

National Differences in Environmental Concern and Performance Are Predicted by Country Age

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Abstract

There are obvious economic predictors of ability and willingness to invest in environmental sustainability. Yet, given that environmental decisions represent trade-offs between present sacrifices and uncertain future benefits, psychological factors may also play a role in country-level environmental behavior. Gott's principle suggests that citizens may use perceptions of their country's age to predict its future continuation, with longer pasts predicting longer futures. Using country- and individual-level analyses, we examined whether longer perceived pasts result in longer perceived futures, which in turn motivate concern for continued environmental quality. Study 1 found that older countries scored higher on an environmental performance index, even when the analysis controlled for country-level differences in gross domestic product and governance. Study 2 showed that when the United States was framed as an old country (vs. a young one), participants were willing to donate more money to an environmental organization. The findings suggest that framing a country as a long-standing entity may effectively prompt proenvironmental behavior.

Keywords

environmental behavior, environmental performance, intergenerational connectedness, decision making, judgment

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The longer you can look back, the farther you can look forward.

—Winston Churchill, 1944 (quoted by Langworth, 2011, p. 576)

National differences in environmental concern and in countries' willingness to take actions that safeguard environmental resources are well established (Franzen & Meyer, 2010; Scraggs, 2003). Switzerland and Scandinavian countries lead in national willingness to make trade-offs between immediate economic benefits and current and future environmental benefits, whereas countries like India and Iraq lag behind (Emerson et al., 2012). There are obvious economic predictors of ability and thus willingness to invest in environmental sustainability (Franzen, 2003; Gelissen, 2007). In this article, we explore a possible psychological determinant, namely, the time horizon in a country's collective mind-set, which we hypothesized—in line with Churchill—mirrors the length of the country's existence. We predicted that citizens of countries that have

a longer past will look further into the future and, as a result, be more aware of and concerned about environmental sustainability, which in turn will result in greater willingness to invest in the environment.

Our prediction is grounded in theory by Gott (1993, 1994). To estimate the remaining lifetime of an entity (e.g., a nation), one must assume that the current point in time, which is somewhere in the interval between the start point and the end point, could lie anywhere in that range with equal likelihood, given that there is insufficient reason to assume otherwise. On average, the current time will be at the midpoint of the interval, which means that the best approximate estimate of the future duration of an entity is its past duration (Gott's principle).

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Gott applied his principle to the Berlin Wall when he visited it in 1969 (Gott, 1993). Given that the Wall had been in existence for 8 years at the time, he suggested that the best estimate of its continued existence was another 8 years, and that the 50% confidence interval for its remaining lifetime was between 2.6 years at the low end and 24 years at the high end. The Wall fell 20 years later, within the confidence interval that Gott had predicted using only the past duration of the Wall.

This reasoning suggests that a good estimate of the remaining time of one's country's existence is its past duration—that is, that one should mirror its past duration into the future. Given that most countries' starting points (e.g., 1776 for the United States and 1949 for China) are well known to their citizens, we hold that most people will have an intuitive sense for (a) how long their country has been in existence and, implicitly, (b) how much longer their country will continue to exist. We are not suggesting, however, that citizens in a given country actually apply the confidence intervals set out by Gott's principle (e.g., that the United States could last anywhere between 78 and 711 more years). Rather, we assume that a longer past implicitly suggests a longer and less uncertain future, for a country that has endured through the years may be robust enough to continue its existence longer than a newer country. As Gott (1993) noted, "the length of time something has been observable in the past is a rough measure of its robustness not only against calamities of the past, but also against whatever calamities may affect its observability in the future" (p. 315).

These perceptions should matter for proenvironmental behavior, which fundamentally relies on making trade-offs between current economic costs and current and especially future environmental benefits (Wade-Benzoni, 2002). When a current generation makes a choice that benefits itself in the present at the cost of future negative environmental impacts, future generations are implicitly ignored, which results in a form of intergenerational discounting. Yet countries and generations are not individuals; they are composed of individuals who set environmental policies or influence them through their perceptions, beliefs, and decisions. To the extent that citizens in a country perceive their nation to have a longer, and less uncertain, future, one would expect them to have greater motivation to make choices that express greater concern for that distant future (Wade-Benzoni, 1999, 2008).

In sum, we hypothesized that perceived duration of a country's existence would be positively related to that country's environmental performance. We tested this hypothesis in two studies that used country-level and individual-level data, respectively. Although making parallels between the individual and the collective can be

difficult, our research question was fundamentally concerned with the way individual perceptions lead to collective action and thus necessitated taking both a macro- and a microlevel approach.

Study 1

In Study 1, we examined whether a country's length of duration was related to its environmental performance, by correlating country age (in 2012) with an environmental-performance score.

Measures

Environmental Performance Index (EPI). The EPI is an index developed by Yale University to quantify environmental performance of a given country (EPI, n.d.). For the 2012 index, the EPI comprised data from 10 categories. Three categories made up the environmental-health subscale: environmental burden of disease (which refers to disability attributed to environmental factors), air pollution (effects on people), and water cleanliness (effects on people). The remaining 7 categories formed the ecosystem-vitality subscale: air pollution (effects on ecosystem), water cleanliness (effects on ecosystem), biodiversity and habitat, agriculture, forests, fisheries, and climate change. (See the Supplemental Material available online for more detailed information about the EPI.)

Country age. Country age was computed as the difference between the year when analyses were conducted (2012) and the official start date for the 131 countries for which we had EPI scores. The official start date¹ refers to the year when the country became independent, and was obtained from the U.S. Department of State (n.d.) and the Central Intelligence Agency's (2012) *World Factbook*.

Control variables

Gross domestic product (GDP). GDP for 2010 in current U.S. dollars was obtained from the World Bank (2012a). Because GDP is skewed, a natural log transformation was computed.

Worldwide Governance Indicators (WGI). The World Bank's (2012b) WGI report quantifies a country's stability, using six indicators: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Because the indicators were highly correlated, which could have led to collinearity in regression analyses, we averaged them to create a composite score

for each country ($\alpha = .97$). Because WGI scores were from 2010, we used GDP and EPI data from 2010 as well in our regression analyses.

Mediator: perceived climate-change threat

Country-level data regarding citizens' concern for the environment were obtained from a recent Gallup poll (Pugliese & Ray, 2009). A total of 206,193 people (age 15 and older) were surveyed in 128 countries between 2007 and 2008. Participants were asked, "How much do you know about global warming or climate change?" Those who said they knew something or knew a great deal about climate change were then asked to rate how serious a problem they considered it to be, on a 4-point scale ranging from *not at all serious* to *very serious*. Pugliese and Ray then tallied the percentage of people in the sample who felt that climate change is either a very serious or a somewhat serious threat. Of the 128 countries surveyed, 97 also had EPI data and were included in the mediation analysis.

Results and discussion

Seven countries (Portugal, Thailand, Spain, Sweden, Japan, The Netherlands, and Switzerland) had ages more than 2 standard deviations above the mean of country age and were thus excluded from the analyses that follow.² As hypothesized, we found a strong positive relationship between country age and environmental performance, $r(122) = .332, p < .001$ ³ (Fig. 1). Furthermore, results remained consistent when we examined the relationships between country age and the two subscales of the EPI: Official country age was significantly correlated with the environmental-health subscale, $r(122) = .196, p = .03$, as well as with the ecosystem-vitality subscale, $r(122) = .198, p = .03$.

Because many factors could affect environmental performance, we used stepwise regression to analyze the impact of country age on EPI score, controlling for GDP (natural-log-transformed) and WGI. Four countries that did not have GDP data (Burma, Iran, Libya, and Cuba) were excluded from this analysis. Even after controlling for these factors, however, we found that country age accounted for approximately 6% of the variation in country-level environmental performance, $\beta = 0.25, p < .001$. (See Table 1 for results of the stepwise regression.)

This finding, of course, only shows a link between country duration and environmental performance. But if past duration is causal in the sense of mirroring implicit expectations of future continuation among the citizens and leaders of a country, then between-country differences in concern for the environment at the individual level should help explain the relationship between country duration and environmental performance. As predicted, between-country differences in the percentage of respondents who were both aware of and seriously concerned about climate change (Pugliese & Ray, 2009) accounted for the link between country age and environmental performance in our archival data (bias-corrected 95% confidence interval = [0.0173, 0.0533]; 20,000 resamples; Preacher & Hayes, 2008).

Study 2

To further explore the proposed link between these macrolevel effects and microlevel mechanisms, we examined whether manipulating the perceived length of a country's existence would have a similar effect, at the individual level, on its citizens' willingness to invest in the environment. We wanted to measure this sense of proenvironmentalism at the behavioral level for two reasons. First, a host of previous research (e.g., Bamberg & Moser, 2007) has suggested that there is at best a weak relationship

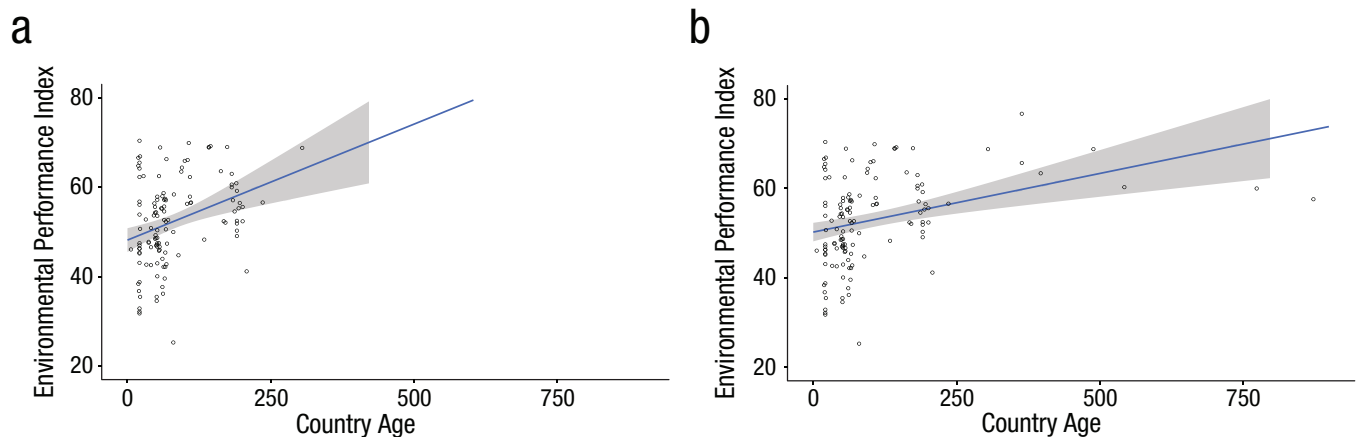


Fig. 1. Results from Study 1: regression plots (and 95% confidence bands) showing the relationship between environmental performance and country age (in years). Results are shown separately for analyses in which (a) outliers (countries with ages more than 2 SDs above the mean of country age) were excluded and (b) outliers were included.

Table 1. Study 1: Summary of the Stepwise Regression Analysis Predicting 2010 Environmental Performance Index Score ($N = 120$ countries)

Predictor	Step 1			Step 2		
	<i>b</i>	<i>SE b</i>	β	<i>b</i>	<i>SE b</i>	β
Country age	0.04	0.01	0.28**	0.04	0.01	0.25***
Gross domestic product (natural log)	0.74	0.49	0.14	-0.58	0.42	-0.11
WGI				0.23	0.03	0.64***

Note: WGI = Worldwide Governance Indicator (World Bank, 2012b). $R^2 = .12$ for Step 1; $\Delta R^2 = .34$ for Step 2 (both $ps < .001$).

** $p < .01$. *** $p < .001$.

among environmental attitudes, intentions, and behavior. To be able to demonstrate the importance of temporal framing, we wanted to assess an outcome variable that was consequential, given that previous research has shown that subtle manipulations of environmentalism can affect proenvironmental behavior (Wade-Benzoni, Li, Thompson, & Bazerman, 2007). Second, results from Study 1 suggested a link between country age and proenvironmental investment, so we sought a dependent variable in Study 2 that was commensurate with the environmental measures in Study 1. Accordingly, American respondents were randomly assigned to one of two between-subjects conditions, in which they were primed to think of the United States as either a new, immature country or an old, mature country and were then given the opportunity to donate some of their potential earnings to a proenvironmental organization.

Study 2 had an additional goal. In Study 1, we found that countries with longer pasts (and theoretically, longer perceived futures) scored higher on an index of environmental performance. A longer perceived future might, however, not be sufficient to prompt environmental concern and action for all people. Rather, a sense of kinship or emotional connection to future generations may also be required (Wade-Benzoni, 2008). People's decisions and their implicit trade-offs (e.g., present economic well-being vs. environmental impacts and future generations' well-being) are influenced by the extent to which the different and often conflicting goals they hold are activated at the time of decision (Weber & Johnson, 2009). For a prompt such as a long perceived country future to be effective in activating the goal of providing for future generations, the goal must first exist. If the only goal held by a person is maximizing present well-being (and if, by implication, the future and future generations do not matter), then having a longer time window on the future will not affect attitudes or behavior regarding the long term. Analogously, previous research has found that retirement-saving appeals that create a sense of responsibility toward one's future self work best for employees

who already feel a sense of connection with that distant self (Bryan & Hershfield, 2012). Thus, Study 2 examined whether manipulations that influence perceived country duration would be particularly effective in influencing proenvironmental behavior among individuals who felt a strong sense of connection to future generations.

Method

Participants. Online participants ($N = 499$) were recruited from two different populations. Through Amazon's Mechanical Turk, we recruited 360 participants, all with a 97% or higher approval rate according to the screening procedures of this site. An additional 139 participants were recruited by an invitation e-mail from the Center for Decision Sciences Virtual Lab (VLab) Online Panel. Participants in each sample were told that one of them would be randomly selected to receive a \$50 bonus. All participants (56% female and 44% male) were U.S. residents (mean age = 37 years, $SD = 14.54$).

To ensure the effectiveness of our experimental manipulation, we dropped participants from analyses if they (a) were not born in the United States (Liu, Wilson, McClure, & Higgins, 1999),⁴ (b) were not native English speakers, (c) did not pass an instructional manipulation check (Oppenheimer, Meyvis, & Davidenko, 2009) given in the middle of the experiment, or (d) left the Web page with the condition manipulation too quickly (below the 5th percentile, or less than 15 s) or remained on it too long (above the 99th percentile, or more than 500 s). Because online experiments lack real-time response supervision, these exclusion criteria are commonly used (Hardisty & Weber, 2009). Thirty-eight percent of respondents were removed as a result, and all analyses reported here are based on the remaining 308 participants.

Procedure. Participants were shown one of two history timelines (see Fig. 2), which were designed to influence their subjective feeling of temporal distance via the spatial distance between the endpoints (Wilson & Ross,

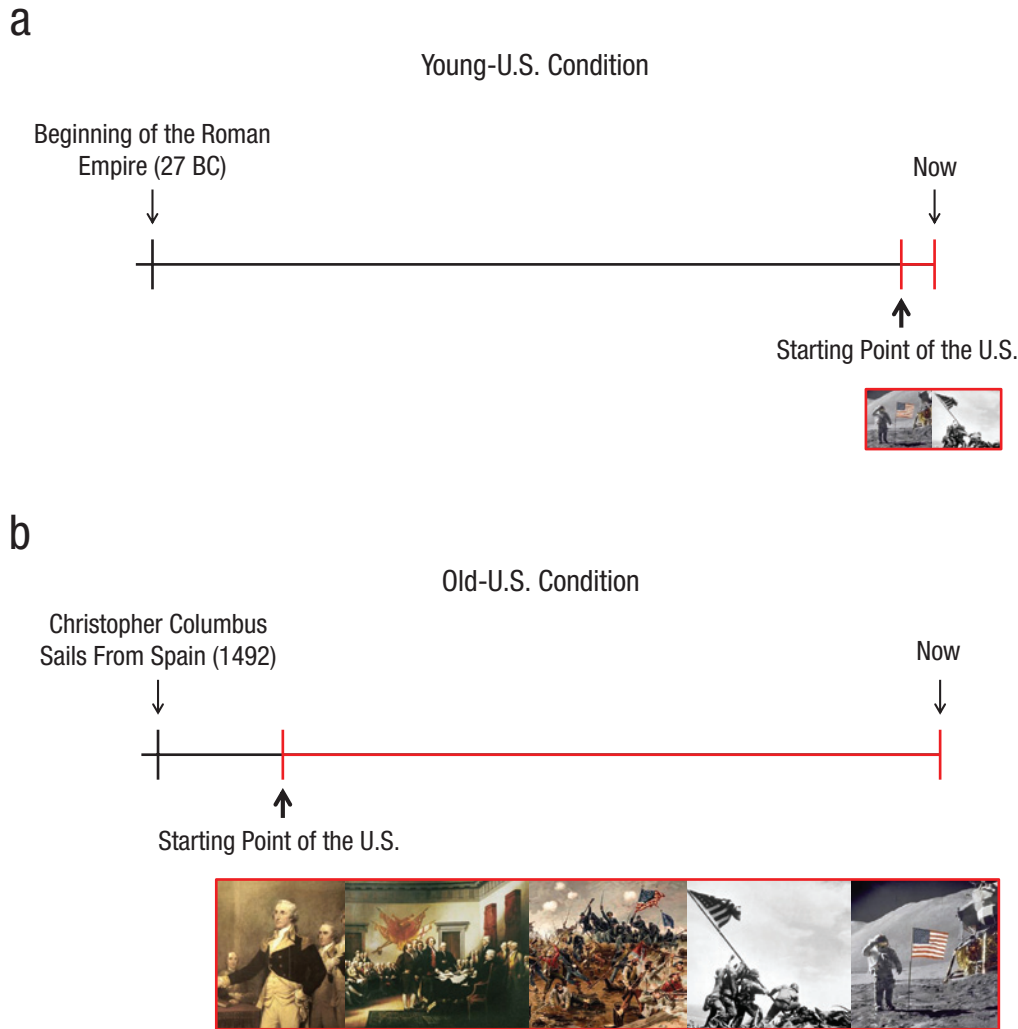


Fig. 2. Timelines displayed in Study 2. The difference in framing of the starting point of the United States led participants to think of the United States as (a) a newer, younger country (young-U.S. condition) or (b) an older, established one (old-U.S. condition).

2003). In the young-U.S. condition, participants saw a timeline that began with “Beginning of the Roman Empire (27 BC)” and ended at “Now.” The “starting point of the U.S.,” indicated by an arrow, appeared close to the right end of the timeline. Thus, this timeline suggested that the United States has had a relatively short history. In the old-U.S. condition, participants saw a timeline that began with “Christopher Columbus sails from Spain (1492)” and ended at “Now.” The “starting point of the U.S.,” indicated by an arrow, appeared close to the left end of the timeline. Thus, this second timeline suggested that the United States has had a relatively long history (see the Supplemental Material for additional information).

Our study assessed whether manipulations that frame the United States as an older (vs. younger) country subsequently cause people to behave in a way that is more

long-term oriented, specifically, to be more environmentally responsible. For such a manipulation to be effective, however, it was important that participants first understood that environmental choices were representative of long-term intertemporal choices. To prompt participants to think about environmental choices as being representative of long-term/short-term trade-offs in decision making, after showing participants the timeline, we presented a table containing two columns; the left column listed four social issues labeled “immediate concerns” (unemployment, immigration, educational funding, and stem cell research), and the right column listed four environmental issues labeled “longer-term concerns” (water security, energy crisis, climate change, and air pollution). We provided a one-sentence description of each issue and explained that the social issues were more immediate

concerns, whereas the environmental issues might not constitute immediate concerns at that point, but might end up having more severe consequences for future generations.

Participants next saw four pairings of one immediate and one longer-term concern (e.g., educational funding vs. energy crisis). For each pair, they were asked to select which issue they thought should be more highly prioritized and were then prompted to indicate the extent to which the selected issue should be prioritized, on a scale from 0 (*immediate concerns*) to 100 (*longer-term concerns*); the issues were ordered randomly across participants. These ratings were designed to elicit short-term/long-term trade-offs and thus meant to be part of our manipulation, rather than a dependent measure.

Our behavioral dependent variable concerned a consequential behavior: people's willingness to invest in environmental sustainability. Following the priority choices and ratings, we gave participants the option of using the \$50 bonus that they could potentially win to make a real financial donation to Environment America, a federation of state-based, nonprofit environmental advocacy organizations. We provided a brief description of the organization and its Web address (www.environmentamerica.org) for reference. After reading the description, participants typed in the amount they would donate, from \$0 to \$50. The winner of the bonus in each sample was drawn at random.

As a manipulation check, at the end of the study participants were asked to indicate how they thought about the United States, on a scale that ranged from 1 (*the United States is a recent country with a frontier spirit*) to 5 (*the United States is a well-established country with a long history*).

Finally, we asked respondents how close they felt to future generations of Americans, using a modified version of the Inclusion of Other in the Self Scale (Aron, Aron, & Smollan, 1992) and the Future Self-Continuity Scale (Ersner-Hershfield, Garton, Ballard, Samanez-Larkin, & Knutson, 2009; see Fig. S1 in the Supplemental Material).

Results and discussion

Manipulation check and trade-off data. A preliminary analysis revealed that our priming manipulation was successful: Participants in the old-U.S. condition ($n = 151$) were more likely to think of the United States as a well-established country with a long history ($M = 3.25$, $SD = 1.05$) than were those in the new-U.S. condition ($n = 157$; $M = 2.66$, $SD = 1.05$), $t(306) = 4.87$, $p < .001$.

For the priority choices, we summed the number of long-term issues that each participant prioritized and found that participants in the old-U.S. condition chose as

many long-term issues ($M = 1.61$, $SD = 1.05$) as did participants in the young-U.S. condition ($M = 1.57$, $SD = 1.11$), $t(306) = 0.35$, $p = .73$. There were no significant differences in the amount of weight given to the long-term issues (old-U.S.: $M = 44.05$, $SD = 17.97$; young-U.S.: $M = 46.19$, $SD = 19.95$), $t(306) = .99$, $p = .32$.

Donation. Results for our dependent measure were consistent with the country-level results: Participants induced to think about the United States as a country with a longer history were willing to donate significantly more of their earnings to an environmental fund ($M = \$13.13$, $SD = \$13.83$) than were those prompted to think about the United States as a country with a short history ($M = \$9.84$, $SD = \$12.72$), $t(306) = 2.17$, $p < .05$. The difference remained significant when we compared the natural-log-transformed values of the donation amounts in order to make the right-skewed distribution more normal, $t(306) = 2.03$, $p < .05$.

If the duration of a country serves as a mirror (i.e., a long past leads to the possibility of a long future), then manipulations that make a country seem older (in possession of a longer past) should have a particularly strong effect on people who feel close to future generations. As predicted, we found a significant interaction between condition and psychological closeness to future generations, $\beta = 0.25$, $p < .01$. We used simple-slopes analysis (Jaccard, Wan, & Turrissi, 1990) to test the relation between condition and donation amount at 1 standard deviation above and below the mean of felt closeness to future generations. We found that participants who felt close to future generations were affected by the experimental manipulation, $t(307) = 3.52$, $p < .001$, and the closer they felt, the more they were affected. Participants who were low in closeness to future generations, however, were not affected by the manipulation, $t(307) = 0.09$, $p = .93$ (see Table 2 for full regression results and Fig. 3 for a graphical representation of this result).

General Discussion

Using both country-level data and an experiment, we found evidence that a country's past duration may act as

Table 2. Study 2: Condition and Closeness to Future Generations as Predictors of Donation Amount ($N = 308$)

Predictor	<i>b</i>	<i>SE b</i>	β
Condition	3.24	1.49	0.12*
Closeness	-0.71	0.72	-0.08
Condition \times Closeness	3.08	1.00	0.25**

Note: $R^2 = .54$, $p < .01$.
* $p < .05$. ** $p < .01$.

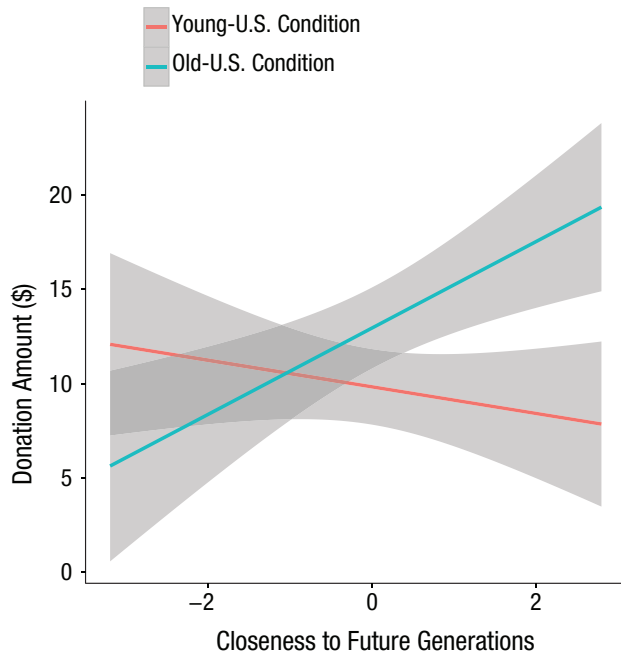


Fig. 3. Results from Study 2: predicted donation amount (with 95% confidence band) as a function of closeness to future generations (centered to the mean) in the two experimental conditions.

a mirror for estimates of its possible future duration. The longer the future appears to be, the more likely people are to act in proenvironmental ways, if they feel connected to future generations. Policymakers interested in harnessing these effects to promote environmental concern and action can take encouragement from the fact that in our studies, such concern and action was elicited by participants' perception that their country has a long past (and by implication, a long future), and not by its actual age. Thus, prompts that very simply compare a given country with a shorter-lived entity or that promote the country's historic past rather than existence in its current political identity may effectively change long-term environmental behavior.

In Study 2, after showing such prompts, we also had participants undergo an exercise that framed environmental choices as being representative of long-term/short-term trade-offs in decision making. We had hoped that doing so would ensure maximum effectiveness of the timeline manipulation. Yet these additional prompts may be unnecessary, especially to the extent that people naturally view environmental decisions as intertemporal choices. Future research may examine the effect of framing a country as an old versus young one without the additional exercises that highlight short-term/long-term trade-offs.

Furthermore, even though the timelines in both conditions prompted participants to look far beyond the here and now, it is possible that the manipulation in Study 2 influenced not only participants' time perspectives, but also their time preferences. A preference for the present over the distant future (strong discounting of future outcomes) might have caused, or at least contributed to, the lower level of proenvironmental behavior in the young-U.S. condition. It may therefore be useful for future research to distinguish between these two effects and examine other ways to change perceptions of a country's longevity over and above the inducement of time preferences. Given that intergenerational discounting is especially likely to occur when a nation's future is uncertain, one way of changing longevity perceptions, while minimizing change in time preferences, may be through influencing how robust or resilient (and thus, certain) a country's future seems (Wade-Benzoni, 2008).

Study 2 also shows that selective prompts may be effective at influencing behavior. The present work indicates that broad nudges to change behavior in directions that increase public welfare (as suggested by recent behavioral economics research and theory; Thaler & Sunstein, 2008) may be less effective than careful segmentation and targeting of existing groups (Goldstein, Johnson, Herrmann, & Heitmann, 2008). For example, messages that appeal to a country's long past (and perceived long future) could be strategically placed in areas populated by individuals who have good reason to care about future generations (e.g., new grandparents or civil servants). Given the variation in country-level environmental behavior (e.g., Scruggs, 2003) and the urgency for greater environmental action in the face of anthropogenic climate change (Lindner et al., 2010), interventions that highlight the shadow of the past may actually help illuminate the path to the future.

Author Contributions

H. E. Hershfield and E. U. Weber developed the study concept. All authors contributed to the study design. H. E. Hershfield and H. M. Bang collected data, performed the data analysis, and drafted the manuscript. H. E. Hershfield and E. U. Weber provided critical revisions and experimental support. All authors discussed the results and approved the final version of the manuscript for submission.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Supplemental Material

Additional supporting information may be found at <http://pss.sagepub.com/content/by/supplemental-data>

Notes

1. Another way to index country duration is to use “unofficial duration” (e.g., 1492 as the start of the United States), but estimates of such unofficial beginnings vary. For example, China’s official starting date is 1949, when the People’s Republic of China was established after the Chinese Civil War, but this date encompasses only the most recent government. China is known as one of the oldest civilizations in the world; its unofficial starting date could be 2000 B.C. or 1911. Another reason for using official starting dates is that, through annual celebrations, these dates are made salient to the public. Indeed, in pilot work using an online sample of 275 Americans, we found that 82% reported that America started in 1776, give or take 10 years (the next most common answer, 1492, garnered 5% of responses), and 14 of 26 Chinese online participants said that their country started in 1949, give or take 10 years (the next most common answer, 1000, garnered 2 responses). Nonetheless, excluding the 32 countries in our data set with official and unofficial starting dates that differed by more than 1,000 years did not change the pattern of results.

2. When we included these seven outliers, all reported results remained significant with the exception of the correlation between country age and ecosystem vitality, which was in the same direction as in the full sample although not statistically significant, $r(129) = .142$, $p = .11$.

3. We used the most recently obtained (2012) data for the zero-order correlation between country age and EPI scores. Because the most recent data for governance indicators (WGI scores) comes from 2010, however, we used 2010 data for all variables in the regression analyses. Note that we obtained similar results for the zero-order correlation when we instead used 2010 EPI data.

4. We excluded participants on this basis because historical perception and interpretation vary across cultures.

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