Partisan Differences in Reporting by Actual Number of Wildfire Experienced



*Note: We plot the number of wildfires that happened within 3,5,10 mile radius on the x-axis. On y-axis, we plot the predicted probability of reporting having experienced wildfire (1=yes; 0-otherwise). Relative to smoke, bias perceptual distortion is much smaller across partisan groups.*

## 2. Does Personal Experience Translate into Policy Preferences?

We repeated the above analyses, except this time the dependent variables are supported for various wildfire-related policies as mentioned in the Data Section. We intentionally designed the questions around the use of public funds to subsidize four different

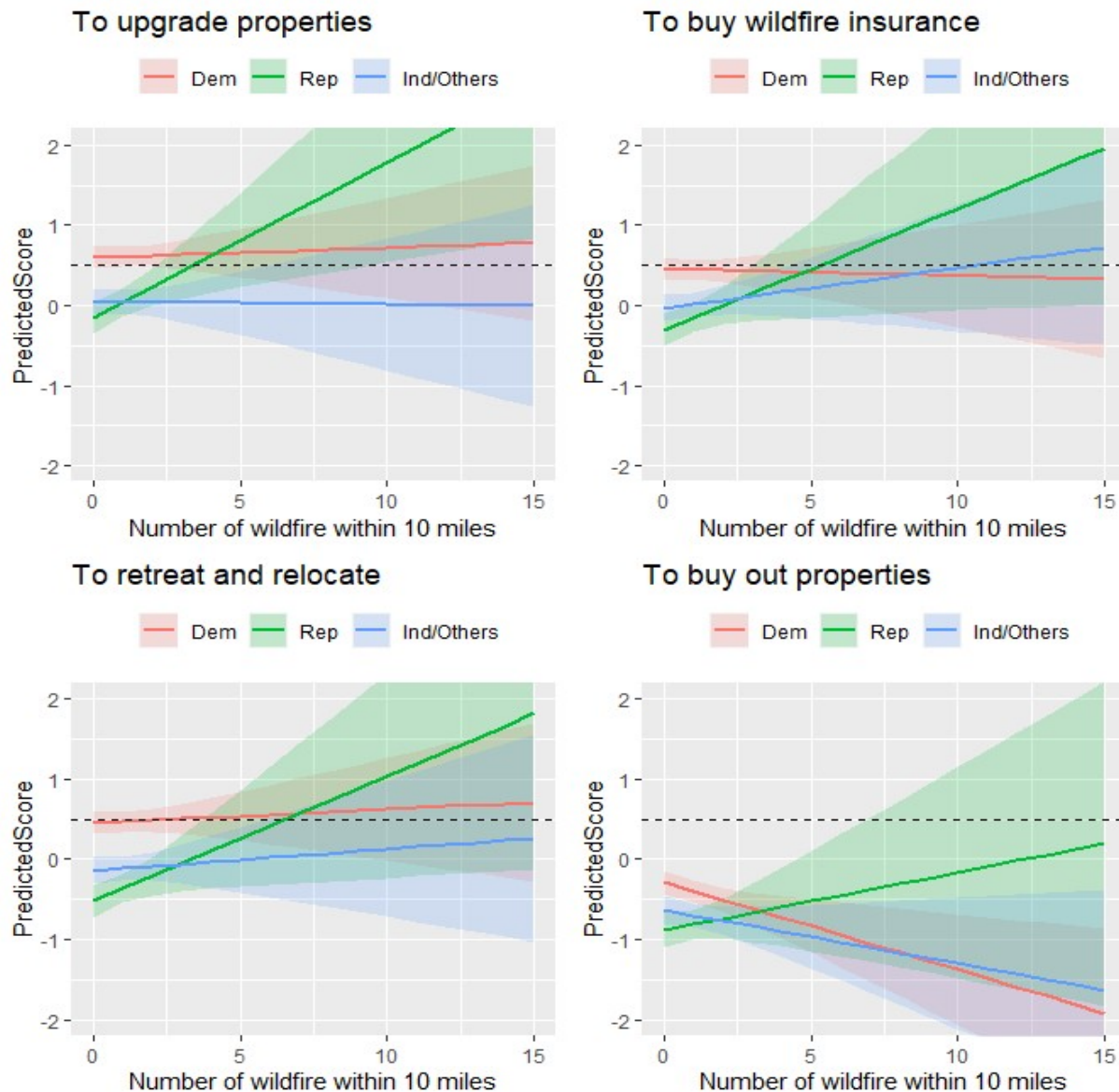
types of adaptive strategies as these are always contentious political topics. Democrats, historically, are more likely to support the use of public funds for social programs, whereas Republicans are more likely to prefer smaller government spending on transfers. For the four policy questions, we ran the following equation:

$$Y = \beta_0 + \beta_1 PartyID \times \beta_2 Actual Experience + \epsilon$$

$Y$  is ordinal in scale which ranges from strongly disagree (-2) to strongly agree (2). We tried both ordinary least square (OLS) and ordinal logistic regression for all our models. The two methods yield the same conclusion. For ease of interpretation and illustration, Figure 4 shows the predicted outcomes from the OLS results. In three out of four policy questions, the interaction terms between being a Republican and actual experience are positive and statistically significant (except on the issue related to retreat and relocating where the coefficient is positive but not statistically significant at 0.05 level). That is, if a hypothetical Republican who experienced more than one wildfire within 10 miles, the Republican would move toward more similar positions about wildfire policy subsidies as a Democrat. This finding, again, needs to be interpreted with caution at the tails of the event frequency because of our small sample size. We also repeated the same analyses with 3 mile-buffer (reported in Online Appendix Figure A1) and arrived at the same conclusion.

Figure 4. Comparing Partisan Differences in Their Support for Four Wildfire Policies by Actual

## Number of Wildfire Experienced within 10-mile Buffer



*Note: We plot the number of wildfires within a 10 mile buffer to their home address zip code on the x-axis. On the y-axis, we plot the predicted score of reporting support for a policy (2-strongly approve; -2-strongly disapprove). Republicans who did not experience any wildfire are less likely to support using public funds to adapt (when X-axis is at 0); those who experienced more than 1 wildfire became more similar to Democrats in their support for using public funds.*

## Discussion and Conclusion

To conclude, we find that, when asked, Republicans are less likely to recall experiencing a wildfire or related smoke than Democrats and Independents/others but their responses converge with wildfire exposure. The policy gap also diminishes with personal exposure to wildfire events. This suggests that increasing numbers of wildfire events and smoke may increase the cross-party consensus to take these kinds of policy steps. Republicans who experienced wildfire at least once are more likely to translate their personal experience into support for using public funding to subsidize adaptive policies. Our result echoes some of the findings in the literature that personal experience does translate into opinion towards climate policies (see Howe et al. 2019).

The intriguing question, then, is how do we reconcile our findings with Hazlett and Mildenerger (2020)? We contend that several factors may be at play. First, modifiable areal unit problem (MAUP) is known to affect the outcome of aggregate level study when individual voters are aggregated into geographic units (Openshaw 1984). Gelman (2009) has documented that the relationship observed at an individual level (i.e. richer voters are more likely to vote for a Republican presidential candidate) can be reversed at the county level (i.e. richer counties are *less* likely to vote for a Republican candidate). Another reason we suspect is that Hazlett and Mildenerger (2020) combined a number of “pro-environment” ballots that ranged from clean energy to suspending California’s Global Warming Act of 2006, which was politically charged. In contrast, we asked respondents questions about using public funds to support four types of adaptive wildfire policies. The broad range of issues in Hazlett and Mildenerger’s study may have diluted the contribution of specific personal encounters with a wildfire event to one’s

voting preferences. Nonetheless, all these ballots required either taxation or bonds to finance. Taxation is always a highly politicized and partisan issue. The personal experience may not be sufficient to overcome the deep, pre-existing partisan divide.

There is strong scientific evidence that global climate change is happening at a faster pace (Karl and Trenberth 2003; IPCC Fifth Assessment Report 2014). As a result, researchers predict mankind would experience more extreme climate events, such as wildfire, prolonged drought and flooding, as well as more extreme weather patterns in the coming decades (Planton et al. 2008; Easterling et al. 1999; Diffenbaugh et al. 2017). All these scientific forecasts paint a bleak future and call for an immediate course of actions to prepare and respond. Yet, in the age of highly polarized partisan politics, bipartisan actions in the U.S. government are hard to come by.

Our study offers a glimpse of hope or a silver lining amid the bleak projections. If extreme climate events were destined to happen more frequently and intensely, perhaps the share of common experience with nature may bring Democrats and Republicans together. And extreme weather events may even open narrow “policy windows” where bipartisan agreement could have never happened under normal circumstances (Birkmann et al. 2010; Farley et al. 2006; Mockrin, Fishler and Stewart 2018). Yet, there is skepticism for such an optimistic view. Boudet et al. (2020) find that collective actions after extreme weather events are rare --- communities rarely enact policy changes after an extreme climate event. But they note that these climate events do increase the discussion about the event’s link to global climate change, especially among communities with higher concentration of Democrats and educated residents.

With that, we end this paper with the hope that discussion would open the door for more collaborative dialogues across party lines.



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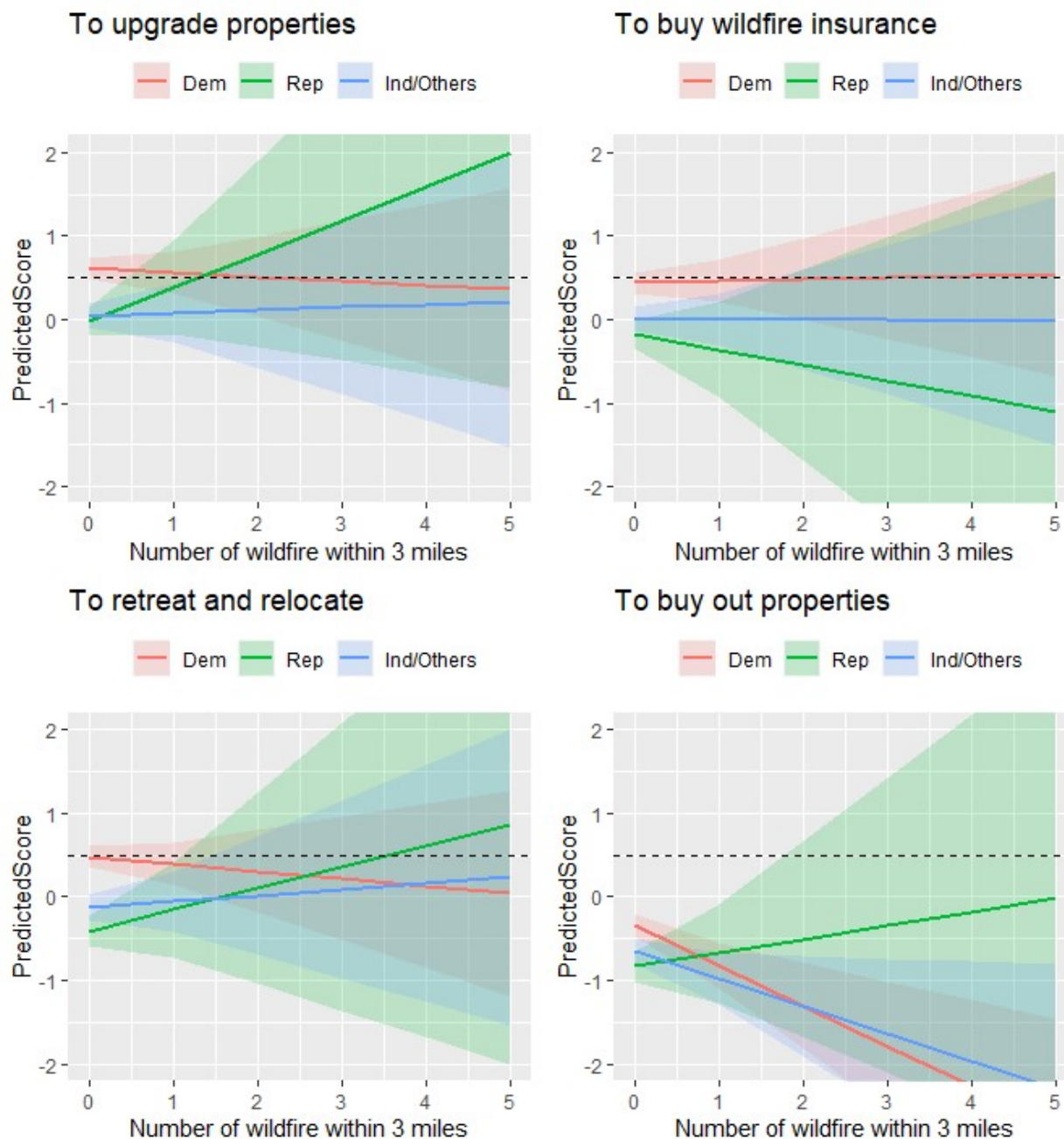
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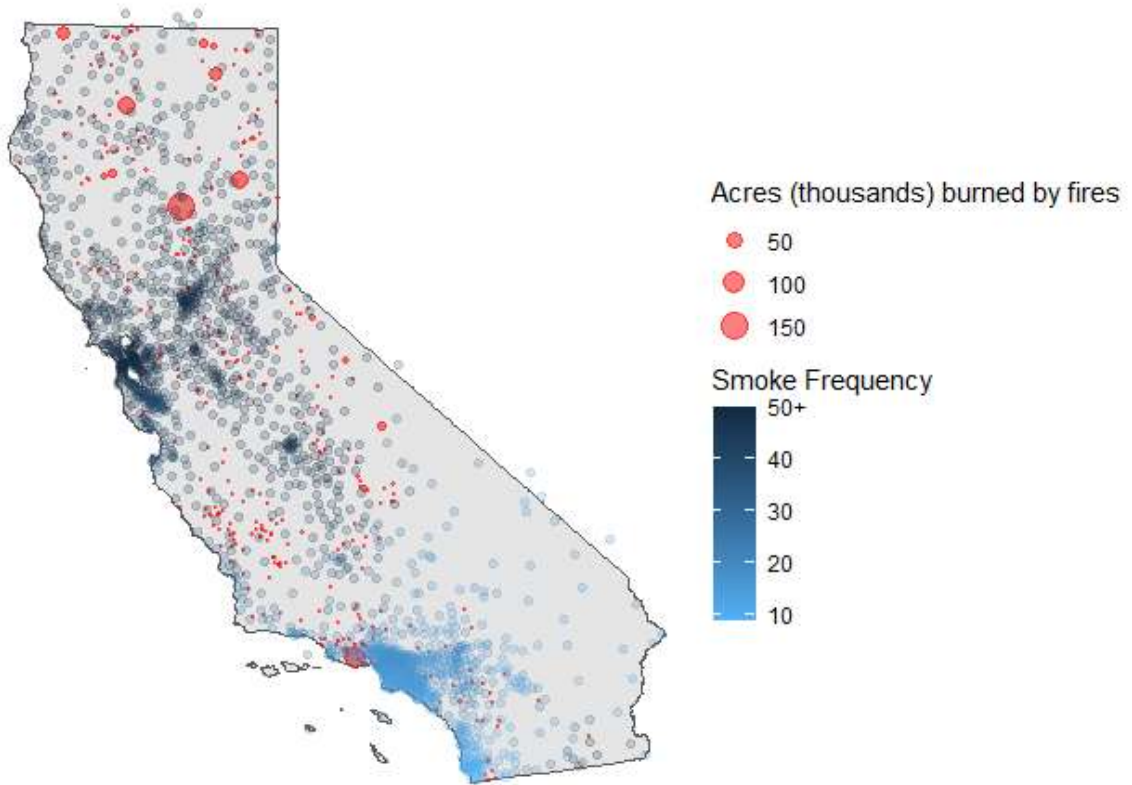
## ONLINE APPENDIX

Figure A1: Comparing Partisan Differences in Their Support for Four Wildfire Policies by Actual Number of Wildfires Experienced within 3-mile Buffer of Address Zip Code

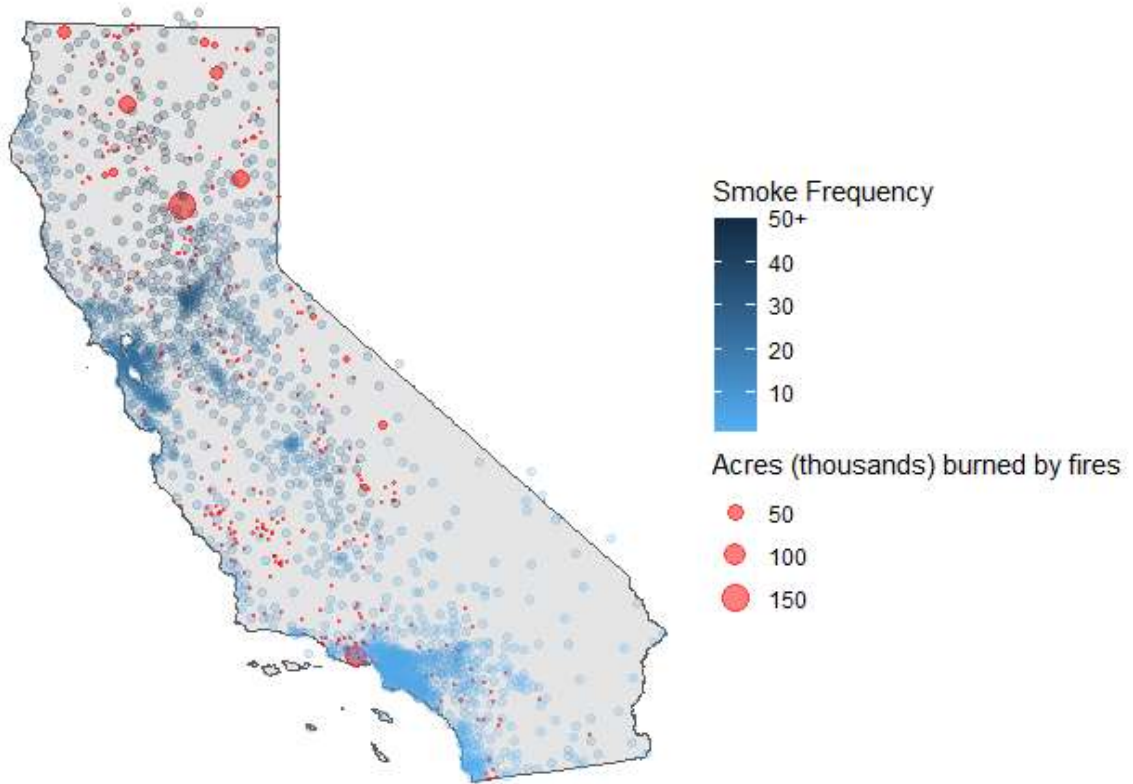


Note: We plot the number of wildfires that happened within 3 mile radius on the x-axis. On y-axis, we plot the predicted score of support by partisan group.

Figure A2: Distribution of Wildfires and Smoke Density and Frequency by Zip Code  
Wildfires and Low Smoke Intensity Distribution 2018-2019



# Wildfires and Medium Smoke Intensity Distribution 2018-2019



# Wildfires and High Smoke Intensity Distribution 2018-2019

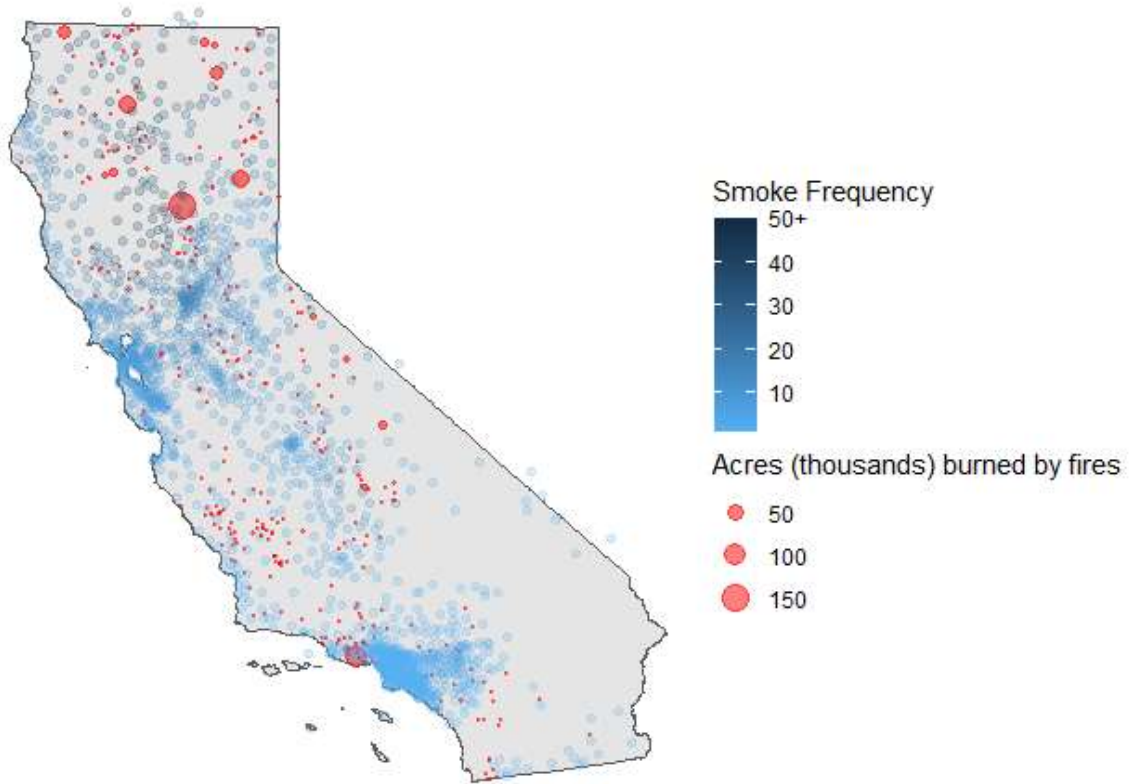




Table A1: Summary Description of Our YouGov Sample vs. Census ACS 2018

Category	YouGov Survey Sample (2018)	CA Population (2018) American Community Survey
% Democrat	45	Not Available
% Republican	22	Not Available
% Independent/Other	33	Not Available
% Age 21+	93	73
% Age 62+	21	17
% Income <\$50k	40	36
% Income \$50k- <\$100k	27	28
% Income over \$100k	21	35.5
% Income not stated	12	Not Available
% Married	45	47
% Non-Hispanic White	41	38
% Hispanic origin	35	39
% High school or less	40	38
% Some college	32	29
% College or more	28	33
% Male	51	50