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Here and now, there and then: How "departure dates" influence climate change engagement

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ABSTRACT

Climate change alters landscapes, challenges economic systems, and threatens human and environmental health. Yet, despite real and present impacts, climate change remains largely an abstract risk to most people in the U.S. Using a survey with an embedded experiment, we explore responses to messages about climate "departure dates" by manipulating the spatial and temporal dimensions of future climate change impacts in two exemplar cities (New York City and Singapore) among U.S. and Singapore participants. Overall, results suggest that the influence of temporal and spatial features of departure dates is moderated by participants' political orientation and geographic location. For instance, we observed some of the largest effects of our manipulation on the reported policy support of conservatives in the U.S. as compared to U.S. liberals and their counterparts in Singapore. We draw connections to relevant theory (e.g., construal level theory) and consider implications for climate departure dates as communication devices.

1. Introduction

The recent releases of the U.S. National Climate Assessment and the Intergovernmental Panel on Climate Change (IPCC)'s fifth assessment report provide compelling evidence that the impacts of anthropogenic climate change are presently being felt across the world. No longer a hypothetical, future risk, climate change has already changed our landscapes and weather patterns, impacting economic systems and human and environmental health; unquestionably, climate change mitigation and adaptation represent urgent tasks for the present generation (IPCC, 2013; Melillo et al., 2014). Yet, from explicating complex feedback loops to outlining policy implications, communicating about climate change science and mitigation measures is far from straightforward (e.g., Swim et al., 2011). Moreover, despite real and present impacts, for many U.S. residents, climate change continues to represent an abstract risk—a low-salience issue surpassed by competing concerns (e.g., Gifford, 2011; Moser and Dilling, 2004).

Addressing these issues, the present study was designed to explore psychological effects of an emerging concept in climate change communication containing messaging features related to psychological distance—the perceived relative closeness of an object or event, including its spatial, temporal, social, and/or hypothetical dimensions (Trope and Liberman, 2010). More specifically, we used a survey with an embedded experiment to explore the extent to which distance-related cues (e.g., regarding temporal and spatial distance) in contemporary messaging about climate impacts influences risk perception, affective responses to the message, and support for climate change policy. As the basis of our experimental stimuli, we utilize a recent study by Mora et al. (2013) that analyzed past climate models to produce the concept of "departure date"—the year after which the annual climate in a specific location, such as New York City, will be warmer than anything experienced in the meteorological record (i.e., the last 150 years). From a theoretical perspective, results contribute to the climate change communication literature by integrating social psychological concepts from construal level theory (McDonald et al., 2015; Pahl et al., 2014; Trope and Liberman, 2010). Moreover, our findings extend practical advice to science communicators and environmental advocates wishing to highlight projected climate impacts, occurring in different places and at different times, in order to persuade the public to adopt timely and effective policies.

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2. Background

2.1. Climate "departure dates"

The recent study by Mora et al. (2013) provides an interesting and practical case study for exploring the effect of psychological distance on messaging about climate change mitigation and adaptation. Starting from the premise that scientists' understanding of climate change "still lacks a precise indication of the time at which the climate of a given location will shift wholly outside the range of historical precedents" (p. 183), the researchers analyzed 39 existing global climate models. They then calculated an index of minimum and maximum temperatures from 1860 to 2005, which allowed for determining the future date (a specific year) after which the climate experienced on earth will be unlike anything experienced in the recorded past. Using this index, the researchers projected that if emissions of greenhouse gases remain high, then after the year 2047, more than half of the earth's surface will experience an annual climate hotter than any experienced previously. Especially relevant to the present work, the technique used allowed for the specification of climate "departure dates" for individual cities across the globe. For example, under a high emissions scenario, climate "departure" for New York City is projected to occur in 2047. In contrast, in tropical regions, such as Manokwari, Indonesia, the departure date is expected to arrive as early as 2020.

According to study co-author Abby Frazier, in addition to contributing to the scientific body of evidence of climate change, the researchers hoped that the novel departure date concept would motivate action:

> By giving a year of when we can start to expect these changes, it would help to connect people more closely to the issue, and hopefully get them involved and aware of how urgent it is that we start to take action now (Living on Earth, 2013).

Frazier's comments, though speculative, help to motivate the present study. When considering the departure date concept as a persausive communication device, its temporal and spatial features (i.e., *when* and *where* climate departure will occur) may meaningfully shape how audiences respond to information about climate change, including their level of support for mitigation and adaption polices. While scholars have begun to explore effects of psychological distance on climate change attitudes in earnest (e.g., Bostrom et al., 2014; Brugger et al., 2015b; Haden et al., 2012; Milfont et al., 2014; Scannell and Gifford, 2013; Spence et al., 2012), results to date have been somewhat mixed. Moreover, empirical research has yet to explore effects of the psychological distance features inherent within the departure date framework, specifically.

The present study was designed as an initial test of how climate departure dates, with their naturally embedded spatial and temporal locations, influence affective and cognitive responses to projected climate impacts. For purposes of enhanced ecological validity, we sampled participants at two geographical locations, namely in the U.S. state of New York and Singapore, who read a brief scenario describing how life in either location will differ once different departure dates are reached. In addition to randomly assigning participants to read about projected climate impacts occurring in New York City or Singapore (i.e., a spatially proximal or distal location, depending on the participants' own location), we also randomly assigned the climate departure dates specified in the scenario (i.e., as 2020, 2047, or 2066). We chose these three departure dates with the intention of exploring a possible *departure date threshold* that might function as most effective in influencing climate change policy support. That is, although 2020 may seem the most intuitively compelling (and thus, motivational) date given its temporal closeness to the present, it may also induce undesired despair and a sense of helplessness, a challenge previously identified by those studying climate change communication (see McDonald et al., 2015). In contrast, while climate impacts occurring in 2066 may reduce a sense of urgency because of its greater distance from the present, this distant date allows more time for policy proposals to take effect from a perceived efficacy perspective. Thus, exploring a gradient of climate departure dates–ranging from temporally proximal to temporally distal–would allow researchers to gauge differential impacts on risk perception and policy support related to climate change. Before offering a more detailed description of our research design, we next review literature related to psychological distance and climate change engagement to introduce the hypothesis and research questions examined in this study.

2.2. Psychological distance

Involving places and times far removed from the present, climate change challenges the scientists who study it, and is perhaps even more perplexing for the average citizen to envision. Establishing the effects of a changing climate can involve sampling ice core data (which speak to Earth's conditions many thousands of years ago) that originate in Greenland or Antarctica, places that few people call home. Moreover, projections of climate change impacts many decades into the future characterize locations as distant and unfamiliar: places we would rather not (or perhaps cannot) imagine as our homes. Recent research supports this contention, suggesting that the psychological distance we experience when thinking about climate change includes temporal, spatial, social, and hypothetical dimensions (McDonald et al., 2015; Spence et al., 2012; Trope and Liberman, 2010). In the language of construal level theory, events that are experienced as "psychologically close," such as those that are geographically and socially relevant (e.g., the flooding of a river in one's hometown) are expected to evoke a low-level construal that is contextually rich, vivid, and detailed. Psychologically close events also likely occur closer in time to the present—for example, tomorrow as compared to next year. In contrast, events that are experienced as "psychologically distant," such as those occurring in the distant future or outside of one's immediate social and geographical context (e.g., rising sea level that threatens nations in the southern Indian Ocean, as opposed to one's home in the U.S.), are expected to evoke a high-level construal that is less contextualized, less detailed, and more abstract (Liberman and Trope, 2008; Trope and Liberman, 2010).

Psychological distance has been thought to matter in climate change communication because individuals who perceive related threats, such as sea level rise or ocean acidification, as psychologically distant and abstract may discount them more than those who perceive them as psychologically proximal and concrete (Brugger et al., 2015a,b; Milfont, 2010; Schuldt et al., in press; Spence et al., 2012; van der Linden et al., 2015; Weber, 2010; Zwickle and Wilson, 2014). Yet, the literature presents conflicting evidence as to whether this discounting exists with respect to risk perception, as we explain below (for a further review of this literature, see McDonald et al., 2015).

Past research suggests that the four dimensions of psychological distance are interrelated with a certain degree of interchangeability among them (Bar-Anan et al., 2007). For instance, Bar-Anan et al. (2007) found that individuals process information faster when its spatial distance is congruent with its temporal, social, and hypothetical distance. Temporal distance may also influence social distance, as reduced temporal distance of a future encounter leads individuals to perceive strangers as more familiar and similar to themselves (Stephan et al., 2006). Moreover, experiencing an initial psychological distance dimension may dampen individuals' sensitivity to further psychological distance dimensions (Maglio

et al., 2013). Despite these gains in understanding the interrelationships of the dimensions of psychological distance, to date, limited research has applied these principles in the context of real-world climate change messaging, in which different dimensions of psychological distance are inherent. The present study does this, examining the interplay of two of these dimensions, temporal and spatial distance, in the context of communicating climate change impacts. Below, we review relevant literature addressing these two dimensions.

2.2.1. Temporal distance

Past research has shown that temporal distance influences risk perception related to climate change and environmental behavior in general, although findings are somewhat mixed (Arnocky et al., 2014; Bashir et al., 2014; Pahl and Bauer, 2013; Pahl et al., 2014; Rabinovich et al., 2010). For instance, Spence et al. (2012) found that the majority of a U.K. sample perceived climate change as temporally close, and this lower psychological distance was linked to their greater concern. Focusing on the direct impact of temporal distance on pro-environmental attitudes and behaviors, Bashir et al. (2014) showed that individuals in the experimental condition in which the future, described as including the negative consequences of climate change, appeared temporally closer were more motivated to pursue pro-environmental behaviors. Respondents' concrete construal of the message also mediated the relationship between perceived temporal closeness and willingness to engage in these behaviors.

In contrast, Rabinovich et al. (2010) found that the relationship between pro-environmental attitudes and behavioral intentions is stronger when the projection of a future environmental situation – specifically, envisioning the environmental issues facing a participant's country – is temporally distant (i.e., in the next 10 years) rather than close (i.e., in a month). Similarly, Roh et al. (2015) presented narratives varying the projected impacts of an environmental risk (an emerging zoonotic disease), as occurring now (proximal) versus in the next ten years (distal). Results suggested that the distal framing tempered Republican participants' resistance to engaging in pro-environmental behavior. Unlike the studies reviewed above, Sundblad et al. (2011) showed that individuals' intentions to reduce carbon dioxide emissions did not vary depending on the projected future timing of climate change impacts presented. Possibly, as McDonald et al. (2015) suggest, the nature, scale, and/or severity of the climate change impacts presented (e.g., local temperature increases versus sea level rise around the globe) moderate the effect of temporal distance, thus helping to account for the differences in the research reviewed.

2.2.2. Spatial distance

Past research has shown a consistent optimistic bias operating with respect to environmental assessment and spatial distance (Dunlap et al., 1993; Gifford et al., 2009; Milfont et al., 2014; Schultz et al., 2014; Uzzell, 2000). That is, as spatial distance increases from the local, to the national, to the global level, individuals' assessment of environmental quality decreases and recognition of environmental problems increases; indeed, studies suggest that this spatial bias appears across cultures (Schultz et al., 2014). In the case of climate change, however, information about local impacts tends to be perceived as more relevant than information about impacts on geographically distant areas (Spence and Pidgeon, 2010). Perceived individual responsibility for environmental problems also diminishes as geographical distance increases, often resulting in feelings of powerlessness to respond to environmental issues at a global level (Darier and Schule, 1999; Uzzell, 2000).

Of particular relevance to this study, a nascent literature explores the concept of spatial distance through the application of "locally-framed" climate change messaging (Haden et al., 2012; Scannell and Gifford, 2013; Schweizer et al., 2013; Spence and Pidgeon, 2010; Spence et al., 2012). In a quasi-experiment with residents in three Canadian communities, Scannell and Gifford (2013) found that individuals receiving locally framed messages about climate change impacts reported greater levels of climate change engagement (e.g., likelihood to seek out information about climate change) as compared to individuals receiving globally framed messages. Similarly, residents of Wellington, New Zealand who were primed to consider climate change adaptation measures local to their city scored significantly higher on personal willingness to engage in climate change mitigation than did those in the control group, regardless of prior climate change skepticism (Evans et al., 2014). Somewhat differently, in a study involving UK university students, Spence and Pidgeon (2010) found that framing climate change impacts with respect to Rome, rather than local to Cardiff, resulted in the impacts being perceived as more severe; however, no impact of spatial distance framing on attitudes towards climate change mitigation was found. To an increasing degree, researchers interested in the perceived spatial "closeness" or "local" aspects of climate change also consider direct (i.e., firsthand) experience of climate change effects (e.g., living through a major storm attributed to climate change), and find influences on risk perception and support for policy and related behaviors (for review, see Reser et al., 2014).

2.3. Climate change engagement

Taken together, the results from the studies reviewed above suggest that message framing may be an appropriate and effective strategy to encourage support for climate change-related policy and action. These and other studies are also instructive in suggesting additional variables that might help to predict climate change engagement (see also Drews and van den Bergh, 2015). In particular, we focus on political ideology, risk perception, and affect in the present research.

2.3.1. Political ideology

In the U.S. and other Western industrialized nations (including the UK and Australia), opinions about leading environmental issues such as climate change are often highly politicized (see Bolsen and Druckman, 2015, for a detailed discussion of politicization). Using ten years of U.S. Gallup polls, McCright and Dunlap (2011) show that liberals and Democrats are more likely to express beliefs consistent with scientific consensus (i.e., support for the idea that climate change is occurring), while conservatives and Republicans are less likely to do so. McCright and Dunlap (2011) also find a significant interaction effect between educational attainment (and self-reported understanding about climate change) and political orientation. Examining the role of political partisanship in messages that convey the geographically proximal versus distal consequences of climate change, Hart and Nisbet (2012) found that whereas Democrats expressed increased support for climate change mitigation policy when they read about public health threats to distal victims, these portrayals *decreased* support among Republicans. Such findings suggest that, beyond simple main effects on attitudes and beliefs, political orientation may shape how audience members process and interpret the same climate change message, highlighting the utility of examining interactive effects between political orientation and distance-related message factors – a strategy we pursue in the present study.

2.3.2. Risk perception

The extent to which individuals perceive risk related to climate change can also predict their support for relevant policy

(Leiserowitz, 2006; O'Connor et al., 1999, 2002; van der Linden, 2015; Zahran et al., 2006; Zhao et al., 2011). Using a psychometric approach to measuring risk perception among university students in six nations, for instance, Bostrom et al. (2012) showed that perceived attributes of climate change risk, including its "dreaded" quality or the extent to which the consequences are perceived as "known," predicted support for climate change-relevant policies, such as increasing taxes on fossil fuels.

2.3.3. Affect

How one feels about the topic of climate change – whether generally "good" or "bad" (i.e., affect) or more specific, discrete emotions (e.g., fear) – can influence opinions on relevant policy (Leiserowitz, 2006; Meijnders et al., 2001; van der Linden, 2015; Yang et al. 2014). Given the nature of climate change impacts as generally undesirable outcomes, researchers most often assess individuals' negative emotions, such as worry and anger (Hovick et al., 2011; Kahlor, 2007; ter Huurne et al., 2009). Indeed, in a nationally representative sample of U.S. respondents, Smith and Leiserowitz (2014) found worry to be the strongest predictor of support for climate change policies. Leiserowitz (2006) also showed negative affect (a holistic measure, rather than a set of discrete emotions) to be a consistent predictor of climate change risk perception and policy preferences, and stronger than all sociodemographic variables, including political ideology. Complementing these correlational findings, recent research suggests that varied experimentally – including incidental emotions evoked through standard emotion-induction methods and integral emotions evoked through message appeals – can shape climate change policy preferences (Lu and Schuldt 2015; Lu and Schuldt, in press).

2.3.4. The present study

Following the studies reviewed above, we explore how manipulating temporal and spatial distance in the context of climate change messaging about "departure dates" (Mora et al., 2013) can influence policy support, risk perception, and affect. For purposes of ecological validity, we sampled participants from two distant geographic locations – New York State (in the U.S.) and Singapore – to afford a naturalistic context for exploring the effects of psychological distance. At the same time, this unique cross-national sample also presents some methodological complexities, given differences in the political, social, and economic systems of the two countries that could impinge on citizens' attitudes toward climate change and their reactions to the different climate departure date scenarios that we investigate here.

As a small, low-lying nation, Singapore is a parliamentary republic that is particularly vulnerable to climate change impacts from sea-level rise that have been documented in recent decades (Ho et al., 2014; Ng and Mendelsohn, 2005). In response, the Singapore government has pursued a number of climate change mitigation and adaptation strategies, including pledging to limit greenhouse gas emissions as a signatory to the Kyoto Protocol and implementing new regulations for coastal infrastructure projects that account for projected sea-level rise. Perhaps not surprisingly, surveys conducted in Singapore reveal high levels of concern about climate change and support for government action on the issue (Ho et al., 2014). Thus, compared to the United States, where residents may feel less personally vulnerable to climate impacts and where climate change has emerged as a highly politicized issue (McCright and Dunlap, 2011), we may expect to observe higher levels of climate-related policy support, risk perception, and negative affective responses in the Singapore context. We might also expect political ideology, operationalized as a continuous liberal–conservative dimension, to play a more limited role in the Singapore context, where the issue of climate change is less of a partisan issue. While it is important to acknowledge these cross-national differences, we also note similarities between our U.S. and Singapore participants that afford meaningful comparisons in the present study. Although representing different cultural backgrounds and completing the questionnaire at distant locations, all participants were affiliated with the same university (The State University of New York at Buffalo) and followed the same curriculum, studying either at the university's main campus in New York State or at the university's satellite undergraduate program in Singapore. As such, respondents in both samples shared cultural and educational experiences (including fluency in English, exposure to Western media and climate change discourse, etc.) that could possibly counteract broader cross-national differences that may manifest in the present context.

Drawing on the literature reviewed above, and particularly the extensive literature on construal level theory and the emerging literature on the effects of psychological distance in climate change communication, we pursued the following hypothesis:

H1. Departure dates containing more proximal temporal or spatial features will elicit increased climate change policy support **(H1a)**, risk perception **(H1b)**, and negative affect **(H1c)** than those containing more distal features.

We pursued the above hypothesis alongside the following exploratory research questions inspired by recent research on the role of political orientation in climate change communication, which frequently reveals strong moderation effects particularly in the contemporary U.S. context.

RQ1. To what extent does political ideology moderate the effects of departure date message features on policy support **(RQ1a)**, risk perception **(RQ1b)**, and general affect **(RQ1c)**?

RQ2. To what extent is any moderation effect of political ideology contingent upon study location (that is, U.S. vs. Singapore)?

3. Method

During Summer and Fall 2015, data were collected through an experimental survey via the online survey platform Qualtrics from undergraduate samples recruited from one university in Singapore ($N = 183$) and one university in the U.S. ($N = 193$). At the Singapore location, participants were recruited from different majors and received research credit for participation; at the U.S. location, participants were recruited from a large, introductory-level communication class that included students from different majors who likewise received research credit for participating. The students in Singapore were recruited from a program affiliated with one of the co-author's universities in the U.S. Thus, all participants were asked, "Before enrolling in the XX university, where did you spend the most time living?" with the response options as the U.S. or a country other than the U.S. Participants who answered a country other than the U.S. were subsequently asked to specify the country.

In part 1 of the study, participants answered questions assessing their individual characteristics, including gender, age, ethnicity, political ideology, and home country. We also measured environmental values, perceived issue salience, perceived causes of climate change, and perceived information need with respect to climate change; however, due to space constraints, the impacts of these variables are not reported in this manuscript.

In part 2 of the study (approximately two weeks later), participants were randomly assigned to either the control condition or one of the six experimental conditions (described below). After the experimental manipulation, participants answered questions gauging policy support, risk perception, and

general affect related to the climate change message, as well as manipulation check questions. This final page of the online questionnaire informed participants of the study design—namely, that the story was (at least partially) fictional, and that participants were not told this in advance to avoid biasing their responses to subsequent questions. See Table 1 for a detailed description of the two samples.

3.1. Experimental stimuli

The experiment followed a 2×3 between-subjects factorial design featuring temporal distance (2020, 2047, or 2066) and spatial distance (New York City vs. Singapore) as the two factors, in addition to a no-message control group. Except for the variations related to the two locations and their departure dates, the focal climate change messages were kept consistent across the six experimental conditions. To manipulate temporal and spatial distance, we designed ostensible news stories to present findings from Mora et al. (2013). Titled "A New Normal? Climate 'departure date' suggests major impacts on NYC [Singapore] residents by 2020 [2047, 2066]," each story was formatted to appear like a syndicated news story focusing on the specific location (New York vs. Singapore), with no newspaper source mentioned. Each story started with a summary of key findings from Mora et al. (2013), followed by reactions from a fictitious local exemplar, Kevin Lee (a conceivable name for either a New York City or Singapore resident). Additional impacts from climate change were also mentioned, including unpredictable weather and changes to urban water supplies. At the end of the story, reduction in greenhouse gas emissions was proposed as a possible solution to postpone climate change impacts (see Appendix A for example stimuli).

3.2. Measures

To measure policy support, we used 12 policies ranging from "regulating carbon dioxide as a pollutant" to "improve early warning systems in cities to inform residents about weather and natural hazard-related risks" to assess respondents' support for climate change mitigation and adaptation policies. Some of the items were adopted from past research (Zhao et al., 2011), while others were designed specifically for this research due to no readily available measures gauging support for climate change adaptation policies. These items were measured on a 10-point scale ranging from 1 (strongly oppose) to 10 (strongly support), including a "don't know/no opinion" option. Participants selecting the "don't know/no opinion" option on one or more of the policy measures were excluded, leaving $n = 278$ for the policy support analysis. Upon satisfactory reliability check ($\alpha = .85$), they were averaged into an index to measure policy support ($M = 6.51$, $SD = 1.29$).

Risk perception was measured on a 6-point scale ranging from 1 (not at all) to 6 (a very large amount), again including a "don't know/no opinion" option, using three items adapted from past research (Zhao, 2009): *How much do you think climate change will harm you and your community?*; *How much do you think climate change will harm future generations?*; *How much do you think climate change will harm people all over the world?* Upon reliability check ($\alpha = .88$), these three items were averaged into an index for risk perception ($M = 5.08$, $SD = .91$).

Following research investing the role of affect and emotion in responses to climate change (Leiserowitz, 2006), we used two items that assessed participants' general affective reaction to the news story in the experimental conditions on a scale from 1 (negative/bad) to 10 (positive/good) that included a "don't know/no opinion" option. Upon reliability check ($\alpha = .90$, $r = .81$), these two items were averaged into an index for general affect ($M = 4.51$, $SD = 1.75$).

In terms of individual characteristics, demographic variables measured included sex ($n_{male} = 125$, 38.1%; $n_{female} = 203$, 61.9%), age ($M = 21.15$, $SD = 2.07$), and race/ethnicity (21.9% White, 69.6% Asian, 4.3% African American, 4.3% Other). Political ideology was measured on a continuous scale from 1 (very liberal) to 7 (very conservative) ($M = 3.49$, $SD = 1.25$). We also asked respondents to identify the country (U.S. or otherwise) in which they had spent the most time before coming to the university. In the U.S. sample, 38.3% of U.S. participants indicated that they had spent the most time living in a country other than the U.S., as compared to 99.5% of Singapore participants (who overwhelmingly indicating spending the most time in Singapore).

4. Results

4.1. Manipulation check

A series of chi-square tests and one-way analyses of variance (ANOVA) were conducted to check the success of random assignment. No significant demographic differences (age, gender, race, and political ideology) were found across the experimental conditions. Thus, random assignment was successful. We included two questions for the manipulation check. First, participants were asked, "The story mentioned a climate departure date. How far away from the present date does this departure date feel to you?" (1 = very close, 10 = very far), including a "don't know/no opinion" option. ANOVA revealed a significant main effect of experimental condition on temporal distance perception, $F(2, 296) = 9.11$, $p < .001$. As expected, participants in the 2066 condition reported the farthest temporal distance perception ($M = 5.80$, $SD = 2.33$), followed by those in the 2047 ($M = 5.13$, $SD = 2.22$) and 2020 conditions ($M = 4.41$, $SD = 2.31$). Next, we asked participants how

Table 1
Individual characteristics of the two samples ($N = 376$).

Variables	U.S. sample (n) or M (SD)	Singapore sample (n) or M (SD)
Age[a]	19.55 (1.28)	22.44 (1.65)
Female[a]	50.3% (73)	71.0% (130)
Race/ethnicity		
White, non-Hispanic	49.3% (72)	0 (0)
Black, non-Hispanic	9.6% (14)	0 (0)
Asian[a]	34.9% (51)	97.3% (178)
Other, including multi-racial	6.2% (9)	2.7% (5)
Political orientation (1 = extremely liberal, 7 = extremely conservative)	3.59 (1.27)	3.41 (1.24)
Country of origin		
The United States	81.5% (119)	0.5% (1)
A country other than the United States[a]	18.5% (27)	99.5% (182)

Note. All sample characteristics are percentages with sample sizes in parentheses, except for age and political orientation, which are means (standard deviations in parentheses).
[a] Denotes a statistically significant sample difference at $p < .001$.

interesting they found the story to be (1 = not all interesting, 10 = very interesting), including a "don't know/no opinion" option. Participants in different experimental conditions rated the story similarly in terms of interest, $F < 1, ns$. Thus, the experimental manipulation was successful.

4.2. Experimental results

To test the effects of our experimental treatments of temporal distance (2020 vs. 2047 vs. 2066) and spatial distance (New York City vs. Singapore) on our three dependent measures – policy support, risk perception, and general affect – we conducted a series of ANOVA models examining the role of experimental condition, political ideology (liberal-conservative), and their interaction effect for each dependent measure, with follow-up regression analyses that diagnosed the nature of any significant interactions. Importantly, each model included a variable denoting the sample from which the participant was drawn (i.e., U.S. or Singapore), which allowed for modeling the role of spatial distance (proximal vs. distal) and its interactive effects in responses to the climate departure date messages.

Below, we organize the results by dependent measure. We first report on tests for the main effect of condition (i.e., H1) and then discuss results from models testing for contingent effects based on political ideology (i.e., RQ1 and RQ2).

4.2.1. Policy support

First, consistent with other research on cross-national opinions regarding climate change mitigation (Bostrom et al., 2012; Ho et al., 2014; Pew Research Center, 2013), we observed a significant main effect of participant sample on policy support, such that our Singapore participants reported greater policy support ($M = 7.01$, $SD = 0.98$) than our U.S. (predominately American) participants ($M = 6.15$, $SD = 1.40$), $t(276) = 5.87$, $p < .001$. Following past research reporting gender differences in environmental attitudes and risk perceptions (e.g., Davidson and Freudenburg, 1996; Dietz et al., 2007; Finucane et al., 2000; van der Linden, 2015), we also examined whether our dependent measures varied by participants' reported gender. Echoing familiar observations, females reported greater support for climate change policy ($M = 6.89$, $SD = 1.09$ vs. $M = 6.39$, $SD = 1.31$; $t(240) = 3.26$, $p < .01$), greater risk perception ($M = 5.28$, $SD = .69$ vs. $M = 4.86$, $SD = .99$; $t(315) = 4.45$, $p < .001$), and more negative affect ($M = 4.25$, $SD = 1.74$ vs. $M = 5.08$, $SD = 1.54$; $t(285) = 4.12$, $p < .001$) than did their male counterparts. Reported results remain substantively unchanged when controlling for gender.

We then examined the overall effect of experimental condition on policy support with an ANOVA model featuring spatial condition, temporal condition, participant sample, and all two-way and three-way interactions as the predictor variables. Results revealed no main effects of condition in either our U.S. or Singapore samples ($F < 1, ns$) (no support for H1a). Nevertheless, mean-level policy support varied widely across conditions, from a low of $M = 5.89$ ($SD = 1.43$) (NYC_2047 condition, U.S. sample) to a high of $M = 7.38$ ($SD = 1.12$) (NYC_2066 condition, Singapore sample).

Turning to whether the effect of experimental condition differed by political ideology, we ran a similar ANOVA model as above but with political ideology added as a predictor variable, with its respective interaction terms (RQ1a). For this analysis, the two experimental factors (spatial and temporal distance) were collapsed into a single, 7-level categorical variable (including the control condition). The three-way interaction was significant, $F(6, 213) = 2.28$, $p = .04$, and follow-up analyses revealed that the moderation effect of political ideology emerged among our U.S. participants, $F(6, 93) = 2.21$, $p < .05$, but not our Singapore participants, $F < 1, ns$ (RQ2). Diagnosing this interaction using spotlight analysis in regression (Spiller et al., 2013) revealed that whereas conservative U.S. participants ($M + 1SD$) expressed markedly different levels of policy support across experimental conditions (ranging from $M = 5.29$ in the Singapore_2020 condition to $M = 8.20$ in the NYC_2066 conditions; contrast $t = 3.77$, $p < .001$), liberal U.S. participants ($M - 1SD$) showed much less variability in responses (e.g., $M = 6.52$ and $M = 6.34$ for the same conditions) (see Fig. 1). Only one pairwise contrast emerged as significant among liberal U.S. participants ($M = 6.87$ in the Singapore_2066 condition vs. $M = 5.67$ in the NYC_2020 condition, $t = -2.05$, $p = .04$). Moreover, complementary simple slopes analysis revealed that, whereas the familiar negative association between conservatism and support for climate change policy was observed in the overall sample ($r = -0.10$), that pattern achieved significance only in the Singapore_2020 and Singapore_2066 conditions ($Bs = -0.50$ and -0.47, respectively; $|t|s > .2.40$, $ps < .05$). In contrast, a significant positive association emerged between conservatism and policy support in the NYC_2066 condition only ($B = .75$, $t = 2.19$, $p = .03$).

4.2.2. Risk perception

On our second dependent measure, analysis of risk perception again revealed a main effect of participant sample. Echoing the

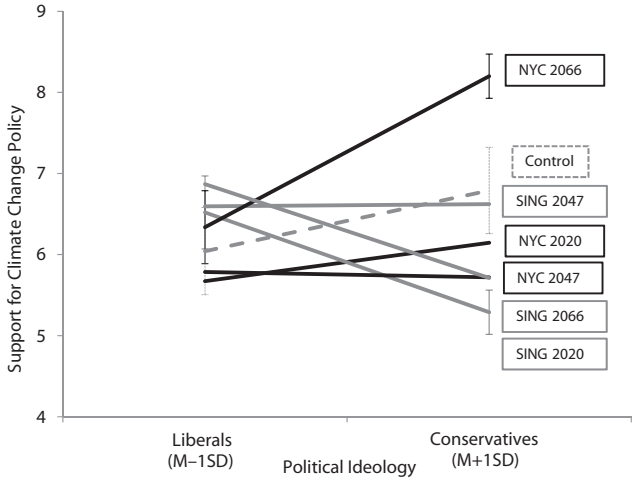

Fig. 1. Graph depicting support for climate change policy by experimental condition and political ideology, in the U.S. sample. Black lines represent the NYC conditions, solid gray lines represent the Singapore conditions, and the dashed gray line represents the control condition. For clarity, mean standard error bars appear for the NYC_2066, Singapore_2020, and Control conditions only.

effects reported above, our Singapore participants reported significantly greater perceived risk ($M = 5.34$, $SD = 0.58$) than did our U.S. participants ($M = 4.82$, $SD = 1.09$), t (360) = 5.71, $p < .001$. The ANOVA model testing the overall effect of condition on risk perception, however, did not reveal a significant effect, $F < 1$, *ns* (no support for H1b); mean-level risk perception ranged from a low of $M = 4.92$ to a high of $M = 5.26$, for the NYC_2020 and NYC_2066 conditions, respectively (no post-hoc contrast, with Bonferroni correction, was significant).

We next incorporated political ideology into the ANOVA model (again with its interaction terms) to explore the possible moderating effect of political ideology on risk perception (RQ1b). Although the three-way interaction between experimental condition, participant sample, and political ideology was not significant, F (6, 288) = 1.45, $p = .19$, further analysis revealed a significant two-way interaction between condition and political ideology, F (6, 302) = 2.18, $p < .05$. Follow-up analyses diagnosing this pattern suggested that the moderation effect was driven, in part, by the differential risk perception of liberals and conservatives in the Singapore_2020 condition, in particular. Whereas this condition elicited the greatest levels of perceived risk of any condition among liberals ($M = 5.64$ in the Singapore_2020 condition vs. $M = 4.85$ in the NYC_2020 condition, for example; contrast $t = -3.21$, $p < .01$), the same condition elicited the *lowest* levels of perceived risk among conservatives ($M = 4.73$ in the Singapore_2020 condition vs. $M = 5.36$ in the NYC_2066 condition, for example; contrast $t = 2.43$, $p = .02$). Moreover, whereas the expected negative association between conservatism and risk perception was observed in the sample overall ($r = -0.11$), simple slopes analysis revealed that this negative association was most strongly pronounced in the Singapore_2020 condition ($B = -0.37$, $t = -3.84$, $p < .001$) (RQ2).

4.2.3. General affect

We next followed a similar analytic approach to examine the effect of experimental condition on general affect and the possible moderating role of political ideology in this effect. First, we again observed a trend-level effect of participant sample: overall, our Singapore participants reported significantly more negative (less positive) affect ($M = 4.31$, $SD = 1.66$) than our U.S. participants ($M = 4.70$, $SD = 1.82$), t (294) = 1.95, $p = .05$. Once again, the ANOVA model testing the overall effect of condition on general affect did not reveal a significant effect, $F < 1$, *ns* (no support for H1c); general affect ratings ranged from a low of $M = 4.12$ ($SD = 1.81$) to a high of $M = 4.77$ ($SD = 1.69$), for the Singapore_2066 and NYC_20202 conditions, respectively (no post-hoc contrast, with Bonferroni correction, was significant).

As was the case for policy support, adding political ideology to the model again revealed a significant three-way interaction between experimental condition, participant sample, and political ideology, F (5, 236) = 2.97, $p < .05$ (RQ1c). Although follow-up analyses revealed that this moderation effect of political ideology was more pronounced among our Singapore participants (F (5, 135) = 2.90, $p < .05$) than our U.S. participants (F (5, 101) = 1.63, $p = .16$), additional analyses were instructive (RQ2). Although we observed significant effects of condition among liberals and conservative participants in both samples, the largest effects again emerged among conservative participants in the U.S. sample ($M + 1SD$). For instance, whereas conservative participants in Singapore reported the most negative (least positive) affect ($M = 3.56$) in the NYC_2020 condition and the most positive affect in the NYC_2047 condition ($M = 5.20$) (contrast $t = -1.64$, $p < .05$) conservative participants in the U.S. showed the most *negative* affect in response to that same condition (NYC_2047; $M = 2.81$) and the most positive affect ($M = 5.29$) in the Singapore_2020 condition (contrast $t = -2.48$, $p < .01$). In contrast, liberal participants ($M - 1$ *SD*) in the U.S. sample expressed more similar levels of general affect across experimental conditions (see Fig. 2).

5. Discussion

Motivated by our interest in exploring how the emerging concept of climate change "departure dates" (Mora et al., 2013) may influence audiences' cognitive and affective responses, we designed this study to test the influence of spatial/temporal framing that is inherent to the departure date concept on risk perception, affect, and support for climate change policy preferences among participants in two different nations. Taken together, results provide initial evidence for the ways in which climate departure dates may influence audience responses, while complementing and extending existing work on the moderating role of political ideology in climate risk messaging (e.g., Hart and Nisbet, 2012; Schuldt et al., 2011).

Echoing emerging findings regarding psychological distance in climate change communication (Bostrom et al., 2014), our results show little evidence that exposure to these different departure date scenarios exert main effects on climate-related perceptions; however, our analyses suggest that exposure to this information may interact with individuals' political orientation in important ways. With regard to support for policies aimed at mitigating and/

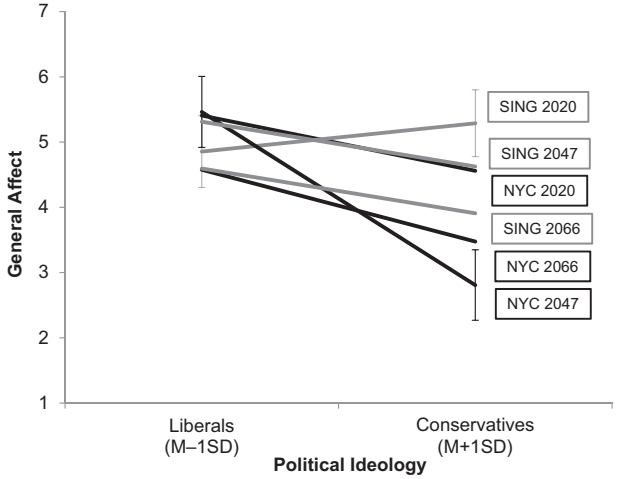

Fig. 2. Graph depicting general affect by experimental condition and political ideology, in the U.S. sample (higher scores indicate more positive affect). For clarity, mean standard error bars appear for the NYC_2047 and Singapore_2020 conditions only.

or adapting to climate change, we find that exposure to varying departure dates and locations played a significant role in the preferences of U.S. conservatives, in particular. In comparison, U.S. liberals, as well as their counterparts in Singapore, showed less variability in their policy support across conditions. These findings complement past results indicating that the climate-related beliefs of liberals may be more stable or "crystallized" than those of conservatives (e.g., Schuldt et al., 2011), and as a result, less malleable to fleeting and relatively subtle experimental manipulations like the one employed here. The findings also support recent research on boomerang effects related to environmental messaging more broadly, where, for instance, the influence of temporal framing may be contingent on political partisanship (Roh et al., 2015). Moreover, while some evidence suggests that political orientation has emerged as an important determinant of climate-related beliefs and policy preferences in nations beyond the U.S. (McCright et al., 2016), it is likely that political orientation plays a less central role in climate change opinions of our Singapore participants compared to our U.S. participants. This insight could further explain the stronger moderation effect of political ideology on policy support that we observed in the U.S. sample, although we note that political ideology did appear to play a role – albeit a less pronounced one – in risk perception and general affect for both samples. In future work, researchers may wish to undertake a more nuanced approach to understanding the various sociopolitical and cultural differences that may further explain differences (and similarities) between U.S. and Asian respondents when it comes to policy support and perceptions of climate change risk.

Beyond the observed moderation effects of political ideology, *per se*, it is important to consider the question of which departure date locations and times, in particular, will exert the greatest influence on audience responses—for both theoretical reasons (e.g., for testing predictions derived from construal level theory) and practical reasons (e.g., given the potential of departure dates as an influential climate change communication "frame"). On this point, however, our results are somewhat mixed. For example, U.S. conservatives reported the highest level of policy support after reading the climate departure scenario that discussed the negative impacts on New York City in 2066—that is, the scenario that was most proximal in terms of spatial distance but most distal in terms of temporal distance, a result that is not perfectly consistent with what construal level theory might predict. And moreover, while this condition appeared to resonate the most with conservatives in our U.S. sample in terms of their policy support, it was a different condition (i.e., the NYC 2047 condition) that elicited the most negative (least positive) affect in this group.

While these results may appear somewhat conflicting at first glance, examining them in the context of recent research in environmental messaging employing temporal and spatial distance frames may be instructive. For instance, Roh et al. (2015) find that a temporally distant frame – specifically, that the effects of an infectious disease will be experienced in the next 10 years – lessened Republican participants' backlash to a worldview-incongruent message (i.e., that an emerging infectious disease has both human and environmental causes). Yet Hart and Nisbet (2012) illustrate that increasing social distance (i.e., describing victims of climate change impacts in a different country)—which, by virtue of the interchangeability of the dimensions of psychological distance is likely closely related to spatial distance—can decrease Republican participants' support for climate change policy. Considering Hart and Nisbet (2012) and Roh et al. (2015) in the context of the present findings leads us to tentatively suggest that, when it comes to presenting climate change information to more conservative U.S. audiences, there may be persuasive value in messaging that combines perceived closeness in geographic (i.e., spatial) location and perceived distance in timing of impacts. Interestingly, this suggestion seems to run counter to recent effects to link construal level theory to risk communication (Zwickle and Wilson, 2014) suggesting that maximizing the effectiveness of risk messages requires composing messages that are consistent across different dimensions of psychological distance (e.g., proximal in both space and time). With respect to policy implications, social scientists' recent admonitions to "emphasize the present and make climate change impacts and solutions locally relevant" (van der Linden et al., 2015, p. 761; see also Scannell and Gifford, 2013) may be less a panacea given the opportunity for partisan backlash. Concluding that representing climate change as a proximal risk is "complex," Brugger et al., (2015, p. 17) suggest:

> At best, proximising will be successful in encouraging people to take steps to mitigate or adapt to climate change. At worst, this strategy will lead to defensive reactions such as increased scepticism about the reality and relevance of climate change.

Thus, while the current results suggest that exposure to different climate departure information might affect key climate perceptions of audiences, and perhaps especially of more conservative individuals in the U.S. where climate issues are highly politicized, further research will be needed to better clarify *which* scenarios (in terms of their proximal vs. distal spatial and temporal features) are most impactful. In addition, future research should clarify the mechanism(s) by which these particular combinations of temporal and spatial distance "work" to influence attitudes and behaviors among diverse audiences.

This work is not without limitations. Though representing two populations differing in predominate nationality and (most likely) certain cultural beliefs, our sample consisted of students, limiting the external validity of our findings. Certain attributes of our sample, such as the fact that most of the U.S. sample hailed from New York State and that the majority of the foreign participants in the U.S. sample ($n = 27$, 14%) were from China ($n = 13$), may have influenced our results. For example, it is possible that a proportion of the sample would not have had the assumed spatial perceptions, as Chinese college students might not perceive Singapore as spatially distant and also might not regard New York City as spatially near, perhaps especially if they identify more as a resident of China than of New York State. Moreover, we interpret our results related to general affect with some caution, given possible ambiguity regarding respondents' reactions to the departure date scenarios. For example, although our intention was to capture affective responses to the climate impacts depicted in the randomly assigned news story, it is possible that some participants interpreted the survey questions as soliciting their feelings about climate change more generally, their feelings about the message and/or its anticipated effects on readers, or something else besides (e.g., the possibility of decreasing greenhouse gas emissions to delay the onset of a departure date, as mentioned in the final paragraph); indeed, the fact that we observed no correlation between general affect and political ideology ($r = -0.01$, $p = .85$) may suggest that participants interpreted the affect question in differing ways. Nevertheless, the larger effects of condition on reported affect observed among U.S. conservatives, in particular, echoes the pattern observed for the policy support measure, suggesting the different spatial and temporal information inherent in the departure date concept may exert greater influence among this traditionally more skeptical audience segment in the U.S. Finally, the risk perception measures incorporated aspects of both temporal (i.e., "future generations") and spatial distance (i.e., "people all over the world"), therefore posing the possibility of a spillover effect from our experimental manipulation to the dependent variable. Future research might consider alternative risk perception measures to avoid this potential overlap.

Moving forward, researchers interested in the psychological distance of climate change would also be advised to consider the role of place attachment, the cognitive/affective bond an individual may feel towards a place (Low and Altman, 1992; Williams et al., 1992), in influencing climate change engagement. Emerging research suggests that strong place attachment may motivate individuals and communities to support policies and enact behaviors that mitigate and/or adapt to climate change impacts specific to their locale (Amundsen, 2014; Devine-Wright, 2013; Scannell and Gifford, 2013; Schweizer et al., 2013). Further research is necessary to further clarify the moderating (and/or mediating) role of place attachment in influencing not only temporal and spatial distance, but also social distance, and ultimately, climate change engagement. Moreover, as evidenced in the most recent IPCC report (2013), strategies to combat climate change worldwide increasingly involve adaptation—responding to already-occurring changes in the biophysical and social environments by reducing risk and vulnerability; however, research investigating public support for and engagement in adaptation is limited at best (e.g., Carrico et al., 2015; Evans et al., 2014). Future research should attempt to tease apart whether the effects of psychological distance framing vary by the type of climate change policy/behavior under consideration—whether broadly speaking, such as mitigation or adaptation, or more specifically, such as state- or nation-level policies (e.g., a carbon tax) versus individual-level behaviors (e.g., carpooling) (see also McDonald et al., 2015; Moser, 2014).

6. Conclusions

As evidence of the present effects of climate change mounts, so too does support for the oft-repeated adage that strategic messaging about climate change must eschew a "one size fits all" approach (e.g., Moser and Dilling, 2004; Myers et al., 2012; Nisbet, 2009). The present research adds to a growing literature in science and risk communication suggesting that dimensions of psychological distance – specifically, temporal and spatial distance – may be applied as frames to influence audience attitudes toward environmental policies and behaviors (Hart and Nisbet, 2012; McDonald et al., 2015; Roh et al., 2015). Moreover, we lend credence to strong evidence that political ideology can moderate message effects, particularly among a U.S. audience, for whom climate change has represented a partisan, and sometimes polarizing issue (McCright and Dunlap, 2011). In addition to employing a more diverse sample and accounting for possible covariates, such as sense of place, future research should further investigate the interactions between the various dimensions of psychological distance in influencing climate change engagement.

Appendix A. Example Experimental Stimulus (New York City_2020 condition)

New Normal?

Climate 'Departure Date' Suggests Major Impacts on NYC Residents by 2020

NEW YORK CITY—In the future, the average temperature will be hotter across most parts of the planet than it had been at those locations in the past. Scientists refer to this as a region's "departure date," which is the point after which "the coldest year in the future will be warmer than the hottest year in the past," said Camilo Mora, the lead author of a recent paper in the journal *Nature*. As temperatures increase, plants and animals that cannot adapt to changes in the environment will be forced to move, or will be driven to extinction. Weather will also become more unpredictable and extreme.

The scientists used computer models to determine the departure date for several cities. If emissions of greenhouse gases like carbon dioxide remain high, the departure date for New York City will be 2020. In other words, unless current emissions levels are substantially reduced, New York City will experience the effects of this new climate, such as severe heat waves, in just over 5 years.

When told about the prediction, long-time New York City resident Kevin Lee reflected on how his daily life might change. "One of the best parts of living in this city is being able to walk to work, walk to the market, or walk to the park for most of the year," he said. "If what the scientists predict is true, though, the heat may be just too intense for me to do that."

Unfortunately, oppressive temperature is not the only change that New Yorkers may face in 2020. More unpredictable weather, including periods of drought and intense rainfall, may pose a challenge to urban water supplies. Having safe drinking water from the faucet or taking daily showers may no longer be feasible. Warmer, wetter weather may also increase vector-borne diseases, such as those spread by mosquitoes. "I never thought I would need to wear bug spray to work," Mr. Lee noted, adding, "it may become my new normal."

A reduction in greenhouse gas emissions can help postpone climate change impacts in New York City. If the reduction is large enough, these climatic changes could be delayed by 20 to 25 years. While that may not sound like a lot, scientists say the delay could buy critical time to allow nature and human society to adapt, and for the development of technologies to further reduce emissions.

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