Manuscript methods and results

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1 Summary

This document contains the methods and results for the manuscript.

2 Methods

Data and analysis scripts for the study are available online at https://github.com/matt-lab/bushfire-audience-segmentation. This study was approved by the Human Research Ethics Committees of the University of Western Australia (reference: 2019/RA/4/20/5104) and the Commonwealth Scientific and Industrial Research Organisation (reference: 026/19).

2.1 Participants and design

The study was a longitudinal design, where data was collected at three time periods, as presented in Table 1. Study 1 was conducted before in September ($n = 387$, 88.97% of participants), October ($n = 42$, 9.66% of participants), and November ($n = 6$, 1.38% of participants) of 2019 prior to the peak severity of the Black Summer bushfires. Study 2, conducted in February ($n = 403$, 97.58% of participants) and March ($n = 10$, 2.42% of participants) of 2020, and Study 3, conducted in March of 2020 ($n = 213$), were both completed after the peak severity of the Black Summer bushfires. In total, 1061 Australian adults participated in the study. Participants were recruited complete an online survey via Qualtrics—an Internet panel services platform. We used a targeted and stratified sampling process was used to match the age and gender of each studies' sample to the general population (as per the national 2016 census). We discarded the data of extremely fast responders, who were categorised using a preregistered threshold (see Supplementary Materials).

[Table 1 about here.]

2.2 Materials

Psychological inventories and tasks were used to gauge climate change and bushfire perceptions, in addition to auxiliary psychological characteristics.

2.2.1 Q-sort

To measure climate change views, we used the Q-sort. The Q-sort is a card-sorting task, where participants ranked thirty cards with climate change statements, such as "it is important to vote for leaders who will combat climate change" and "scientists should stop falsely claiming that climate change is a settled science". The statements were selected to reflect the breadth of the Australian climate change discourse on social media [Andreotta, Boschetti, Farrell, Paris, Walker, and Hurlstone, 2022]. To encourage reflection, participants began the Q-sort by reading each card and determining if the statement was: (1) like their point of view; (2) unlike their point of view; or neutral or unsure. Next, participants ranked their relative agreement for each statement by assigning ranks to each statement, from -4 (most unlike their point of view) through to +4 (most like their point of view). The distribution of possible ranks is forced and non-uniform, such that participants must consider the few statements to place at the extremes (see Figure 1). This encourages participants to carefully reflect on their views whilst completing the task [Stephenson, 1986, Brown, 1980]. Following completion of the survey, participants were asked to justify their placement of statements ranked most extreme.

[Figure 1 about here.]

2.2.2 Auxiliary psychological scales

In Study 1 and Study 3, we quantified twenty-eight auxiliary psychological characteristics (Table 2).

Most relevant to the current research were climate change cognition and affect inventories. We measured general belief in anthropogenic climate change, with scales concerning epistemic scepticism (doubt concerning anthropogenic climate change), response scepticism (doubt concerning the effectiveness of climate change mitigation), perceived human contribution (belief that humans have changed global climate), knowledge volume (self-perceived confidence in climate change knowledge), and worry about climate change. In addition, we included higher-resolution inventories to quantify participants mental models of specific climate change causes, consequences, and effectiveness of climate change mitigation policies.

Other psychological scales pertained to trait-based concepts found to be associated with climate change belief. This includes inventories concerning: cognitive styles; ideology, worldviews, and values; and personality.

[Table 2 about here.]

2.2.3 Fire Perception Scale

To measure perceptions of the Black Summer bushfires, we created a Fire Perception Scale. The scale's seven items were constructed from prominent media and politicians' statements on the role of climate change in Black Summer. Items included "climate change made the 2019-20 Australian bushfires more severe" and "over one hundred arsonists have contributed to the 2019-20 Australian bushfires". Participants respond on a five-point Likert scale: (1) disagree, (2) slightly disagree, (3) neither agree nor disagree, (4) slightly agree, and (5) agree.

2.2.4 Policy direction preferences

To measure participants views on the policy consequences of the Black Summer bushfires, we asked participants to respond to two items. First, participants were asked: "Do the 2019-20 Australian bushfires justify a change in Australia's climate change policy?". Participants could respond with one of four options: (1) "yes, the Australian government should be taking further action to mitigate climate change"; (2) "no, the Australian government should not modify the current climate change policy"; (3) "yes, the Australian government should be taking less action to mitigate climate change"; and (4) "yes, the Australian government should be taking no action at all to mitigate climate change". Next, participants were asked to justify their response ("Why?") through writing an open-ended response.

2.3 Procedure

All studies began with the same procedure. To begin, participants read an information sheet, provided informed consent, and provided demographic information. Next, procedure varied across studies (summarised in Table 1). In Study 1, participants completed the Q-sort followed by the auxiliary psychological scales. In Study 2, participants completed the Q-sort followed by a task unrelated to our current research inquiry. In Study 3, participants completed all materials: the Q-sort, auxiliary psychological scales, the Fire Perception Scale, and policy direction preferences. The presentation sequence of materials were counterbalanced across participants to control for order effects (see Supplementary Materials).

3 Results

All analyses were completed with the *R* programming language [R Core Team, 2023].

3.1 Replication of the three-segment solution

As per our previous research, we used the Q-methodology to identify distinct views on climate change [Brown, 1980]. The Q-methodology transposes traditional dimension reduction techniques, to reduce the dimensions of *people* rather than *items*. For each study, we used principal components analysis with varimax rotation to group individuals with similar Q-sort ranks. We extracted a single factor, as the first component accounted for a large portion of variance than subsequent components for each study. This single factor represented a dimension of anthropogenic climate change acceptance. Based on factor loadings, we divided individuals into one of three segments: (1) *Acceptors* ($n = 653$, 61.55%), whose positive factor loading was statistically significant from zero ($p < .05$); (2) *Sceptics* ($n = 97$, 9.14%), whose negative factor loading was statistically significant from zero ($p < .05$); and (3) *Fencesitters* ($n = 311$, 29.31%), whose factor loading was not statistically significant from zero ($p \geq .05$).

Although the number of segments was consistent across studies, the nature of segments may vary. To explore this possibility, we constructed an average Q-sort for Acceptors and Sceptics in each study [Brown, 1980]. The ranks assigned to each statement were averaged (weighted by participants' factor loading). These averages are then ranked to be consistent with Q-sort structure, to produce a set of numbers known as factor scores. For example, the statement with the lowest average was assigned a factor score of -4 and the statement with the highest average was assigned a factor score of +4 (see Supplementary Material for all factor scores). We did not build a representative Q-sort for Fencesitters, as point estimates cannot represent the necessarily homogeneous segment (otherwise Fencesitters would have emerged as a separate factor). In all three studies, the greatest factor score for Acceptors was assigned to the statement "It is important to vote for leaders who will combat climate change" whereas the greatest factor score for Sceptics was assigned to the statement "Scientists should stop falsely claiming that climate change is a settled science."

We found minimal differences in each segment's factor scores across studies Acceptor factor ranks from the three studies were strongly correlated (all Spearman's ρ correlations > 0.95, all p's $< .001$). Likewise, Sceptic factor ranks across studies were strongly correlated (all Spearman's ρ correlations > 0.94, all p's $< .001$). Consistently across studies, Acceptors and Sceptics views held divergent views (all Spearman's ρ correlations < -0.81, all p's $< .001$). In sum, the number and nature of segments were consistent across time.

3.2 Change in segment membership over time

To explore whether segment membership changed during Black Summer, we investigated the relative proportions of segments across studies (Figure 2). Numerically, the proportion of Acceptors fell across time (from 64.60% of Study 1 sample to 54.46% of Study 3 sample), whereas the proportion of Fencesitters increased across time (from 27.13% of Study 1 sample to 37.09% of Study 3 sample). To investigate whether these changes were statistically significant, we created a multinomial logistic regression model to predict segment membership as a function

of study (coefficients reported in Supplementary Material), using the *multinom* function from the *nnet* package [Venables and Ripley, 2002]. A log likelihood ratio test did not indicate an improvement in model fit when study was included as a predictor, compared to a model with only an intercept term (χ^2 (4) = 8.85, $p = 0.07$). Thus, segment membership did not reliably differ across study samples.

[Figure 2 about here.]

3.3 Auxiliary psychological characteristics

We tested for mean differences in auxiliary psychological characteristics between Study 1 (September, 2019) and Study 3 (March, 2020) using t tests. To guard against Type I errors, we applied a Holm [1979] p value adjustment to four families of tests for changes in psychological characteristics: climate change cognition and affect; cognitive styles; ideology, worldviews, and values; and personality. We found evidence of a statistically significant mean difference in climate change cognition and affect (Table 3). Specifically, participants in Study 3 had a greater mean endorsement (Cohen's $d = 0.25$) of natural cycles causes for climate change (e.g., volcanic eruptions, fluctuations in the sun) than participants of Study 1. No other climate change cognition and affect characteristics reliably differed between Study 1 and Study 3. Regarding dispositional attributes, there were no statistically significant mean differences in: cognitive styles; ideology, worldviews and values; or personality (all $p > .05$; see Supplementary Material for t tests).

[Table 3 about here.]

We explored the psychological characteristics associated with segment membership, by replicating the regression analysis of Andreotta et al. [2022]. This analysis is complicated by multicollinearity, which can lead to unstable estimates of coefficients. We sought to produce stable estimates with a ridge regression model. A ridge regression reduces the variance of estimates, caused by multicollinearity, by shrinking the coefficients towards zero [a bias-variance trade-off; James, Witten, Hastie, and Tibshirani [2021]]. With the *glmnet* package [Friedman, Tibshirani, and Hastie, 2010], we fitted a multinomial logistic ridge regression model to predict segment membership as a function of psychological characteristics for Study 1 and Study 3. The degree of shrinkage, controlled by a hyperparameter λ, was chosen by cross-validation process (k-fold) that minimised the model's multinomial deviance. Prior to analysis, we converted responses to z scores for each predictor in each study. Confidence intervals were estimated by repeating the modelling procedure via bootstrapping with 10,000 samples [sampled with replacement; Efron and Tibshirani [1994]].

The ridge regression model predicted segment membership with 83.22% accuracy in Study 1 (49.07% of null deviance) and 88.26% accuracy in Study 3 (66.39 % of null deviance). As

seen in Table 4, the models' coefficients were generally consistent (same sign) across studies, indicating a robust association between psychological characteristics and segment membership. Regarding climate change cognition and affect, Acceptors and Sceptics were distinguished by opposing patterns of climate change scepticism and belief in anthropogenic climate change. In contrast, the Fencesitters of Study 3 were characterised by response scepticism and perceptions that carbon-emitting activities cause climate change. Turning to cognitive styles, conspiracist ideation was positively associated with Fencesitter membership, and negatively associated with Acceptor membership (both studies), whereas Sceptics were characterised by a reduced orientation towards future consequences (Study 3). Generally, Acceptors and Sceptics were distinguished by opposing patterns of ideologies, worldviews, and values. Lastly, personality tended not to be a robust predictor of segment membership, although evidence from Study 3 indicated that Fencesitters were characterised by greater extraversion and conscientiousness, whereas Sceptics were characterised by greater introversion.

[Table 4 about here.]

3.4 Bushfire perceptions

To explore perceptions of the Black Summer bushfires, we performed a principal components analysis with varimax rotation on the Fire Perception Scale (see Table 5). We extracted three factors, as these accounted for the majority of scale variance (78.31%; see Supplementary Materials for scree plot). The first factor, labelled *Climate Processes*, was characterised by four items (items 1, 3, 5, 6) which linked climate change to the bushfires and accounted for 41.22% of scale variance. The second factor, labelled *Fire Realities*, was characterised by two items (items 2 and 4) which participants generally responded with certainty and accounted for 19.97% of scale variance. The third factor, labelled *Arson Causes*, was characterised by a single item (item 7) stating that Black Summer was caused by hundreds of arsonists and accounted for 17.12% of scale variance. We created subscales corresponding to each factor by averaging item scores. Items that negatively loaded onto factors were reverse coded. The multi-item factors of Climate Processes and Fire Realities had an internal consistency of Cronbach's α = 0.86 and 0.42, respectively.

To test segment differences in bushfire perceptions, we built linear regression models predicting Climate Processes, Fire Realities, and Arson Causes as a function of segment membership (coefficients reported in Supplementary Materials). All linear regression models accounted for a significant amount of bushfire perception variance compared to intercept-only models, indicating that segment membership was a significant predictor of Climate Processes (F (2, 210) = 47.44, $p < .001$, $R^2 = 0.31$, $R^2_{adjusted} = 0.30$), Fire Realities (F (2, 210) = 30.31, $p < .001$, $R^2 = 0.22$, $R^2_{adjusted} = 0.22$), and Arson Causes (F (2, 210) = 12.69, $p < .001$, $R^2 = 0.11$, $R^2_{adjusted} = 0.10$). To quantify specific segment differences, we conducted pairwise comparisons of marginal means using the *marginaleffects* package [Arel-Bundock, Greifer, and Heiss, Forthcoming], with a Holm [1979] p value adjustment for multiple comparisons. As seen

in Figure 3, Acceptors had a higher mean endorsement of Climate Processes than Fencesitters (difference = 0.53, $SE = 0.14$, $z = 3.87$, $p < .001$, $p_{adjusted} < .001$), who in turn, had a higher mean endorsement than Sceptics (difference = 1.76, $SE = 0.25$, $z = 7.14$, $p < .001$, $p_{adjusted} < .001$). For Fire Realities, Acceptors had a greater mean endorsement than Sceptics (difference = 0.48, $SE = 0.19$, $z = 2.54$, $p = .011$, $p_{adjusted} = .022$) and Fencesitters (difference = 0.84, $SE = 0.11$, $z = 7.75$, $p < .001$, $p_{adjusted} < .001$). However, Fencesitters did not reliably differ from Sceptics in their mean endorsement of Fire Realities (difference = -0.36, $SE = 0.20$, $z = -1.86$, $p = .063$, $p_{adjusted} = .063$). The pattern of Climate Processes endorsement was reversed for Arson Causes, with Sceptics having a higher mean endorsement than Fencesitters (difference = 0.74, $SE = 0.30$, $z = 2.47$, $p = .014$, $p_{adjusted} = .014$), who in turn, had a higher mean endorsement than Acceptors (difference = 0.55, $SE = 0.17$, $z = 3.32$, $p < .001$, $p_{adjusted} = .002$).

[Table 5 about here.]

[Figure 3 about here.]

We investigated causal perceptions by examining responses to claims that the mass arson (item seven of the Bushfire Perception scale) and climate change (item one of the Bushfire Perception Scale) contributed to the Black Summer bushfires. Despite segment differences, participants seldom rejected the claim that over one hundred arsonists contributed to the Black Summer bushfires ($n = 38$; 17.84% responded with 'disagree' or 'strongly disagree' to item seven). Many Acceptors ($n = 45$; 38.79%), and a majority of Fencesitters ($n = 45$; 56.96%) and Sceptics ($n = 16$; 88.89%), agreed (responded with 'agree' or 'strongly agree') with mass arson causal claims. In contrast, a majority of Acceptors ($n = 101$; 87.07%), some Fencesitters ($n = 33$; 41.77%), and no Sceptics agreed that climate change worsened the Black Summer bushfires. Endorsement of the mass arson causal account was negatively associated with endorsement of climate change causal account ($r = -0.21$, $p = .002$), which suggests that the two causal accounts for the Black Summer bushfires were somewhat incompatible.

3.5 Policy direction preferences

Participants differed in their policy direction preferences in response to the Black Summer bushfires. Most participants desired more governmental climate change mitigation policies ($n = 145$, 68.08%), or no changes to governmental climate change mitigation policies ($n = 54$, 25.35%). Few participants desired less or no governmental climate change mitigation policies (totalling $n = 14$, 6.57%). Policy direction preferences differed across segments, with the majority of Acceptors and Fencesitters desiring more governmental climate change mitigation policies, and the majority of Sceptics desiring no changes to governmental climate change mitigation policies (Figure 4). We investigated the statistical significance of segment differences using a binomial logistic regression model, estimated the odds of desiring more governmental

climate change mitigation policies as a function of segment membership (reported in full in Supplementary Materials). Sceptics were excluded from analysis, as none desired more governmental climate change mitigation policies. A likelihood-ratio test indicated that segment membership significantly predicted policy direction preferences (χ^2 (1) = 35.45, $p < .001$). Specifically, we found that the odds of Acceptors (n = 104, 89.66% of Acceptors, odds = 8.67) indicating a preference for more governmental climate change mitigation policies were approximately eight times greater (odds ratio = 8.03, 95% CI = [3.92, 17.49], $p < .001$) than Fencesitters (n = 41, 51.90% of Fencesitters, odds = 1.08).

We explored the text justification of policy direction preferences using an emotion analysis. We detected the emotional association of each word using the NRC Word-Emotion Association Lexicon [Mohammad and Turney, 2013]. This lexicon is a list of words manually annotated (via crowdsourcing) for their association with eight emotions: anger, fear, anticipation, trust, surprise, sadness, joy, and disgust. For each response, we assigned a dichotomous code (present/not present) if the response contained at least one word associated with an emotion, for each emotion. The most common emotion evoked by participants was fear (n = 67, 31.46%), found in both justification for more action ("the recent bushfire is a wakupe call. how much more *worse* do we want to experience?", fear words italicised) and for no changes or less action ("…100 arsonists were charged as a starter and the it was the fuel left on the ground for decades that made the fires so much *worse* and caused the *disaster*", fear words italicised). To test whether emotions varied across segments, we made a binomial logistic regression model for each emotion with segment membership as a predictor (reported in full in Supplementary Materials). Generally, we found no statistically significant differences in the use of emotions across segments, except for fear, where the odds of Acceptors using a fear word (n = 47, 40.52% of Acceptors, odds = 0.68) were approximately three times higher (odds ratio = 3.16, 95% CI = [1.59, 6.28], p = .001) than Fencesitters (n = 14, 17.72% of Fencesitters, odds = 0.22).

[Figure 4 about here.]

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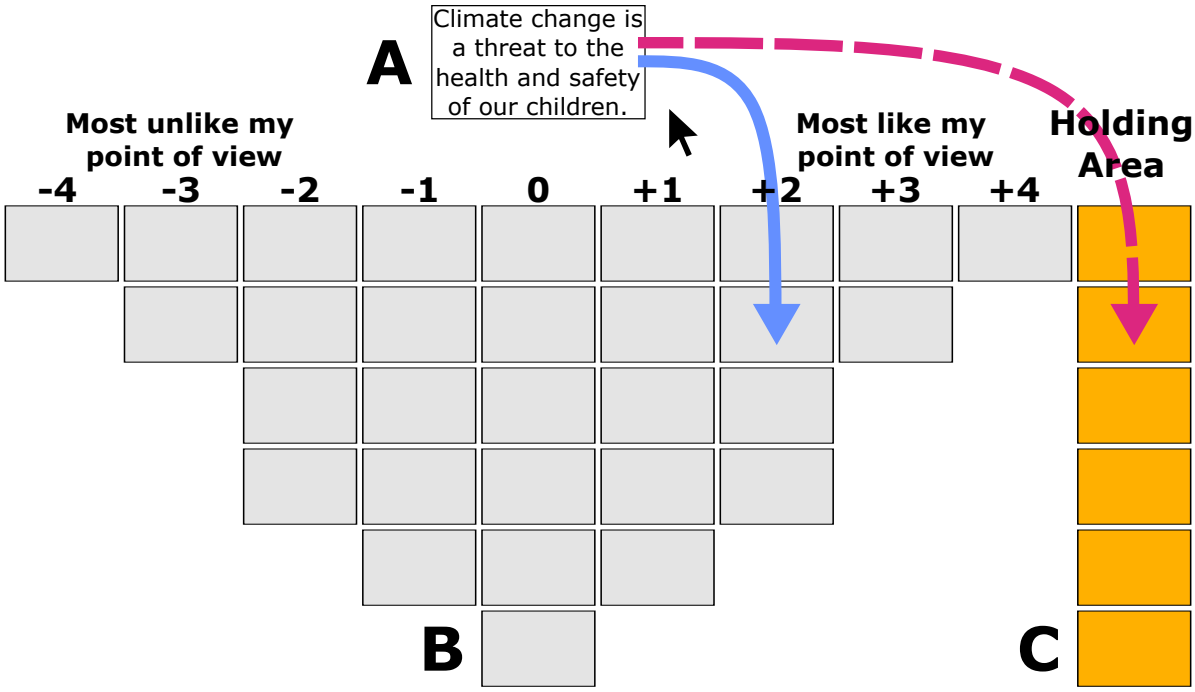

Figure 1: Schematic of the Q-sort task. Participants read through a stack of statements (A) by dragging the top-most statement into the grey box that best corresponded to their point of view (B). As the majority of statements had to be placed around the midpoint, participants could only highlight a few statements that strongly reflect their point of view. Participants could re-arrange statements at any time during the task. To facilitate this process, participants could temporarily place statements in the yellow holding area (C). Figure reproduced without changes from [Andreotta et al., 2022], under the Creative Commons license (CC BY 4.0).

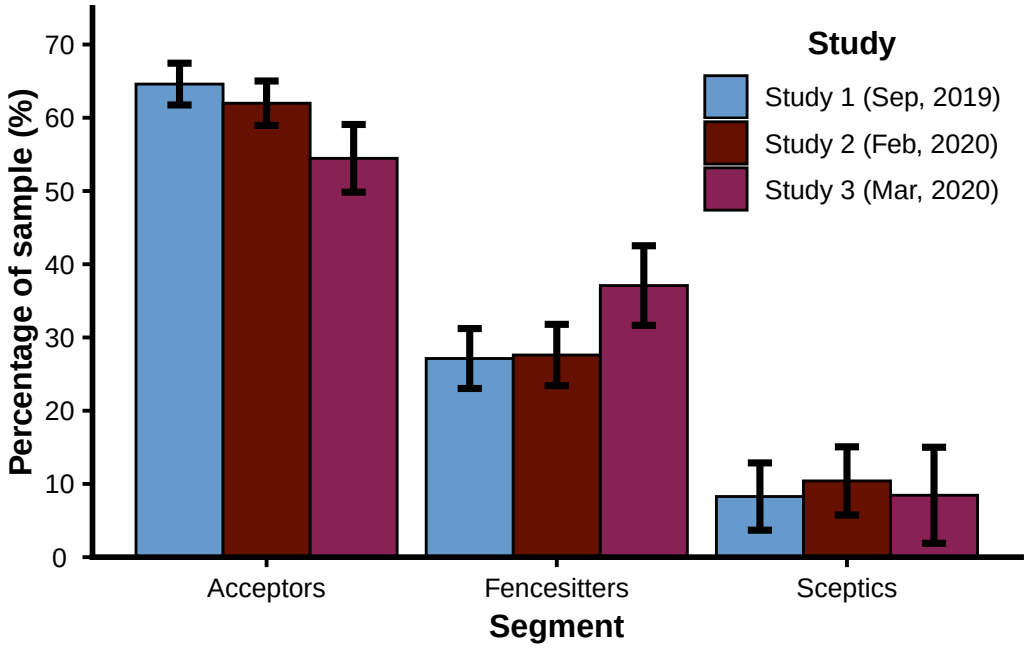

Figure 2: The segment membership of each study's sample, as a proportion (percentage). Error bars indicate one standard error of the proportion.

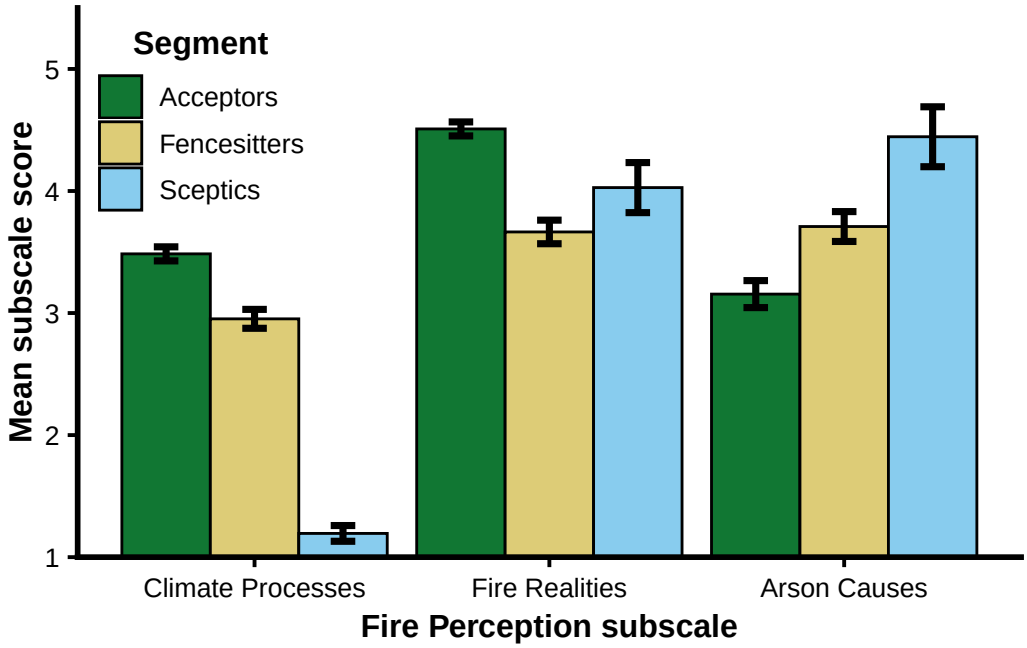

Figure 3: Mean Fire Perception subscale scores as a function of segment. Error bars indicate one standard error above and below the mean.

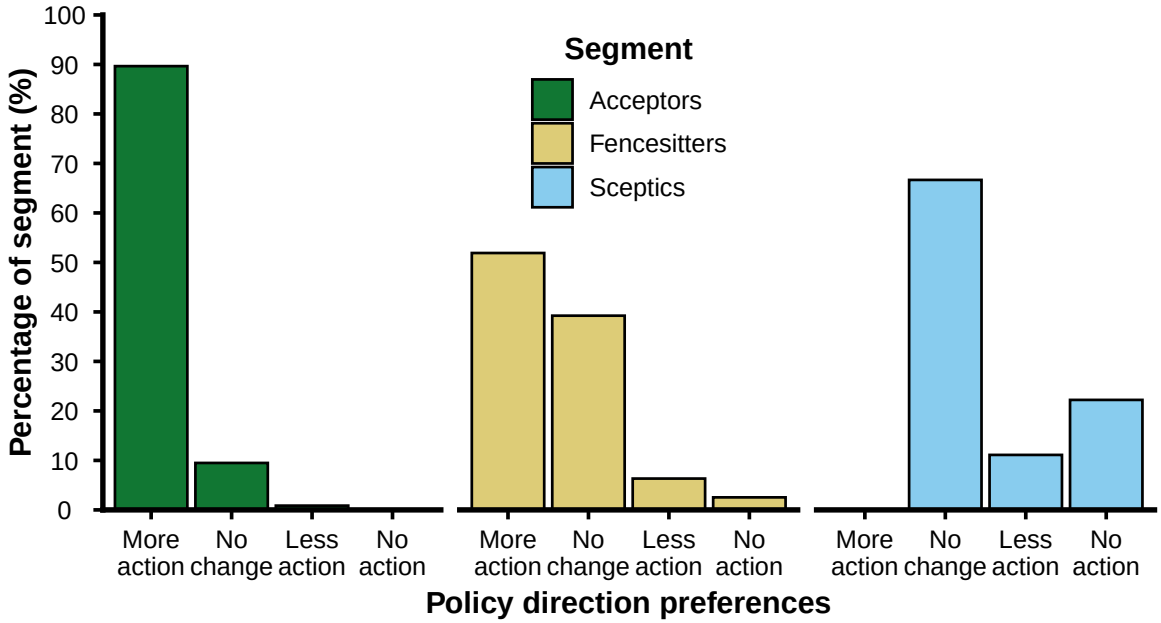

Figure 4: Policy direction preferences as a function of segment.

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Table 1: Sample characteristics and materials of study.

	Study		
Characteristics	1	2	3
Time	Before peak bushfire severity	After peak bushfire severity	After peak bushfire severity
Data collection dates			
Start	24-SEP-2019	25-FEB-2020	13-MAR-2020
End	09-NOV-2019	02-MAR-2020	26-MAR-2020
Sample characteristics			
n	435	413	213
Mean age in years (SD)	46.71 (17.77)	46.82 (18.04)	47.13 (17.29)
Number of women in sample (%)	213 (48.97%)	206 (49.88%)	107 (50.23%)
Materials			
Q-sort	✔	✔	✔
Auxiliary psychological scales	✔	✖	✔
Fire Perception Scale	✖	✖	✔
Change in policy items	✖	✖	✔

Table 2: Summary of auxiliary psychological measures.

Psychological characteristic	Items	Cronbach's α	Range	Example item	Reference
Climate change cognition and affect					
Knowledge Volume	1	-	1 to 4	How much do you feel you know about climate change?	Malka, Krosnick, and Langer [2009]
Perceptions of Carbon Emission Causes	7	0.92	1 to 7	Please indicate to what extent each of the following is a cause of climate change, to the best of your knowledge: people driving their cars	Andreotta et al. [2022]
Perceptions of Environmental Harm Causes	4	0.87	1 to 7	Please indicate to what extent each of the following is a cause of climate change, to the best of your knowledge: air pollution from toxic chemicals	Andreotta et al. [2022]
Perceptions of Natural Causes	2	0.79	1 to 7	Please indicate to what extent each of the following is a cause of climate change, to the best of your knowledge: volcanic eruptions	Andreotta et al. [2022]
Perceived Personal Consequences	3	0.87	1 to 7	Please rate for each of the following how likely it is as a consequence of climate change by the year 2050: food shortages where you live	Bostrom, O'Connor, Böhm, Hanss, Bodi, Ekström, Halder, Jeschke, Mack, Qu, Rosentrater, Sandve, and Sælensminde [2012]
Perceived Societal Consequences	8	0.96	1 to 7	Please rate for each of the following how likely it is as a consequence of climate change by the year 2050: food shortages in many parts of the world	Bostrom et al. [2012]
Perceived Human Contribution	1	-	1 to 7	How likely do you think it is that human actions have changed global climate?	Bostrom et al. [2012]
Perceived Effectiveness of Carbon Policies	3	0.75	1 to 7	Please rate for each step what effect you think it would have on climate change: requiring cars and trucks to have higher fuel efficiency (1 = Reduce or Stop Climate Change, 4 = Neither Reduce nor Increase, 7 = Increase Climate Change)	Bostrom et al. [2012]
Perceived Effectiveness of Engineering Policies	3	0.42	1 to 7	Please rate for each step what effect you think it would have on climate change: putting more dust in the atmosphere (1 = Reduce or Stop Climate Change, 4 = Neither Reduce nor Increase, 7 = Increase Climate Change)	Bostrom et al. [2012]
Perceived Effectiveness of Green Policies	5	0.91	1 to 7	Please rate for each step what effect you think it would have on climate change: planting trees (1 = Reduce or Stop Climate Change, 4 = Neither Reduce nor Increase, 7 = Increase Climate Change)	Bostrom et al. [2012]
Epistemic Scepticism	8	0.91	1 to 5	Climate change is just a natural fluctuation in Earth's temperatures	Capstick and Pidgeon [2014]
Response Scepticism	7	0.89	1 to 5	There is no point in me doing anything about climate change because no-one else is	Capstick and Pidgeon [2014]
Worry about Climate Change	1	-	1 to 4	How strongly do you feel worry when you think about the issue of climate change?	Smith and Leiserowitz [2014]
Cognitive style					
Orientation to Future Goals	4	0.72	1 to 5	I consider how things might be in the future	Enzler [2015]

(continued)

Psychological characteristic	Items	Cronbach's α	Range	Example item	Reference
Orientation to Immediate Goals	5	0.86	1 to 5	I mainly act to satisfy my immediate concerns, figuring the future will take care of itself	Enzler [2015]
Conspiracist Ideation	6	0.90	1 to 5	The Apollo moon landings never happened and were staged in a Hollywood film studio	Lewandowsky, Oberauer, and Gignac [2013]
Need for Cognition	6	0.79	1 to 5	I would prefer complex to simple problems	Lins de Holanda Coelho, Hanel, and Wolf [2018]
Ideology, worldviews, or values					
Environment-as-Ductile Worldview	6	0.81	1 to 5	If the balance of the natural environment is upset the whole system will collapse	Price, Walker, and Boschetti [2014]
Environment-as-Elastic Worldview	6	0.85	1 to 5	The natural environment is capable of recovering from any damage humans may cause	Price et al. [2014]
Political Ideology	1	-	1 to 7	Please indicate the extent to which you identify yourself as politically left-wing or right-wing (1 = Very Left-Wing, 7 = Very Right-Wing)	-
System Justification	8	0.85	1 to 9	Everyone has a fair shot at wealth and happiness	Kay and Jost [2003]
Conservation Values	10	0.32	-2.94 to 5.54	Please, rate the importance of the following values as a life-guiding principle for you: CONFORMITY (obedience, honouring parents and elders, self-discipline, politeness)	Lindeman and Verkasalo [2005]
Self-Transcendence Values	10	0.55	-4.84 to 2.52	Please, rate the importance of the following values as a life-guiding principle for you: BENEVOLENCE (helpfulness, honesty, forgiveness, loyalty, responsibility)	Lindeman and Verkasalo [2005]
Personality					
Agreeableness	2	0.27	1 to 5	I see myself as someone who is generally trusting	Rammstedt and John [2007]
Conscientiousness	2	0.53	1 to 5	I see myself as someone who does a thorough job	Rammstedt and John [2007]
Extraversion	2	0.53	1 to 5	I see myself as someone who is outgoing, sociable	Rammstedt and John [2007]
Neuroticism	2	0.62	1 to 5	I see myself as someone who gets nervous easily	Rammstedt and John [2007]
Openness	2	0.14	1 to 5	I see myself as someone who has an active imagination	Rammstedt and John [2007]

Note:
Conservation and Self-Transcendence Value scores were a weighted average of ten items (rated along a nine-point scale). Table reproduced with updated Cronbach's α from Andreotta et al. [2022], under the Creative Commons license (CC BY 4.0).

Table 3: Difference in means of climate change cognition and affect characteristics between Study 1 and Study 3.

	Study 1	Study 3			
Psychological characteristics	*M* (*SD*)	*M* (*SD*)	*t*	*p*	$p_{adjusted}$
Perceptions of Natural Causes	4.23 (1.51)	4.62 (1.62)	2.95	.003	.044*
Response Scepticism	2.37 (1.01)	2.56 (0.99)	2.29	.022	.269
Perceived Effectiveness of Green Policies	4.69 (1.52)	4.49 (1.50)	-1.60	.110	1.000
Worry about Climate Change	2.72 (1.01)	2.61 (1.01)	-1.35	.178	1.000
Perceptions of Carbon Emission Causes	5.06 (1.33)	4.91 (1.40)	-1.29	.197	1.000
Perceived Human Contribution	5.59 (1.72)	5.41 (1.71)	-1.22	.222	1.000
Epistemic Scepticism	2.97 (1.00)	3.05 (0.99)	1.04	.300	1.000
Knowledge Volume	2.69 (0.76)	2.76 (0.78)	0.99	.325	1.000
Perceived Personal Consequences	4.59 (1.58)	4.71 (1.40)	0.97	.331	1.000
Perceptions of Environmental Harm Causes	4.61 (1.49)	4.51 (1.57)	-0.75	.457	1.000
Perceived Effectiveness of Engineering Policies	4.04 (1.06)	4.00 (1.08)	-0.43	.670	1.000
Perceived Effectiveness of Carbon Policies	4.19 (1.26)	4.15 (1.32)	-0.33	.742	1.000
Perceived Societal Consequences	5.12 (1.51)	5.10 (1.41)	-0.11	.914	1.000

Note:

$^{*}p_{adjusted} < .05$;

p values were adjusted using the Holm [1979] method.

Table 4: Effect of psychological characteristics on segment membership, as estimated by a multinomial logistic ridge regression for Study 1 and Study 3.

	Acceptors		Fencesitters		Sceptics	
Predictors	Study 1	Study 3	Study 1	Study 3	Study 1	Study 3
Intercept						
	+1.64^	**+1.66^**	**+0.56^**	**+1.03^**	**-2.20^**	**-2.69^**
	[1.64, 2.18]	**[1.44, 2.09]**	**[0.44, 0.99]**	**[0.71, 1.32]**	**[-3.06, -2.19]**	**[-3.22, -2.36]**
Climate change cognition and affect						
Epistemic Scepticism	**-0.33^**	**-0.46^**	+0.11	+0.13	**+0.23^**	**+0.33^**
	[-0.59, -0.26]	**[-0.72, -0.25]**	[-0.05, 0.30]	[-0.08, 0.39]	**[0.16, 0.43]**	**[0.19, 0.46]**
Worry about Climate Change	**+0.31^**	+0.13	-0.06	+0.10	**-0.25^**	**-0.23^**
	[0.23, 0.60]	[-0.09, 0.38]	[-0.25, 0.11]	[-0.12, 0.36]	**[-0.50, -0.19]**	**[-0.44, -0.07]**
Response Scepticism	**-0.29^**	**-0.55^**	+0.08	**+0.34^**	**+0.21^**	**+0.21^**
	[-0.55, -0.19]	**[-0.75, -0.37]**	[-0.09, 0.28]	**[0.14, 0.56]**	**[0.15, 0.40]**	**[0.09, 0.35]**
Perceived Human Contribution	**+0.20^**	**+0.27^**	+0.12	-0.06	**-0.32^**	**-0.22^**
	[0.08, 0.41]	**[0.12, 0.51]**	[-0.02, 0.35]	[-0.29, 0.16]	**[-0.59, -0.23]**	**[-0.42, -0.07]**
Perceived Societal Consequences	**+0.19^**	+0.11	-0.09	+0.06	-0.10	**-0.16^**
	[0.06, 0.39]	[-0.08, 0.38]	[-0.30, 0.05]	[-0.21, 0.25]	[-0.23, 0.04]	**[-0.33, -0.02]**
Perceptions of Environmental Harm Causes	+0.08	+0.04	+0.08	+0.19	**-0.16^**	**-0.22^**
	[-0.09, 0.26]	[-0.18, 0.24]	[-0.08, 0.28]	[0.00, 0.43]	**[-0.32, -0.05]**	**[-0.37, -0.10]**
Knowledge Volume	-0.10	-0.05	-0.06	-0.01	**+0.15^**	+0.06
	[-0.34, 0.01]	[-0.25, 0.13]	[-0.24, 0.10]	[-0.22, 0.19]	**[0.04, 0.43]**	[-0.11, 0.26]
Perceptions of Carbon Emission Causes	**+0.15^**	+0.15	+0.04	**+0.29^**	**-0.19^**	**-0.44^**
	[0.00, 0.35]	[-0.02, 0.32]	[-0.11, 0.23]	**[0.09, 0.49]**	**[-0.36, -0.11]**	**[-0.59, -0.29]**
Perceived Effectiveness of Engineering Policies	**-0.13^**	+0.09	**+0.14^**	-0.10	-0.01	+0.01
	[-0.36, -0.01]	[-0.11, 0.31]	**[0.01, 0.36]**	[-0.31, 0.11]	[-0.14, 0.15]	[-0.15, 0.16]
Perceived Personal Consequences	+0.12	+0.12	-0.02	-0.09	-0.10	-0.03
	[-0.03, 0.30]	[-0.09, 0.36]	[-0.19, 0.14]	[-0.31, 0.15]	[-0.23, 0.02]	[-0.21, 0.11]
Perceived Effectiveness of Carbon Policies	+0.11	-0.13	-0.03	+0.17	-0.08	-0.03
	[-0.03, 0.35]	[-0.34, 0.09]	[-0.23, 0.15]	[-0.07, 0.36]	[-0.27, 0.02]	[-0.16, 0.13]
Perceived Effectiveness of Green Policies	+0.10	-0.04	-0.04	+0.10	-0.06	-0.06
	[-0.02, 0.30]	[-0.24, 0.17]	[-0.20, 0.14]	[-0.12, 0.31]	[-0.27, 0.05]	[-0.20, 0.08]
Perceptions of Natural Causes	-0.08	-0.15	+0.05	+0.10	+0.02	+0.05
	[-0.26, 0.08]	[-0.40, 0.05]	[-0.10, 0.24]	[-0.12, 0.36]	[-0.15, 0.20]	[-0.16, 0.25]
Cognitive style						
Orientation to Future Goals	+0.05	+0.21	+0.06	+0.10	-0.11	**-0.31^**
	[-0.11, 0.25]	[0.00, 0.38]	[-0.10, 0.26]	[-0.09, 0.30]	[-0.33, 0.04]	**[-0.47, -0.11]**
Conspiracist Ideation	**-0.15^**	**-0.49^**	**+0.15^**	**+0.33^**	+0.00	+0.16
	[-0.36, -0.02]	**[-0.70, -0.32]**	**[0.02, 0.36]**	**[0.15, 0.55]**	[-0.18, 0.17]	[-0.02, 0.34]
Need for Cognition	-0.12	-0.07	+0.01	-0.02	+0.10	+0.09
	[-0.32, 0.01]	[-0.25, 0.15]	[-0.15, 0.18]	[-0.23, 0.19]	[-0.03, 0.31]	[-0.12, 0.27]
Orientation to Immediate Goals	+0.02	-0.16	0.00	+0.15	-0.02	+0.02
	[-0.12, 0.25]	[-0.42, 0.00]	[-0.20, 0.17]	[-0.04, 0.41]	[-0.21, 0.10]	[-0.18, 0.21]
Ideology, worldviews, and values						
Environment-as-Ductile Worldview	+0.18	**+0.40^**	-0.11	**-0.21^**	-0.07	**-0.19^**
	[-0.01, 0.44]	**[0.23, 0.62]**	[-0.36, 0.05]	**[-0.43, -0.01]**	[-0.21, 0.10]	**[-0.36, -0.04]**

(continued)

	Acceptors		Fencesitters		Sceptics	
Predictors	Study 1	Study 3	Study 1	Study 3	Study 1	Study 3
Conservation Values	-0.11	**-0.26^**	+0.01	-0.02	+0.11	**+0.27^**
	[-0.32, 0.02]	**[-0.46, -0.06]**	[-0.17, 0.18]	[-0.22, 0.22]	[-0.05, 0.32]	**[0.06, 0.45]**
Environment-as-Elastic Worldview	**-0.20^**	**-0.37^**	+0.05	+0.07	**+0.15^**	**+0.30^**
	[-0.43, -0.05]	**[-0.58, -0.20]**	[-0.15, 0.23]	[-0.12, 0.33]	**[0.03, 0.38]**	**[0.12, 0.46]**
System Justification	+0.04	**+0.20^**	+0.06	**-0.23^**	-0.09	+0.03
	[-0.12, 0.25]	**[0.04, 0.39]**	[-0.12, 0.23]	**[-0.44, -0.04]**	[-0.30, 0.07]	[-0.16, 0.22]
Self-Transcendence Values	+0.04	+0.17	-0.10	+0.02	+0.06	**-0.19^**
	[-0.10, 0.21]	[-0.04, 0.36]	[-0.28, 0.05]	[-0.20, 0.21]	[-0.12, 0.24]	**[-0.33, 0.00]**
Political Ideology	**-0.18^**	-0.10	+0.03	-0.16	**+0.16^**	**+0.26^**
	[-0.41, -0.04]	[-0.35, 0.12]	[-0.17, 0.19]	[-0.38, 0.06]	**[0.02, 0.40]**	**[0.09, 0.47]**
Personality						
Extraversion	-0.01	+0.03	+0.03	**+0.23^**	-0.02	**-0.26^**
	[-0.15, 0.14]	[-0.21, 0.22]	[-0.11, 0.19]	**[0.04, 0.45]**	[-0.18, 0.11]	**[-0.43, -0.07]**
Conscientiousness	+0.03	-0.14	-0.06	**+0.19^**	+0.03	-0.05
	[-0.09, 0.20]	[-0.33, 0.01]	[-0.21, 0.09]	**[0.01, 0.39]**	[-0.15, 0.16]	[-0.19, 0.11]
Neuroticism	+0.11	+0.03	-0.02	-0.08	-0.09	+0.05
	[-0.01, 0.30]	[-0.15, 0.22]	[-0.17, 0.14]	[-0.30, 0.10]	[-0.29, 0.01]	[-0.09, 0.23]
Agreeableness	+0.04	+0.01	+0.02	-0.03	-0.06	+0.03
	[-0.11, 0.20]	[-0.18, 0.24]	[-0.13, 0.17]	[-0.27, 0.16]	[-0.21, 0.10]	[-0.18, 0.23]
Openness	0.00	+0.01	-0.07	0.00	+0.07	-0.01
	[-0.16, 0.14]	[-0.18, 0.23]	[-0.24, 0.06]	[-0.22, 0.19]	[-0.05, 0.25]	[-0.22, 0.17]

Note:
Square brackets indicate 95% confidence intervals, estimated using bootstrapping with 10,000 samples. Coefficients with confidence intervals that do not include zero are marked with a caret (textasciicircum) and are bolded.

Table 5: Items of the Fire Perception Scale, their loadings onto each factor, the mean score of each item, and the standard error of the mean.

Item	Factors			Descriptives	
	Climate Processes	Fire Realities	Arson Causes	*M*	*SE*
1. Climate change made the 2019-20 Australian bushfires more severe	**0.78**	0.34	-0.22	3.62	0.10
2. Climate change made the 2019-20 Australian bushfires less likely to occur	0.27	**-0.70**	**0.42**	2.19	0.09
3. The 2019-20 Australian bushfires have accelerated climate change	**0.84**	0.05	-0.14	3.16	0.09
4. The 2019-20 Australian bushfires are severe	0.17	**0.86**	0.23	4.50	0.05
5. If the government increased taxes on all fossil fuels (e.g., gasoline, oil, coal, kerosene), Australia would be less likely to experience extreme bushfires	**0.84**	-0.19	0.13	2.55	0.09
6. If we changed our lifestyles to reduce our consumption, Australia would be less likely to experience bushfires	**0.86**	-0.06	0.08	3.05	0.09
7. Over one hundred arsonists have contributed to the 2019-20 Australian bushfires	-0.10	0.04	**0.94**	3.47	0.08

Note:

Bolded loadings are greater than .40 in magnitude.