Journal of Social and Political Psychology
jspp.psychopen.eu | 2195-3325

Original Research Reports

Climate Change Beliefs Count: Relationships With Voting Outcomes at the 2010 Australian Federal Election

Rod McCrea*[a], Zoe Leviston[b], Iain Walker[bc], Tung-Kai Shyy[d]

[a] Land & Water Flagship, CSIRO, Brisbane, Australia. **[b]** Land & Water Flagship, CSIRO, Perth, Australia. **[c]** School of Psychology, University of Western Australia, Perth, Australia. **[d]** School of Information Technology and Electrical Engineering, The University of Queensland, Brisbane, Australia.

Abstract

Climate change is a political as well as an environmental issue. Climate change beliefs are commonly associated with voting behaviour, but are they associated with *swings* in voting behaviour? The latter are arguably more important for election outcomes. This paper investigates the predictive power of these beliefs on voting swings at the 2010 Australian federal election after controlling for a range of other related factors (demographic characteristics of voters, different worldviews about nature and the role of government, and the perceived opportunity cost of addressing climate change). Drawing on data from two nationally representative surveys of voters and data from the Australian Electoral Commission, this paper investigates relationships between climate change beliefs and voting swings at both the individual and electorate levels. At an individual level, a hypothetical 10% change in climate change beliefs was associated with a 2.6% swing from a conservative Coalition and a 2.0% swing toward Labor and 1.7% toward the Greens party, both left on the political spectrum. At the electorate level, this equates to a shift of 21 seats between the two main political parties (the Coalition and Labor) in Australia's 150 seat parliament, after allocating Green preferences. Given many seats are marginal, even modest shifts in climate change beliefs can be associated with changes in electoral outcomes. Thus, climate change is expected to remain a politically contested issue in countries like Australia where political parties seek to distinguish themselves, in part, by their responses to climate change.

Keywords: climate change, scepticism, denial, politics, elections, voting behaviour

Journal of Social and Political Psychology, 2015, Vol. 3(1), 124–141, doi:10.5964/jspp.v3i1.376

Received: 2014-05-06. Accepted: 2015-02-20. Published (VoR): 2015-05-05.

Handling Editor: J. Christopher Cohrs, Jacobs University Bremen, Bremen, Germany

*Corresponding author at: Land & Water Flagship, CSIRO, PO BOX 2583, Brisbane, Queensland, 4001, Australia. E-mail: rod.mccrea@csiro.au

Overwhelmingly, climate scientists agree that climate change has anthropogenic causes and that it is important for governments to act quickly and substantively on climate change (Cook et al., 2013; Doran & Zimmerman, 2009; Garnaut, 2011). In democracies, though, political willingness to act on climate change partly depends on how such action is perceived to affect a government's electoral chances (Jenkins, 2011; Pietsch & McAllister, 2010).

Extant research focuses on associations between climate change beliefs and votes for particular political parties (e.g., Dunlap & McCright, 2008; Schwartz, Caprara, & Vecchione, 2010). However, in determining election outcomes, swinging voters are arguably more important than those voters who tend to vote consistently for the same party, especially when one party does not hold a majority of votes (Mayer, 2012). The importance of swinging votes becomes highlighted in marginal electorates where even small swings can have electoral consequences.

This paper adopts the broad notion of 'swinging voter' as one who "is not so solidly committed to one candidate or the other as to make all efforts at persuasion futile" (Mayer, 2008, p. 1). Many swinging voters will only decide which party to vote for shortly before casting their vote (e.g., Mayer, 2012; Schill & Kirk, 2014). Swinging voters can be contrasted with 'rusted-on' voters in the sense that the latter decide their voting intention some time prior to an election and then vote as they initially intended (i.e. attempts to persuade them otherwise were futile).

This paper focuses on relationships between climate change beliefs and *swinging* votes between parties, rather than total votes for particular parties, at both the individual and electorate levels. We first test for associations between climate change beliefs and swinging votes at the individual level. Because elections are decided at the electorate, not the individual, level, we then examine the commensurate effect of these swinging votes on the number of seats held by the major political parties at the electorate level. Given that many seats are held by small margins, even small voting swings can have important electoral consequences. Our aim is to show whether there is an association between climate change beliefs and voting swings which are of electoral significance.

The two main research questions in this paper are:

> RQ1. Are climate change beliefs associated with swinging votes in the 2010 Australia federal election when controlling for related factors?
>
> RQ2. And if so, how many electorates might be associated with different outcomes given some hypothetical shift in climate change beliefs?

Australian Politics and Climate Change

Public and political discourse surrounding climate change in Australia was an important political issue in Australia for at least a decade leading up to the 2010 election (Head, 2014; Rootes, 2011; Speck, 2010; Young & Coutinho, 2013). From the late 1990s, Australia was condemned internationally for refusing to ratify the Kyoto protocol (positioning it alone with the United States as the only abstaining countries). Continued pressure domestically and abroad to ratify the protocol made climate change a key policy platform and a critical point of differentiation between the two major Australian political parties in the 2007 Federal election. The election result delivered a mandate to the incoming Labor Government to show active leadership on climate change, the first parliamentary act of which was to ratify the Kyoto protocol (Howarth & Foxall, 2010). The new Labor Government also sought to bring forward a national Emissions Trading Scheme by two years, to 2010, and committed Australia to an emissions reduction target of 60% from 1990 levels by 2050 (Howarth & Foxall, 2010). The political landscape then changed once more, and reasonably abruptly. A proposed Emissions Trading Scheme was defeated by a hostile Senate in 2009, and in the aftermath key Federal Liberal opposition leadership positions were filled by politicians known for their scepticism of human-induced climate change (Howarth & Foxall, 2010; Suri & Lofgren, 2010). In June 2010 the then Labor leader and Prime Minister, Kevin Rudd, was also defeated in a party leadership spill, his failure to push through the Emissions Trading Scheme cited as a key failing.

While most Australians accept the climate is changing, contention surrounds whether this is due to natural variation or anthropogenic causes (Buys, Aird, van Megen, Miller, & Sommerfeld, 2014; Leviston, Leitch, Greenhill, Leonard, & Walker, 2011). Notwithstanding confusion and debate about attribution, support has waxed and waned for government taking action on climate change (Stefanova, Connor, & O'Halloran, 2014). Variability in climate change beliefs between groups and over time has been related to voting intentions (e.g., Leviston & Walker, 2011a; Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011; Scruggs & Benegal, 2012). All this suggests that climate change beliefs are associated with *changes* in voting, as well as voting outcomes, in Australia.

It is important to predict swinging votes as well as voting outcomes since some voters are 'rusted on voters' (i.e., they tend to vote for the same party at each election), while others are 'swinging voters' (i.e., they decide which party to vote for shortly before the election, and/or change their voting preferences regularly). In electorates held by small margins, swinging votes are the most important in determining election outcomes. By examining swinging votes, we can more accurately examine the idea the climate change beliefs may influence voting outcomes.

We model voting swings by predicting voting behaviour in the 2010 Australian federal election, controlling for voting intentions one month prior to the election. Since 'rusted-on' votes will be perfectly predicted by voting intentions one month earlier, this leaves the residual swinging votes available for climate change beliefs and other factors to predict.

By including voting intentions one month earlier, we also fortuitously control for other factors related to 'rusted-on' votes, such as strong political identities, which are more stable for decided voters (Mayer, 2007). Similarly, political values and ideology are less predictive of voting behaviour for swinging voters (Vecchione, Caprara, Dentale, & Schwartz, 2013), with swinging voters more likely to be 'moderates', both in political ideology and on specific issues such as employment, health care, and the environment (Guber, 2001; Mayer, 2007). Although the attitude strength of swinging voters might be less than rusted-on voters, the *political value* of their attitudes is arguably greater, since electoral campaigns often ignore their most committed supporters to focus instead on persuading undecided or weakly committed voters. Appealing to undecided voters, or those who frequently switch from one party preference to another, is especially important in Australia where voting is compulsory and a preferential voting system is used.

This study examines swings in first preference votes[i] in the federal House of Representatives for the main political parties in Australia plus a minor party – the Australian Greens (known as 'the Greens'). There are two main political parties in Australia: 1) a coalition of conservative parties[ii] (the Liberal Party of Australia; the National Party of Australia; the Liberal National Party in Queensland; and the Country Liberal Party in the Northern Territory), which are on the political right; and 2) Labor (the Australian Labor Party), which is politically left. The Greens minor party is also politically left, with a primary focus on ecological sustainability, but also having a socially progressive agenda.

These three parties represented a spread of positions on climate change leading up to the 2010 Australian Federal Election, exemplified when the governing Labor party tried to introduce a Carbon Pollution Reduction Scheme (CPRS) in late 2009. This bill was rejected in the upper house by both the Coalition and the Greens' senators, the former arguing it went too far in addressing climate change and the latter that it did not go far enough (Rootes, 2011). Thus, climate change represented a political point of difference between these three parties in the 2010 federal election.

In countries like Australia where voting is compulsory, issues such as climate change which differentiate the political parties may be important in determining how swinging voters end up voting. In other countries where voting is not compulsory, the association may not be as strong because undecided voters without a strong inclination for any particular party may decline to vote (Feddersen & Pesendorfer, 1996). Thus, we expect to find an association between climate change beliefs and swinging votes in Australia. Many studies examining the links between such beliefs and voting behaviour operationalize climate change beliefs as the acceptance or rejection of anthropogenic climate change. Here, we view climate change beliefs as a more complex set of beliefs relating to taking action on climate change, for reasons we elaborate later.

Climate Change Beliefs, Voting, and Adaptive Behaviour

In a study addressing the direction of relationships between personal values and voting behaviour over time, Vecchione et al. (2013) found that personal values before an election influenced voting behaviour, which in turn influenced subsequent personal values (i.e., the direction of causation was different before and after an election). This same dynamic may also operate in the context of climate change, where beliefs about the nature of climate change may influence swinging voters prior to an election but may also be subsequently influenced by voting behaviour after an election. With this in mind, our study tests for an association between climate change beliefs and voting swings in a pre-election context.

Individual and social beliefs about and responses to climate change vary greatly. Climate change beliefs rely not only on scientific information but also on media messaging, trust in information sources, attitudes toward the free market, personal experiences, scientific knowledge about the causes of climate change, responsibility attributions, as well as the perceived risks, costs and benefits of addressing climate change (Guy, Kashima, Walker, & O'Neill, 2014; Krosnick, Holbrook, Lowe, & Visser, 2006; Leiserowitz, 2006; Lewandowsky, Gignac, & Oberauer, 2013; Tobler, Visschers, & Siegrist, 2012). Such perceptions are often contingent on underlying assumptions, beliefs and worldviews regarding humanity's relationship with nature (Price, Walker, & Boschetti, 2014), cultural cognition (Kahan, 2013; Kahan, Jenkins-Smith, & Braman, 2011), and misguided estimations of scientific and community consensus (Ding, Maibach, Zhao, Roser-Renouf, & Leiserowitz, 2011; Leviston, Walker, & Morwinski, 2013; Lewandowsky, Gignac, & Vaughan, 2012).

Some climate change beliefs may facilitate (or inhibit) responding adaptively to climate change. Grothmann and Patt (2005) proposed an extended version of Protection Motivation Theory (PMT; Floyd, Prentice-Dunn, & Rogers, 2000; Rogers, 1975, 1983) that incorporates a wide range of these social and cognitive factors in the context of climate change beliefs and adaptation to the threat of climate change. In their model, climate change beliefs are a direct predictor of adaptation behaviour. Thus, we hypothesize climate change beliefs will directly predict voting behaviour, in particular swinging voting behaviour. We also expect climate change beliefs to mediate or partially mediate the influence of other related factors on swinging votes.

Grothmann and Patt (2005) propose that climate change beliefs are more nuanced than simply acceptance or rejection of climate change, and that people's behavioural responses to climate change are a function of a set of beliefs about taking action on climate change. Constellations of these beliefs serve to diminish individual responsiveness to climate change. These beliefs, termed 'maladaptive responses', include avoidance, denial, fatalism, scepticism and pessimism. We suggest, consistent with PMT, these beliefs will be associated with swinging votes, as one significant behavioural response to the perceived threat of climate change.

Other Related Factors

Relationships between climate change beliefs and voting behaviour are related to other factors, which we control for when testing for an association between climate change beliefs and swinging votes. The aim was not to include all the possible factors which may explain voting swings in an election, but to control for factors which may potentially confound any association between climate change beliefs and voting swings. We term these potential confounds 'related factors'.

If the association between climate change beliefs and swinging votes were spurious, any association between climate change beliefs and voting swings should be explained or 'partialled out' by other related factors. Alternatively, an association may remain after controlling for related factors, which means the related factors are either antecedents, consequents or only partial mediators of relationships between climate change beliefs and voting swings. Thus, by controlling for the related factors below, we provide a strong test of any association between climate change beliefs and voting swings in the 2010 Australian federal election.

Demographic Characteristics

Whitmarsh (2011) found that age, education and location (e.g., rural or urban) predicted both climate change scepticism and affiliation with different UK political parties, with older, less educated and more rural respondents being more sceptical and politically conservative. Similarly, O'Connor, Bord, and Fisher (1999) found that young, female and more educated respondents were (on average) associated with believing in climate change and they were more prepared to vote for government action to reduce greenhouse gas emissions. Similarly, McCright and Dunlap (2011) showed that young, white, conservative males are more likely to deny climate change.

Worldviews

Previous research also suggests that levels of environmental concern, preferred environmental management strategies, political ideology, and voting outcomes are all inter-related (Heath & Gifford, 2006; Kahan, 2013; Poortinga, Steg, & Vlek, 2002; Tobler et al., 2012). Cultural Theory (Douglas & Wildavsky, 1982; Thompson, Ellis, & Wildavsky, 1990) posits four worldviews that people tend to draw on when considering information about environmental risks and behaviours (Steg & Sievers, 2000a, 2000b). The four myths, which we control for, are i) *Ephemeral nature:* an egalitarian view where nature is seen as being in a precarious and delicate balance with depleting resources; ii) *Tolerant nature*: a hierarchical view based around regulation and control where nature is seen as being in a stable equilibrium, but only within limits set by experts; iii) *Benign nature*: an individualist's view where nature is seen as being in a stable and resilient equilibrium; and iv) *Capricious nature*: a fatalistic view where nature is seen as unmanageable and human needs and resources are not seen as controllable.

Perceived Opportunity Cost of Addressing Climate Change

Lastly, we control for the perceived opportunity cost of addressing climate change, which is the perceived opportunity forgone of addressing other political issues. In other words, any time and resources applied to addressing climate change may have been applied to addressing other issues. Since climate change is often not the most important issue for voters (Lorenzoni & Pidgeon, 2006; McAllister & Pietsch, 2011) and government resources are limited, there is an inherent trade off in addressing climate change. This helps control for a range of competing priorities and values using a global measure instead of many individual measures.

Summary

Climate change is often perceived as a threat, and individuals often perceive themselves to be vulnerable to changes in natural and social systems produced by changes in the global climate system. This can motivate people to engage in a range of adaptive or maladaptive behaviours. Whether one changes one's vote in response to political parties' stated policies about climate change is one such behaviour, with potentially important consequences. In this study we examine whether climate change beliefs are related to swinging votes, when controlling for a range of other related variables, using data from an Australian national survey.

Method

Data Sources

Individual level data for climate change beliefs, voting intentions and behaviour, and the other related factors came from the CSIRO[iii] Survey of Australian Attitudes to Climate Change, conducted in July-August of 2010 and 2011 (see Leviston & Walker, 2011a, 2011b). The surveys were administered online by a panel survey company using a representative sample of research-only respondents. The number responding to both surveys was 1,355 (i.e., the sample size for this study). The 2010 survey data were collected one month prior to the 2010 Australian federal election; the 2011 survey was similar to the previous year's, but also collected respondents' self-reported voting behaviour in the 2010 election (for more details see Leviston & Walker, 2011a, 2011b). Electorate level data on first preference votes for each political party came from the Australian Electoral Commission website (see http://results.aec.gov.au/15508/Website/HouseDownloadsMenu-15508-csv.htm).

Survey Measures

Voting Outcomes

In the 2011 survey, respondents were asked 'Which political party did you vote for in the last federal election?'. For the purposes of this study, the political parties were grouped into 1) the Coalition (37.5%), 2) Labor (34.7%), 3) the Greens (9.5%), 4) Other (10.4%), and 5) Prefer not to answer (8.0%). This was reasonably representative of the actual percentage of first preference votes for each party in the 2010 federal election: Coalition (43.6%), Labor (38.0%), Greens (11.8%) and other (6.6%) (see http://results.aec.gov.au/15508/Website/HouseStateFirstPrefsByParty-15508-NAT.htm).

Voting Intentions

In the 2010 survey, respondents were asked 'Which political party are you most likely to vote for in the next federal election?'. These responses were grouped into the same five categories as above plus a sixth category for undecided voters. The respective percentages in each group were 32.9%, 30.9%, 10.0%, 7.8%, and 5.0%, plus 13.4% for undecided voters.

Climate Change Beliefs

Five climate change beliefs were measured using a 5-point Likert scale, from 1 = 'strongly disagree' to 5 = 'strongly agree'. The five items were: 'I try not to think about climate change'; 'I don't believe in climate change'; 'The impacts of climate change are inevitable now so there's not much point worrying about it'; 'The whole climate change issue could turn out to be one gigantic mistake by scientists'; and 'Realistically, nothing will be done about climate

change until it's too late'. For ease of interpretation, these items were reverse coded to create a scale of climate change beliefs where higher values equaled more belief in action on climate change. Each respondent's score on this scale was the mean value of the first four items (mean = 3.57; SD = .90; skewness = -.24). An item analysis showed that the first four items correlated well with each other (alpha = .80) while the last item did not (item-rest correlation = .05), and thus this item was excluded from the scale. The first four items were also significantly correlated with voting intentions and behaviours for each political party while the same correlations for the last item were either not significant or very low (all below .08).

Demographic Characteristics

We assessed a range of demographic characteristics of respondents relating to voting and climate change beliefs. *Age* was measured in years and ranged from 21 to 87 years (mean = 57, SD = 13.1, skewness = -.40). *Sex* was measured as 0 = 'male' and 1 = 'female' (male 56% and female 44%). *Education* was measured with 5 categories: 1 = 'did not complete high school' (20.7%); 2 = 'completed high school' (16.2%); 3 = 'completed trade/vocational qualification' (27.7%); 4 = 'completed undergraduate degree' (21.4%); and 5 = 'completed postgraduate qualification' (14.0%). *Annual household income* was measured in Australian dollars using $30,000 increments: 1 = 'less than $30,000' (21.1%); 2 = '$30,000 to $59,999' (23.1%); 3 = '$60,000 to $89,000' (18.2%); 4 = '$90,000 to $119,000' (11.2%); 5 = '$120,000 to $149,000' (5.3%); 6 = 'More than $150,000' (7.7%), and 7 = 'prefer not to respond' (13.4%). Lastly, *location* was measured as 1 = 'capital city' (n = 743, 54.8%), 2 = 'regional town' (n = 365, 26.9%), 3 = 'rural town' (n = 201, 14.8%), and 4 = 'other' (n = 46, 3.4%).

Worldview

Steg and Sievers' (2000a, 2000b) 'myths of nature' items were used to identify a participants worldview. However, adaptations were made to Steg and Siever's (2000b) items so that they were slightly less extreme and more suited to Australian respondents. Respondents were asked which of the following statements best matched their view:

1. Ephemeral nature - 'The environment is fragile and will only be protected if there are large changes in human behaviour and society' (45.2%)
2. Tolerant nature - 'The environment can be managed by the government and experts if there are clear rules about what is allowed' (14.0%)
3. Benign nature - 'The environment can adapt to changes and technology will solve environmental problems eventually' (16.3%)
4. Capricious nature - 'The environment is unpredictable and we can't control what happens' (24.6%)

Perceived Opportunity Cost of Addressing Climate Change

This was measured as the level of agreement with the statement 'Attempting to respond to climate change will cost the country too much money' using a 5 point scale: 1 = 'strongly disagree' (2.4%), 2 = 'disagree' (8.9%), 3 = 'neither agree nor disagree' (26.4%), 4 = 'agree' (39.9%), and 5 = 'strongly agree' (22.5%).

Analytical Strategy

Bivariate analyses were used to examine whether relationships between variables were in the expected directions. Cross-tabulations between voting intentions and voting outcomes were examined, as well as associations between

these two variables and climate change beliefs, worldview, and the social and economic characteristics of respondents.

Then analyses were conducted at an individual and electorate level, addressing RQ1 and RQ2 respectively. At the individual level, voting swings were predicted from climate change beliefs and related factors using a multinomial logistic regression, which is a technique for predicting categorical dependent variables such as voting for particular parties (Long & Freese, 2006). Climate change beliefs were hypothesized to predict swinging votes directly, by mediating or partially mediating other factors relating to climate change beliefs and voting. In Step 1, other factors normally associated with voting behaviour were entered to see if they also predicted *swinging* votes. In Step 2, climate change beliefs were added to see if these directly predicted swinging votes controlling for other related factors. (RQ1).

At the electoral level, voting swings associated with climate change beliefs were applied to the percentage of votes in each electorate at the 2010 Australian federal election. This enables us to estimate a commensurate effect at the electorate level; that is, how many electorates may be associated with a different outcome given a hypothetical change in climate change beliefs (RQ2).

Results

Bivariate Relationships

Table 1 shows voting intentions cross-tabulated with voting outcomes. Generally, respondents voted as they intended, especially for the two main parties (Coalition 92% and Labor 87%). The correlation between voting intentions and voting outcomes was moderately strong (Cramer's V = .61, $p < .001$). However, 140 voters (11.6%) were undecided in their voting intention, and 288 (23.8%) voted differently from their voting intentions one month earlier, excluding those preferring not to answer.

Table 1

Cross-Tabulation – Voting Intentions With Voting Outcomes

	Voting outcomes					
Voting intentions	**1. Coalition**	**2. Labor**	**3. Greens**	**4. Other**	**Prefer not to answer**	**Total**
1. Coalition	412 (92%)	11 (2%)	4 (1%)	11 (2%)	8 (2%)	446 (100%)
2. Labor	13 (3%)	362 (87%)	16 (4%)	16 (4%)	11 (3%)	418 (100%)
3. Greens	7 (5%)	23 (17%)	87 (64%)	13 (10%)	6 (4%)	136 (100%)
4. Other	18 (17%)	8 (8%)	8 (8%)	59 (56%)	13 (12%)	106 (100%)
5. Prefer not to answer	19 (28%)	11 (16%)	3 (4%)	6 (9%)	29 (43%)	68 (100%)
6. Undecided	39 (22%)	55 (30%)	10 (6%)	36 (20%)	41 (23%)	181 (100%)
Total	508 (37%)	470 (35%)	128 (9%)	141 (10%)	108 (8%)	1,355 (100%)

Note. N = 1,355.

Table 2 shows associations for voting intentions and voting outcomes with climate change beliefs, worldview, perceived opportunity cost and the demographic characteristics of respondents. Also, the associations between climate change beliefs and the other predictor variables are show in the last column of Table 2.

The top section of Table 2 shows that climate change beliefs were significantly associated with voting intentions and outcomes for all three political parties; as was perceived opportunity cost, though in the opposite direction. Climate change beliefs and perceived opportunity costs were also moderately correlated with each other (r = -.42).

In the bottom section of Table 2, voting intentions and outcomes significantly differed between respondents with different worldviews, especially for those who intended to or voted for the Greens where over 70 percent had an ephemeral nature worldview. A respondent's worldview was also significantly associated with their climate change beliefs, with an ephemeral nature worldview associated with higher climate change beliefs and a capricious nature worldview associated with lower climate change beliefs.

Table 2

Voting Intentions, Voting Outcomes and Climate Change Beliefs: Bivariate Relationships With Worldview, Perceived Opportunity Cost, and Demographic Characteristics of Voters

	Voting intentions				Voting outcomes				Climate change beliefs	
Predictors	**Coalition**	**Labor**	**Greens**	**Effect size**	**Coalition**	**Labor**	**Greens**	**Effect size**		**Effect size**
Continuous variables		**Means**		**Omega^2**		**Means**		**Omega^2**	**Correlation**	**r^2**
Climate change beliefs	3.04^a	3.69^b	4.17^c	.20*	3.06^a	3.67^b	4.18^c	.18*		
Perceived opportunity cost	4.03^a	3.50^b	3.22^b	.08*	4.02^a	3.50^b	3.28^b	.08*	-.42*	.18
Demographics										
Age	60.73^a	56.98^b	53.77^b	.03*	60.13^a	57.26^b	51.54^c	.04*	-.01	.00
Education (level)	2.73^a	2.92^a	3.63^b	.04*	2.79^a	2.91^a	3.70^b	.04*	.24*	.06
Household income (level)	2.76	2.73	3.10	.00	2.80	2.72	3.12	.00	.10*	.01
Categorical variables		**Percentages**		**Cramer's V**		**Percentages**		**Cramer's V**	**Means**	**Omega^2**
Worldview (percentages)				.25*				.24*		.34*
Ephemeral nature	29.82	53.83	70.59		29.92	53.40	73.44		3.93	
Tolerant nature	10.54	16.51	13.24		11.61	15.53	9.38		3.58	
Benign nature	24.66	13.16	8.09		24.41	13.19	7.03		3.09	
Capricious nature	34.98	16.51	8.09		34.06	17.87	10.16		2.66	
Demographics										
Sex				.08*				.10*		.01*
Male	60.99	58.37	48.53		60.43	57.87	43.75		3.38	
Female	39.01	41.63	51.47		39.57	42.13	56.25		3.49	
Location				.07				.06		.00
City	52.47	56.70	62.50		54.72	54.68	62.50		3.45	
Regional town	27.80	27.03	18.38		25.98	30.00	19.53		3.35	
Rural town	17.04	12.92	13.24		16.14	11.91	14.06		3.46	
Other	2.69	3.35	5.88		3.15	3.40	3.91		3.54^a	

Note. Only the percentages, means, and measures of association for the Coalition, Labor and the Greens Parties are shown (N = 1,000 for Voting intentions; N = 1,106 for voting outcomes; N = 1,355 for climate change belief associations). Opportunity costs, education level and household income level were treated as continuous variables, excluding those preferring not to respond; where overall effects sizes were significant, different superscript letters = a significant difference between means (p > .05) using Bonferroni t-tests.
*p < .05 (two-tailed tests).

The demographic characteristics of residents in Table 2 were more modestly associated with voting intentions and outcomes on average. While relatively small, the associations for demographic variables were in the expected

directions, though there were no significant bivariate associations for voting intentions or outcomes with either household income or location.

Although bivariate associations for voting intentions and outcomes with demographic variables were small or not significant, they are kept in the following model because they may be important for predicting swinging votes. More generally speaking, while larger bivariate associations are interesting in their own right, they also do not speak to the question of whether they are associated with *swings* in voting behaviour. We now turn to that question.

Modelling Swinging Votes

Since climate change beliefs were correlated with other related factors, especially worldview and perceived opportunity cost, variance inflation factors (VIFs) were estimated to examine multicollinearity in the model. All VIFs were 2.5 or less and thus multicollinearity was unproblematic. Multicollinearity is commonly seen as unproblematic if VIFs are less than 10 (Freund, Wilson, & Sa, 2006, p. 191).

Table 3 shows the results from Steps 1 and 2 addressing RQ1. In particular, it shows the "relative risk ratios" (RRRs) for predicting voting swings for each of Labor and the Greens compared to the Coalition. A RRR is the change in odds of voting for one party over another associated with a unit increase in the predictor, with the Coalition being the outcome comparison category in each analysis (see Acock, 2006, p. 275). For example, compared to undecided voters (the comparison category for voting intentions), the first RRR of 0.02 in column one indicates that the odds of one swinging to Labor when one had initially intended to vote for the Coalition a month earlier are 0.02 times the odds of an undecided voter swinging to Labor. More generally, those intending to vote for the Coalition were very unlikely to swing to Labor or the Greens compared to undecided voters. Unsurprisingly, those intending to vote for Labor were very likely (21.25 times more likely) to vote Labor (c.f. those intending to vote for the Coalition) but they were also more likely to swing to the Greens than undecided voters (5.19 times more likely). However, those intending to vote for the Greens were not significantly more likely to swing to Labor than undecided voters. Those intending to vote for other parties were significantly less likely to swing to Labor (c.f. the Coalition) compared to undecided voters.

While the coefficients for voting intentions are interesting, the main purpose of controlling for voting intentions is so other factors can predict voting *swings*. In Steps 1 and 2, age was a significant predictor of voting for the Greens: younger persons are more likely to swing to the Greens than the Coalition. Compared to low income households with less than AUS$30,000 per annum, lower-middle income households ($60-90K) were less likely to swing to Labor while upper-middle income households ($90-120K) were less likely to swing to the Greens. However, there was no clear pattern of findings relating to household income and swinging votes. Compared to capital cities, voters in regional cities were more likely to swing towards Labor. An ephemeral worldview significantly predicted swings to the Greens (c.f. the Coalition) in Step 1 but not in Step 2. As such, worldview was the only factor mediated by climate change beliefs, which is consistent with Grothmann and Patt's (2005) model hypothesizing societal discourse factors as distal predictors of adaptation behaviour.

Table 3

Relative Risk Ratios (RRR) for Voting Swings to Labor or the Greens Compared to the Coalition

	Step 1				Step 2			
	Labor		Greens		Labor		Greens	
Voting intentions								
Coalition	0.02	***	0.06	***	0.02	***	0.06	***
Labor	21.75	***	5.19	**	20.85	***	4.23	**
Greens	2.20		48.98	***	1.91		33.72	***
Other	0.35	*	2.38		0.34	*	2.13	
Prefer not to answer	0.45		0.62		0.44		0.57	
Step 1								
Demographic characteristics								
Age	1.00		0.96	*	0.99		0.96	***
Sex	0.85		1.59		0.86		1.59	
Education								
High school	0.70		0.43		0.67		0.39	
Trade/vocational	0.89		2.24		0.85		1.84	
Undergraduate degree	0.75		2.56		0.69		1.92	
Postgraduate	0.80		2.71		0.73		2.04	
Household income								
$30,000 - $59,999	0.59		0.64		0.57		0.69	
$60,000 - $89,999	0.42	*	0.70		0.40	*	0.73	
$90,000 - $119,999	1.10		0.25	*	1.04		0.24	*
$120,000 - $149,999	0.38		0.31		0.35		0.27	
More than $150,000	0.62		0.68		0.59		0.67	
Prefer not to respond	0.61		0.70		0.59		0.67	
Location								
Regional city	2.13	**	1.49		2.10	**	1.36	
Rural town	0.97		1.27		0.91		1.02	
Other	0.84		0.54		0.83		0.49	
Worldview								
Ephemeral nature	1.48		2.70	*	1.05		1.09	
Tolerant nature	0.85		0.80		0.65		0.36	
Benign nature	0.73		0.65		0.65		0.43	
Perceived opportunity cost	0.79		0.83		0.85		0.99	
Step 2								
Climate change beliefs					1.42	*	2.73	***
Pseudo R-squared	.483				.490			

Note. N = 1,355. Comparison categories were: voting intentions (undecided); sex (male); education (did not complete high school); household income (less than $30,000); location (capital city); worldview (capricious nature); perceived opportunity cost (strongly disagree); and voting intentions (undecided).

*p < .05. **p < .01. ***p < .001.

Adding climate change beliefs in Step 2 significantly improved the model (LR χ^2 (4) = 24.40, p <.0001). Those with higher climate change beliefs were more likely to swing to the Greens and to a lesser extent Labor (c.f. the Coalition). Thus in answer to RQ1, climate change beliefs were associated with swinging votes in the 2010 Australian federal election, controlling for other related factors. This model explained 49% of the variation in voting

behaviour (Pseudo R-squared = .49); however, it only explained an additional 0.7 percent of variation in voting behaviour beyond that explained by initial voting intentions and other factors in Step 1. While this only represents a marginal effect for predicting swinging votes, swinging votes can be potent at the electorate level. Invariably some seats are only held by small margins, so it is important to examine even small effects at the individual level for corresponding impacts at the electoral level because that is the level at which elections are decided.

Electorate Level Analysis

Given climate change beliefs predicted swinging votes, how many electorates (or parliamentary seats) may be associated with different outcomes given some hypothetical change in climate change beliefs (RQ2), say a 10% increase in climate change beliefs across electorates in Australia? We use the results from the multinomial logistic regression to estimate the percent change in votes toward Labor or the Greens associated with this hypothetical shift.

Table 4 shows the percentage of votes for each party estimated from the multinomial model when climate change beliefs equal the sample mean of 3.43, as well as if they increase by 10% to a mean of 3.77. Under mean climate change beliefs, the Coalition had the highest percentage of votes (39.6%). However, approximately 80% of the Greens preferences flowed to Labor in the 2007 and 2010 federal elections[iv], meaning that the percentage of votes flowing to Labor after preferences was similar to the Coalition in 2010, resulting in a hung parliament.

Table 4

Percent Voting for Different Political Parties Under Two Scenarios: Mean Climate Change Beliefs and a 10% Increase in Climate Change Beliefs

	Climate change beliefs		
Party	**Mean beliefs (3.43)**	**10% increase (3.77)**	**Percent change**
Coalition	39.6%	37.0%	-2.6%
Labor	36.3%	38.3%	2.0%
Greens	5.4%	7.2%	1.7%
Other	13.1%	11.7%	-1.4%
Prefer not to answer	5.5%	5.8%	0.3%

N = 1,355.

If climate change beliefs hypothetically were to increase by 10%, the estimated percent voting for the Coalition drops to 37.0% and the percent voting for Labor and the Greens increases to 38.3% and 7.2% respectively. This represents a swing away from the Coalition of 2.6% and a swing toward Labor and the Greens of 2.0% and 1.7% respectively. For comparison, these swings are a similar order of magnitude to the average absolute swings in electorates in the 2010 election of 2.8% (see http://results.aec.gov.au/15508/Website/HouseDownloadsMenu-15508-csv.htm).

To estimate how many electorates may be marginal enough to have different outcomes in the 2010 election given a 10% increase in climate change beliefs (RQ2), the percent changes in Table 4 were applied to the actual percentage of votes for the Coalition, Labor and the Greens in each federal electorate in 2010.

We explored this question using the notions of *majority seats* and *contested seats*. A majority seat for a party was one having more than 50% of first preference votes for that party (i.e., the seat was won outright without relying

on preferences), and a contested seat was one that was not won outright (i.e., won with preferences from other candidates). Though the Greens did not win a majority seat in the 2010 federal election, votes for the Greens are important in the Australian context. Labor and the Greens are both on the left of the political spectrum, both have policies advocating more action on climate change, and approximately 80% of the Greens preferences flow to Labor. We added 80% of the votes for the Greens to the votes for Labor to estimate the number of majority seats that may fall to a notional Labor-Greens coalition given a 10% increase in climate change beliefs. Similarly, we added 20% of the Greens votes to the Coalition votes.

Table 5 shows the estimated number of majority and contested seats associated with an increase in climate change beliefs by 10%. The conservative Coalition would hypothetically have 8 fewer majority seats while the notional Labor-Greens coalition would have 13 more majority seats, with 5 fewer seats remaining contested. Thus the difference between Coalition and Labor-Greens majority seats would change by 21 seats (8 + 13) in the 150 seat parliament.

Table 5

Estimated Majority and Contested Seats Under an Increase in Climate Change Beliefs

	Climate change beliefs		
Party	**Mean (3.43)**	**10% increase (3.77)**	**Estimated change in seats**
Majority Coalition seats	54	46	-8
Majority Labor-Greens seats	68	81	+13
Remaining contested seats	28	23	-5
Total seats	150	150	0

Note. Majority seats: more than 50% of first preference votes for a particular party; contested seats: no party with more than 50% of first preference votes.

Discussion

The aim in this paper was to examine the association between climate change beliefs and voting swings in the 2010 Australian federal election, after controlling for a range of related factors (demographic characteristics, worldview, and the perceived opportunity cost of addressing climate change). Even when controlling for these factors, climate change beliefs still significantly predicted voting swings. From Grothmann and Patt's (2005) process model of private proactive adaptation to climate change (MPPACC), we expect climate change beliefs to directly predict voting behaviour. However, this paper goes further to show that climate change beliefs are associated with swinging votes.

Using beliefs to predict swinging behaviour (or behaviour different to prior intentions) is not normally how attitudes, intentions and behaviour are linked in social psychological theories, including the MPPACC. Normally, intentions are seen to mediate attitude-behaviour relations. However, in the context of voting behaviour, swinging votes are an important type of behaviour to predict in their own right, especially in countries like Australia where voting is compulsory, where preferences across all candidates are required, and where undecided voters may not finalise their vote until shortly before casting their vote. In the 2010 Australian federal election, climate change policy was

a point of distinction between the major parties, and climate change beliefs were associated with swinging votes in the month leading up to the election.

In terms of seats won and lost after distributing the Greens preferences, it is estimated that the conservative Coalition would have eight fewer seats and a notional Labor-Greens coalition would have 13 more seats in a 150 seat parliament given a 10% increase in climate change beliefs across Australian electorates. Thus, climate change beliefs are associated with swinging votes, which translates into changes in a considerable number of marginal seats.

Not only are climate change beliefs associated with support for climate change policies (Krosnick et al., 2006; Leiserowitz, 2006; Tobler et al., 2012), our data suggest they are also associated with electoral swings and outcomes, which is consistent with political parties distinguishing themselves on climate change policies. It was previously unclear whether the association between climate change beliefs and voting might simply be a product of other related factors like demographic characteristics, worldview, the perceived opportunity cost of addressing climate change, or pre-existing voting intentions of 'rusted-on voters'. However, this study shows that climate change beliefs independently predict voting swings over and above these other factors. If climate change beliefs did not predict voting swings, and only predicted voting outcomes, there would be less evidence that climate change beliefs influence voting behaviour.

Limitations

Although variables like perceived opportunity cost may have been better measured with multiple items or additional variables included to better account for an association between climate change beliefs and swinging votes, had they been available, the variables controlled for in this paper still represent a robust test of the association by partialling out many related factors. Moreover, this paper also shows that even relatively small effect sizes for predicting swinging votes at the individual level, in terms of changes in R-squared, can be associated with notable changes in electoral outcomes, since even small swings can change the outcome of marginal seats.

However, we cannot say that changes in climate change beliefs *cause* changes in voting behaviour because the data were cross-sectional, even though voting was measured after voting intentions and the other factors. Conversely, we also cannot say that the association between climate change beliefs and voting behaviour is explained away by other factors. Climate change beliefs may swing votes leading into an election or perhaps climate change beliefs simply express a propensity to swing one way or the other. Clearly, more research is needed to establish causality.

While it may be difficult to experimentally manipulate climate change beliefs or voting behaviour for practical and ethical reasons, it is possible to use longitudinal techniques, preferably over three or more time periods, to explore the causal influence of climate change beliefs on voting, and vice versa. Such longitudinal data analysis is recommended for future research.

Conclusion

With the introduction of a politically controversial carbon pricing mechanism in 2012 by Labor, and its subsequent and equally controversial abolition by the incoming Coalition government in 2014, the issue of climate change as a point of differentiation in Australian federal politics looks set to continue, at least into the near future. In countries where action on climate change enjoys more bipartisan political support, we might assume that beliefs in climate

change would be less associated with swinging votes. But in countries like Australia where political parties make climate change policy a point of political differentiation, climate change beliefs may potentially change election outcomes.

Notes

i) Australia's federal House of Representatives uses a preferential voting system with a full allocation of preferences. For more information, see
http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/RP0708/08rp05#full

ii) In Australia this coalition acts as a single 'party' at the federal level, for all intents and purposes, with the leader from the Liberal Party and the deputy leader from the National Party. For ease of expression, throughout this paper we refer to the coalition as a single party.

iii) The Commonwealth Scientific and Industrial Research Organisation

iv) See http://blogs.abc.net.au/antonygreen/2010/10/preference-flows-at-the-2010-election.html

Funding

This research was supported internally by the Climate Adaptation Flagship, CSIRO. It was not supported by any external funding sources.

Competing Interests

The authors declare they have no competing interests.

Acknowledgments

The authors would like to thank the respondents to the CSIRO Survey of Australian Attitudes to Climate Change, along with the anonymous reviewers and editor for their helpful comments.

References

Acock, A. (2006). *A gentle introduction to Stata* (2nd ed.). College Station, TX: StataCorp LP.

Buys, L., Aird, R., van Megen, K., Miller, E., & Sommerfeld, J. (2014). Perceptions of climate change and trust in information providers in rural Australia. *Public Understanding of Science, 23*, 170-188. doi:10.1177/0963662512449948

Cook, J., Nuccitelli, D., Green, S. A., Richardson, M., Winkler, B., Painting, R., . . . Skuce, A. (2013). Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters, 8*(2), Article 024024. doi:10.1088/1748-9326/8/2/024024

Ding, D., Maibach, E. W., Zhao, X., Roser-Renouf, C., & Leiserowitz, A. (2011). Support for climate policy and societal action are linked to perceptions about scientific agreement. *Nature Climate Change, 1*(9), 462-466. doi:10.1038/nclimate1295

Doran, P. T., & Zimmerman, M. K. (2009). Examining the scientific consensus on climate change. *Eos, Transactions American Geophysical Union, 90*, 22-23. doi:10.1029/2009EO030002

Douglas, M., & Wildavsky, A. B. (1982). *Risk and culture: An essay on the selection of technical and environmental dangers*. Berkeley, CA: University of California Press.

Dunlap, R. E., & McCright, A. M. (2008). A widening gap: Republican and Democratic views on climate change. *Environment, 50*(5), 26-35. doi:10.3200/ENVT.50.5.26-35

Feddersen, T. J., & Pesendorfer, W. (1996). The swing voter's curse. *The American Economic Review, 86*(3), 408-424.

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology, 30*(2), 407-429. doi:10.1111/j.1559-1816.2000.tb02323.x

Freund, R. J., Wilson, W., & Sa, P. (2006) *Regression analysis*. London, United Kingdom: Elsevier.

Garnaut, R. (2011). *The Garnaut Review 2011: Australia in the global response to climate change*. Melbourne, Australia: Cambridge University Press.

Grothmann, T., & Patt, A. (2005). Adaptive capacity and human cognition: The process of individual adaptation to climate change. *Global Environmental Change, 15*(3), 199-213. doi:10.1016/j.gloenvcha.2005.01.002

Guber, D. L. (2001). Voting preferences and the environment in the American electorate. *Society & Natural Resources, 14*(6), 455-469. doi:10.1080/08941920119043

Guy, S., Kashima, Y., Walker, I., & O'Neill, S. (2014). Investigating the effects of knowledge and ideology on climate change beliefs. *European Journal of Social Psychology, 44*, 421-429. doi:10.1002/ejsp.2039

Head, B. W. (2014). Evidence, uncertainty, and wicked problems in climate change decision making in Australia. *Environment and Planning C: Government & Policy, 32*(4), 663-679. doi:10.1068/c1240

Heath, Y., & Gifford, R. (2006). Free-market ideology and environmental degradation: The case of belief in global climate change. *Environment and Behavior, 38*(1), 48-71. doi:10.1177/0013916505277998

Howarth, N. A. A., & Foxall, A. (2010). The veil of Kyoto and the politics of greenhouse gas mitigation in Australia. *Political Geography, 29*, 167-176. doi:10.1016/j.polgeo.2010.03.001

Jenkins, J. C. (2011). Democratic politics and the long march on global warming: Comments on McCright and Dunlap. *The Sociological Quarterly, 52*(2), 211-219. doi:10.1111/j.1533-8525.2011.01201.x

Kahan, D. M. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgment and Decision Making, 8*(4), 407-424.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research, 14*(2), 147-174. doi:10.1080/13669877.2010.511246

Krosnick, J. A., Holbrook, A. L., Lowe, L., & Visser, P. S. (2006). The origins and consequences of democratic citizens' policy agendas: A study of popular concern about global warming. *Climatic Change, 77*(1-2), 7-43. doi:10.1007/s10584-006-9068-8

Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change, 77*(1-2), 45-72. doi:10.1007/s10584-006-9059-9

Leviston, Z., Leitch, A., Greenhill, M., Leonard, R., & Walker, I. (2011). *Australians' views of climate change* (CSIRO report). Retrieved from http://www.garnautreview.org.au/update-2011/commissioned-work/australians-view-of-climate-change.pdf

Leviston, Z., & Walker, I. (2011a). *Baseline survey of Australian attitudes to climate change: Preliminary report* (CSIRO report). Retrieved from https://publications.csiro.au/rpr/download?pid=csiro:EP105359&dsid=DS3

Leviston, Z., & Walker, I. (2011b). *Second annual survey of Australian attitudes to climate change: Interim report* (CSIRO report). Retrieved from http://www.csiro.au/en/Outcomes/Climate/Adapting/annual-climate-change-attitudes-survey-2011.aspx

Leviston, Z., Walker, I., & Morwinski, S. (2013). Your opinion on climate change might not be as common as you think. *Nature Climate Change, 3*(4), 334-337. doi:10.1038/nclimate1743

Lewandowsky, S., Gignac, G. E., & Oberauer, K. (2013). The role of conspiracist ideation and worldviews in predicting rejection of science. *PLoS ONE, 8*(10), e75637. doi:10.1371/journal.pone.0075637

Lewandowsky, S., Gignac, G. E., & Vaughan, S. (2012). The pivotal role of perceived scientific consensus in acceptance of science. *Nature Climate Change, 3*(4), 399-404. doi:10.1038/nclimate1720

Long, J. S., & Freese, J. (2006). *Regression models for categorical dependent variables using Stata* (2nd ed.). College Station, TX: StataCorp LP.

Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic Change, 77*(1-2), 73-95. doi:10.1007/s10584-006-9072-z

Mayer, W. G. (2007). The swing voter in American presidential elections. *American Politics Research, 35*(3), 358-388. doi:10.1177/1532673X06297000

Mayer, W. G. (2008). What exactly is a swing voter? Definition and measurement. In W. G. Mayer (Ed.), *The swing voter in American politics* (pp. 1-31). Washington, DC: The Brookings Institution.

Mayer, W. G. (2012). The disappearing but still important swing voter. *The Forum: A Journal of Applied Research in Contemporary Politics, 10*(3), Article 2. doi:10.1515/1540-8884.1520

McAllister, I., & Pietsch, J. (2011). *Trends in Australian political opinion: Results from the Australian Election Study, 1987-2010.* Canberra, Australia: The Australian National University.

McCright, A. M., & Dunlap, R. E. (2011). Cool dudes: The denial of climate change among conservative white males in the United States. *Global Environmental Change, 21*(4), 1163-1172. doi:10.1016/j.gloenvcha.2011.06.003

O'Connor, R. E., Bord, R. J., & Fisher, A. (1999). Risk perceptions, general environmental beliefs, and willingness to address climate change. *Risk Analysis, 19*(3), 461-471. doi:10.1111/j.1539-6924.1999.tb00421.x

Pietsch, J., & McAllister, I. (2010). 'A diabolical challenge': Public opinion and climate change policy in Australia. *Environmental Politics, 19*(2), 217-236. doi:10.1080/09644010903574509

Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., & Pidgeon, N. F. (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change, 21*(3), 1015-1024. doi:10.1016/j.gloenvcha.2011.03.001

Poortinga, W., Steg, L., & Vlek, C. (2002). Environmental risk concern and preferences for energy-saving measures. *Environment and Behavior, 34*(4), 455-478. doi:10.1177/00116502034004003

Price, J. C., Walker, I. A., & Boschetti, F. (2014). Measuring cultural values and beliefs about environment to identify their role in climate change responses. *Journal of Environmental Psychology, 37*, 8-20. doi:10.1016/j.jenvp.2013.10.001

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology, 91*(1), 93-114. doi:10.1080/00223980.1975.9915803

Rogers, R. W. (1983). *Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation.* In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology* (pp. 153-177). New York, NY: The Guilford Press.

Rootes, C. (2011). Denied, deferred, triumphant? Climate change, carbon trading and the Greens in the Australian federal election of 21 August 2010. *Environmental Politics, 20*(3), 410-417. doi:10.1080/09644016.2011.573363

Schill, D., & Kirk, R. (2014). Courting the swing voter: “Real time” insights into the 2008 and 2012 U.S. presidential debates. *The American Behavioral Scientist, 58*(4), 536-555. doi:10.1177/0002764213506204

Schwartz, S. H., Caprara, G. V., & Vecchione, M. (2010). Basic personal values, core political values, and voting: A longitudinal analysis. *Political Psychology, 31*(3), 421-452. doi:10.1111/j.1467-9221.2010.00764.x

Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: Can we blame the great recession? *Global Environmental Change, 22*(2), 505-515. doi:10.1016/j.gloenvcha.2012.01.002

Speck, D. L. (2010). A hot topic? Climate change mitigation policies, politics, and the media in Australia. *Human Ecology Review, 17*(2), 125-134.

Stefanova, K., Connor, J., & O'Halloran, T. (2014). *Climate of the nation 2014 – Australian attitudes on climate change: Are Australians climate dinosaurs?* Sydney, Australia: The Climate Institute.

Steg, L., & Sievers, I. (2000a). Cultural theory and individual perceptions of environmental risks. *Environment and Behavior, 32*(2), 250-269. doi:10.1177/00139160021972513

Steg, L., & Sievers, I. (2000b). Erratum - Figure 1 "Myths of nature" (vol 32, pg 254, 2000) [Erratum]. *Environment and Behavior, 32*(4), 592.

Suri, K. C., & Lofgren, H. (2010). Uncertain verdict: The 2010 federal election in Australia. *Economic and Political Weekly, 45*, 26-31. Retrieved from http://www.deakin.edu.au/dro/view/DU:30032283

Thompson, M., Ellis, R., & Wildavsky, A. (1990). *Cultural theory*. Boulder, CO: Westview Press.

Tobler, C., Visschers, V. H. M., & Siegrist, M. (2012). Addressing climate change: Determinants of consumers' willingness to act and to support policy measures. *Journal of Environmental Psychology, 32*(3), 197-207. doi:10.1016/j.jenvp.2012.02.001

Vecchione, M., Caprara, G., Dentale, F., & Schwartz, S. H. (2013). Voting and values: Reciprocal effects over time. *Political Psychology, 34*(4), 465-485. doi:10.1111/pops.12011

Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: Dimensions, determinants and change over time. *Global Environmental Change, 21*(2), 690-700. doi:10.1016/j.gloenvcha.2011.01.016

Young, N., & Coutinho, A. (2013). Government, anti-reflexivity, and the construction of public ignorance about climate change: Australia and Canada compared. *Global Environmental Politics, 13*(2), 89-108. doi:10.1162/GLEP_a_00168