Nostalgia and Climate Change:

Using Anchoring to Predict Behavior

Kayla Pincus

Shai Davidai & Clinton Merck

The New School For Social Research

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Abstract

The purpose of this research is to examine the ways in which remembering one's own past can influence their beliefs about present and future climate change. Although local weather patterns do not necessarily correlate with changes in global climate, people's beliefs about climate change is often influenced by local weather patterns. Even the current outdoor and indoor temperature can lead to some differences in beliefs about climate change and willingness to take preventative action.

This series of studies considers possible trends in people's idealization of their pasts and whether those memories influence predictions of the future. The studies investigate the potential use of the availability heuristic in memory in combination with the anchoring and adjustment heuristic to perceive the future. We hypothesize that considerations of the past, specifically nostalgic memories, affect considerations of the future of the environment.

Background

1. *Climate change psychology*

The impetus for this research was a curiosity regarding the potential for directed nostalgia to yield pro-environmental action on climate change. The average global surface temperature has increased by 2 degrees Fahrenheit since the 1800s due to the burning of fossil fuels during industrialization (Levandowsky, 2016). However, skepticism about the validity of the science behind climate change has caused of a slow progression of policy reforms. One explanation is that fast-paced stimuli evoke responses. The slow development of global warming does not capture attention in the same way (Jamieson, 2014). It has been shown that skepticism toward climate change is politically organized denial (Dunlap & McCright, 2010, 2011; Dunlap, 2013; Dunlap & Dunlap, 2000, 2003, 2010, 2011).

Belief in global warming can be swayed by a variety of irrelevant stimuli. Some of those include seeing a dead indoor plant inside of a lab (Guegen, 2012) and the temperature on the day when asked about their global warming beliefs (Li, Johnson, & Zaval, 2011). National media outlets have adjusted their distribution of opinion pieces that express beliefs in and in opposition to climate change based on a comparison between U.S. local temperatures and long-term average temperatures (Donner & McDaniels, 2013). Evidence from the domains of astronomy, evolution, fractions, genetics, germs matter, mechanics, physiology, thermodynamics, and waves show that such scientific theories take over 40 years to overpower the theories people develop intuitively throughout their lifetime (Shtulman, 2016). One way to consider these intuitions, psychological and behavioral tendencies, and how they can be adjusted is through the lens of heuristics.

2. Remembering the past, envisioning the future

Neurological imaging and behavioral studies have shown that there is a connection between remembering and imagining the future (Addis et al., 2007; Szpunar et al., 2007; Buckner & Carroll, 2007; Bar, 2007; Gilbert and Wilson, 2007; Hassabis and Maguire, 2007; Schacter and Addis, 2007a, 2007b; Williams et al., 1996; D'Argembeau and Van der Linden, 2004, 2006; Spreng and Levine, 2006; Suddendorf and Busby, 2005; Morewedge et al., 2005; Atance and O'Neill, 2001, 2005; Clayton et al., 2003; Ingvar, 1979, 1985; Suddendorf and Corballis, 1997; Tulving, 1985, 2002a, 2002b, 2005; Wheeler et al., 1997; Van Hoeck et al., 2012). For example, patients with amnesia have been shown to be unable to imagine novel experiences (Hassabis et al., 2007b). PET scans show that thinking about past and future events involve similar regions of the brain (Okuda et al., 2003). Specifically, memory and imagination correlate with the default network (Raichle et al., 2001), which includes component processes such as the medial temporal and frontal lobes, posterior cingulate and retrosplenial cortex, and lateral parietal and temporal areas (Schacter, 2012). Future simulations have been defined as imaginative constructions of hypothetical scenarios (Schacter et al., 2008; Taylor & Schneider, 1989).

Recent findings in the field of thinking about the past and future have shown the importance of distinguishing "...between temporal and nontemporal factors when conceptualizing processes involved in remembering the past and imagining the future" (Schacter 678, 2012). While evidence has been found connecting thinking about the past and future, theoretical differences have emerged. Episodic memory is defined as specific events in a person's past (Tulving, 1983, 2002a) and semantic memory is defined as general knowledge obtained throughout a person's life (Schacter 678, 2012). Semantic memory is highly relevant in imagining the future (Klein, 2012; Martin-Ordas et al., 2012; Klein et al., 2002; Abraham et al., 2008a; Binder and Desai, 2011; Duval et al., 2012; Irish et al., 2012; Suddendorf and Corballis, 2007; Schacter et al., 2008; Szpunar, 2010).

Trends: Anchoring and Adjustment

Heuristics are the shortcuts that people use to judge and estimate values under uncertainty. One area of heuristics is called anchoring and adjustment. Anchoring is a phenomenon that occurs when a quantity value is considered before one estimates that quantity. In numerical estimation situations where a relevant value is present, the initial relevant value that is used is called an anchor. Any number a person is asked to consider causes an anchoring effect. Quantity estimates remain close to the value that has been considered, "hence the image of an anchor". Anchoring is exemplified with charitable donations for museum-goers in California who had an anchoring index over 30%. Without an anchor, the average donation offer was $64. With a $5 anchor, the average donation offer was $20, and when the anchor was $400, donation offers averaged $143 (Kahneman, 2015).

> "Anchoring effects have been demonstrated in numerous contexts, including the evaluation of gambles (Carlson, 1990; Chapman & Johnson, 1994; Schkade & Johnson, 1989), estimates of risk and uncertainty (Pious, 1989; Wright & Anderson, 1989), perceptions of self- efficacy (Cervone & Peake, 1986), anticipations of future performance (Switzer & Sniezek, 1991), and answers to general knowledge questions (Jacowitz & Kahneman, 1995)... preference reversals (Lichtenstein &

> Slovic, 1971; Schkade & Johnson, 1989), probability estimates (Fischhoff & Beyth, 1975; Hawkins & Hastie, 1991), trait inference (Gilbert, 1989; Kruger, 1999), language production and comprehension (Keysar & Barr, in press), and various egocentric biases such as the spotlight effect (Gilovich, Medvec, & Savitsky, 2000) and the illusion of transparency (Gilovich, Savitsky, & Medvec, 1998)" (Epley & Gilovich 2001, 391).

To quickly respond to estimation tasks, brief computation and extrapolation is made conducted, but these adjustments have been consistently shown to be inaccurate (Tversky, 1974). Errors in judgement occur even when subjects have a motivation to be accurate (such as being rewarded for correct answers)., thereby nullifying potential wishful thinking or "distortion of judgments by payoffs and penalties" (Kahneman, 1972).

In a simulation, the anchoring index is calculated by taking the difference between people's estimations and dividing it by the difference between the anchors. It is expressed as a percentage. In other words, "The anchoring measure would be 100% for people who slavishly adopt the anchor as an estimate, and zero for people who are able to ignore the anchor altogether" (Kahneman 2015, 125). Professionals in their respective fields believe that, due to their expertise on a subject, they are not susceptible to anchoring effects. However, a simulation with real estate agents and business school students showed that a property's listing price had a 7% difference in anchoring effect (the professionals anchoring index was 41% and the students' index was 48%). The notable difference between the two groups was that the students admitted to their susceptibility to being influenced by the anchor, and the professionals denied it (Kahneman, 2015).

System 1 & 2:

Kahneman (2011) articulates two systems of the brain that process information: System 1 is 'fast' and automated: it determines if someone is happy when you look at them, it judges

distance, and it forms first-impressions. System 2 is 'slow' and deliberate - it is the system that deals, for example, with complicated math.

Anchoring occurs within System 1 as an automated priming effect and within System 2 as a deliberate adjustment. Regarding System 1 and priming, Kahneman posits that, "...the absurdly high number still affected your estimate. My hunch was that anchoring is a case of suggestion. This is the word we use when someone causes us to see, hear, or feel something by merely bringing it to mind… the high and the low numbers activate different sets of ideas in memory" (Kahneman 2015, 124).

Regarding System 2, when an anchor is given, people assess whether it is too high or low and accordingly adjust their estimation. When further adjustment causes uncertainty, the adjustment stops. This generally occurs prematurely and the adjustment is subsequently insufficient. A driver exiting the highway onto a local street adjusts her speed down, but does not adjust enough; similarly, an adolescent whose parents ask her to lower the volume of the music in her room does not lower the volume enough for the standard her parents desire (Kahneman, 2015).

Adjustment is a "...deliberate attempt to find reasons to move away from the anchor" (Kahneman 2015, 123). When prompted to shake one's head, adjustment is increased, as if to further reject the anchor. When prompted to nod one's head, adjustment is lesser, reflecting an acceptance of the anchor. With depleted mental resources such as with drunkenness or high cognitive load, less adjusting is present, potentially illustrating that such lack of adjustment is a reflection of a weak System 2 (Kahneman, 2015).

Overall, the relationship between Systems 1 and 2 are crucial when considering anchoring and adjustment phenomena: “System 2 works on data that is retrieved from memory, in an automatic and involuntary operation of System 1. System 2 is therefore susceptible to the biasing influence of anchors that make some information easier to retrieve. Furthermore, System 2 has no control over the effect and no knowledge of it” (Kahneman 2015, 128). This relationship and its lack of acknowledgement is expressed by people who are given obviously absurd anchors and claim that they have no effect on estimations, when the opposite is evidenced to be true.

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The anchoring-and-adjustment heuristic can be a helpful shortcut, but because adjustments are generally insufficient, the anchor simply biases the estimation. Self-generated anchors result in stronger insufficient adjustment (Epley & Gilovich, 2001). Externally-provided anchors are taken with a certain level of consideration, while self-generated anchors are not, because one does not put weight on their own estimation. “There is thus no cause to consider whether the anchor value is correct and thus no engine of heightened accessibility of anchor-consistent information… [A]anchoring effects are produced by insufficient adjustment rather than selective accessibility when the anchor is self-generated” (Epley & Gilovich 2001, 391).

Self-generated anchors use different cognitive processes than externally-provided anchors (Epley & Gilovich, 2001). Research shows that head movements affect estimations: in circumstances where participants have the knowledge to confidently self-generate an anchor, those nodding their heads are more quickly accepting of the anchor value and therefore adjust

less in comparison to those shaking their heads. Head nodding and shaking have an influence on self-generated anchors but not experimenter-provided anchors. Therefore, the source of an anchor in the anchoring phenomenon is relevant as pertains to when adjusts are made and when they are not (Epley & Gilovich, 2001).

Confidence has been shown to result in lessened motivation to thoroughly consider new information. Therefore, this confidence results in an increased use of heuristics (Tiedens & Linton, 2001). Anger and disgust -- emotions of confidence and certainty -- cause for increased adjustment with self-generated anchors than fear and sadness -- emotions of uncertainty (Lerner & Keltner, 2001; Roseman, Spindel, & Jose, 1990; Smith & Ellsworth, 1985). This effect was not shown for experimenter-provided anchors (Inbar & Gilovich, 2011). Effects on the intensity manipulation of adjustment in self-generated anchors are clearer because people feel more confident in the placement of their own anchor (i.e. they have a sense of which direction to adjust in) (Epley & Gilovich, 2001, 2004, 2006). Conversely, experimenter-generated anchor manipulations are more difficult to assess, perhaps because the participants themselves are more unsure of which direction and to what degree they ought to adjust their estimation (Simmons, LeBoeuf, & Nelson, 2010).

High-certainty emotions lead to increased energetic cognitive processing (Lerner & Tiedens, 2006) and therefore adjust more from the initial anchor. Head-nodding and drunkenness result in more acceptance of the anchor value, while certainty emotions result in feelings of confidence and personal control. Confidence, therefore, results in weakened anchoring effects, as there is a more adjustment made. Additionally, ‘challenging states’ associated with self-efficacy, result in increased adjustment from self-generated anchors (Kassam, Koslov, & Mendes, 2009).

In summary, considering the insufficiency of adjustments in estimation tasks (Epley & Gilovich, 2004; Epley, Keyser, Van Boven, & Gilovich, 2004; Gilovich, Medvec, & Savitsky, 2000), increased adjustment leads to more accurate estimations. Therefore, high-certainty emotions -- with their increased adjustments -- result in more accurate estimations (Inbar & Gilovich, 2011).

However, a contradiction is present: either the induction of confidence and certainty lead to more adjustment, or to more reliance on the self-generated anchor, and therefore less adjustment. Certainty and uncertainty are consistent emotions that therefore can affect the adjustment as well as the anchor. Findings from Inbar & Gilovich's 2011 study suggest that such confidence and certainty lead to more adjustment and that "...angry or disgusted people are less prone to a common bias in judgment than people who are frightened or sad" (Inbar & Gilovich 2011, 568). They posit that head-nodding/shaking regard agreement/disagreement, which they associate with 'content of conscious thought' -- the anchor. Emotions, on the other hand, may not impact content but instead impact cognitive processes relating to judgments under uncertainty. Therefore, high-certainty emotions are associated with confidence in adjustment and do not necessarily influence initial confidence, because the anchor is the content of conscious thought.

3. Effects of memory on prosocial behavior

Recalling childhood memories has the potential to offset selfish motives and dishonesty. Moral purity is a psychological state of feeling morally clean and innocent. Childhood memories have been shown to elicit moral purity, leading to increased prosocial behavior. The elicitation of childhood memories inducing moral purity causes people to help in tasks, increase their donations for good causes, and hold others more accountable to ethics standards (Gino & Desai, 2011).

Research has evidenced that nostalgia is positively associated with both general and specific inspiration to act. Historically, nostalgia has been considered a psychological dysfunction (Hofer, 1688). Today nostalgia is generally considered a positive, social and past-oriented emotion (Hepper et. al, 2012). The New Oxford Dictionary of English (1998) defines nostalgia as "a sentimental longing or wistful affection for the past". It is an emotion that is felt approximately three times per week (Wildschut et al., 2006) and cross-culturally (Hepper et al., 2014, as cited in Stephan et al., 2015).

Nostalgia increases positive affect (PA) (Stephan et al, 2012; Verplanken, 2012), social connectedness (Wildschut et al., 2010; Zhou et al., 2008), leading to increased self esteem (Hepper et al., 2012; Wildschut et al., 2006), subsequent inspiration (Thrash & Elliot, 2003), and increased intentions to pursue important goals (Stephan et al., 2015). PA and self-esteem precede inspiration, and social connectedness is a critical component of attachment security, which promotes cognitive openness leading to inspiration (Green-Hennessy & Reis, 1998 as cited in Stephan et al., 2015).

Method

Three studies were conducted to investigate the effects of anchoring on nostalgia to predict future trends. Nostalgia can be tested and manipulated experimentally in various ways. The nostalgia manipulation check (Hepper et al., 2012) consists of a likert scale of 1-6 (strongly agree/disagree) of "now, I am feeling quite nostalgic," "Right now, I am having nostalgic feelings," "I feel nostalgic at the moment." The Nostalgia Inventory (NI) (Batcho, 1995) involves participants rating their intensity of nostalgia regarding 18 components of their past (i.e. "Having someone to depend on," "The way people were," "My family," "My pets"). The Southampton Nostalgia Scale (SNS) (Barrett et al, 2010; Routledge et al., 2008) involves participants reporting the frequency of and proneness to nostalgic engagement on a likert scale as well as their relationship with such engagement. Questions include "How often do you experience nostalgia?", "How prone are you to feeling nostalgia?", "How valuable is

nostalgia for you?", "How important is it for you to bring to mind nostalgic experiences?". The State Functions of Nostalgia Scale (Hepper et al., 2012) assesses nostalgic components including social connectedness, meaning in life and positive affect. An Event Reflection Task (Sedikides et al., 2015) can be combined with these scales- it involves participants recalling a past event - either ordinary or nostalgic - and describing it with a list of four keywords. Another variation on this method is to give participants a dictionary definition of nostalgia and instruct them to list three titles and their musician names of songs that made them feel nostalgia. Participants then read the lyrics of these songs and complete the nostalgia manipulation check (Stephan et al., 2015).

The methods and manipulations used in the following surveys were developed based on a combination of these and other components. The first study looked at the past-present-future relationship of three different trends with predictions that were not obvious to ascertain: child mortality rate, the number of White men in Congress, and the number of white Christmases. Two surveys were conducted: one that asked participants to consider the frequency of these trends 20 years ago compared to the present as well as the present compared to their predictions for 20 years in the future (i.e. *"To the best of your knowledge, was the child mortality rate lower or higher 20 years ago than it is currently?"* and *"To the best of your knowledge, will the child mortality rate be lower or higher 20 years from now than it is currently?"*). Another survey asked participants to only consider the future of these trends. Participants rated their responses on a Likert scale of 1-9 (1 = "*There were many fewer*," 5 = "*There were neither fewer nor more*," 9 = "*There were many more*").

Surveys were administered to park-goers in Union Square (Manhattan, New York) by an undergraduate research assistant. Participants were approached and asked if they wished to answer a short survey for a research project through the New School's psychology department.

Surveys were administered over a two-day period, both of which were notably unusually sunny and warm for the time of year. There were 103 participants; 43 male and 49 female. The mean age was 33.2 (SD = 13); 11 did not specify age. 64 identified as liberals, 7 did not identify with an ideology, 6 were independents, 1 was a conservative, 1 identified with the green party, 1 wrote "it's complicated, and 23 did not specify.

The second study considered the past-present-future relationship of only one trend that also did not have a prediction obvious to ascertain: the quality of music. Research has shown that music can elicit nostalgia (Barrett et al., 2010; Cheung, 2011; Routledge et al., 2011). Again, two surveys were conducted: one that asked participants to choose from partially configured graphs that represented how they felt about the trend of music quality in the past 25 years. Five conditions (graphs) were presented: 1) *extreme past decrease*: 25 years ago, the music quality was fully better than in the present, 2) *moderate past decrease:* 25 years ago, the music quality was moderately better than in the present, 3) *past no change:* 25 years ago, the music quality was the same as it is in the present, 4) *moderate past increase:* 25 years ago, the music quality was moderately worse than in the present, and 5) *extreme past increase:* 25 years ago, the music quality was fully worse than in the present. Participants were then asked to draw, by hand, their estimation of the same trend imagining into the future. They started at the point that their chosen graph ended and drew a straight line to 25 years into the future (music quality will be better or worse on a scale of 8: 8 = *better*, 4 = *no change,* 0 = *worse*.

The second survey included only the drawing task in which participants imagined the future trend of music quality. These two surveys caused participants to think about *and* visualize the past and future with self-generated anchors. Surveys were again administered to park-goers

in Union Square (Manhattan, New York) by one undergraduate and one graduate researcher. Participants were approached and asked if they wished to answer a short survey for a research project through the New School's psychology department. Surveys were administered over a two-day period, the second of which only the undergraduate research assistant collected data. There were 108 participants; 41 male and 39 female. The mean age was 38.75 (SD = 14.88), 32 from NYC, 6 from New York State, 28 from other states and 14 internationals. The graduate researcher recruited 29 participants and the undergraduate research assistant recruited 51.

The third study considered the role of nostalgia on participants' perceptions of trends of environmental degradation in the past and future with self-generated anchors. Three surveys were conducted. The first survey asked participants to consider a positive memory they had outside in nature (*environmental nostalgia)*. The second survey asked participants to consider a positive memory they had indoors (*indoor nostalgia)*. The third survey asked participants to consider a memory that made them feel boredom (*no nostalgia)*. After writing a description of their memory, they answered questions regarding human responsibility in caring for the environment, the importance of environmental preservation, their pleasure in protecting the environment, whether or not the benefits of protecting the environment outweigh the costs, how interested they are in the topic of the environment, their opinion on exaggerated claims of environmental degradation, their overall perception on climate change science, and the emotions those perceptions elicit. Further questions included the role of humans in the environment, the impact of climate change on future generations, the the effect of the participant individually taking action against climate change. Participants then answered questions about their recalled memory, such as their emotional response (happy or sad), the extent to which the memory made

them yearn for the past, and how the memory made them feel about the life they have led. The role of other actors in their memory was considered.

Data was collected online through MTurk with 131 participants; 63 female, 68 male. The mean age was 36.05 (*SD* = 12.36). 52 identified as Democrats, 35 Republicans, 34 Independents, 3 Libertarians, and 6 selected 'None'.

Results

Study 1

For the first study, we hypothesized that: 1) participants would report more white Christmases (WCs), higher child mortality rate, and more White men in Congress in the past than in the future, and 2) those who reported trends in the past and future would demonstrate more extreme future trends than those who reported trends in the future alone.

A significant correlation was found between the past and future regarding child mortality, $r(49) = -.319$, $p = .024$, a moderately significant correlation regarding White men in Congress, $r(49) = -.259$, $p = .069$, but an insignificant correlation regarding the WC condition, $r(49) = .089$, $p = .547$. Therefore, the child mortality rate reported in the past correlates with the child mortality rate expected in the future, the number of White men in Congress reported in the past moderately correlates with the future, and the WCs do not correlate between the past and future.

The mean WC's reported in the future did not differ significantly between those who reported WC's in both the past and future ($M = 3.08$, $SD = 1.51$) and those who reported WC's only in the future ($M = 2.63$, $SD = 1.37$), $t(97) = 1.57$, $p = .119$). Not only is this not significant, but the trend is in the opposite direction as was hypothesized. The mean child mortality rate

reported in the future was not significantly different between those who reported mortality rates in both the past and future (M = 3.82, SD = 2.02) and those who reported mortality rates only in the future (M = 4.35, SD = 2.09), $t(99) = 1.31$, p =.195). Likewise, White men in Congress expected in the future was not different among those who reported this in both past and future (M = 4.06, SD = 2.09) and those who reported this only in the future (M = 4.08, SD = 2.29), $t(98)$ = .05, p = .96).

The number of WCs reported in the past (M = 5.83, SD = 2.157) differed significantly from the number of WCs reported in the future (M = 3.08, SD = 1.514) for those who reported both past and future WCs, $t(47) = 7.554$, $p < .0001$. The child mortality rate in the past was significantly different from the rate reported in the future, $t(47) = 5.385$, $p < .0001$. The number of White men in Congress in the past was significantly different from those expected in the future, $t = 5.4666$, $p < .0001$. The variation (SD) for WCs in the past was greater than the variation in any other past/future variable, but the variation WC's in the future was less than any other variable, likely because participants were often using the low end of the scale.

Study 2

For the second study, we hypothesized that: 1) for those in the past and future condition, the starting point of the trend would negatively predict the endpoint, 2) those who selected different past trend directions (and future-only trends) would differ in the slope of their future trend, and 3) the absolute differences between the endpoint and midpoint would be different for *future only* and *no change* conditions versus the *past increase* and *past decrease* conditions. 28 participants did not follow instructions (i.e. they drew lines that were not straight) and were excluded from analysis.

The regression was significant and showed the first hypothesis: past starting point predicted future endpoint, $b = -.42$, $t(46) = -3.08$, $p = .003$. The past starting point explained 17.1% of variance in the future endpoint, $R^2 = .171$, $F(1, 46) = 9.48$, $p = .003$, meaning that 17.1% of participants' endpoints can be predicted if the past trend is reported.

The second hypothesis was partially shown in that those who selected *past increase* differed from the others, but there were no other changes. The overall main effect of the condition/past trend after taking into consideration Levene's Test and correcting for the violation of the ANOVA test's assumption of the quality of variances between groups was significant: Welch's $F(3,28.92) = 9.57$, $p < .001$. This violation was expected, as the variance should be reduced when a past trend was selected as was the case for *no change* and *increase* conditions. Post-hoc analyses showed significant differences on future endpoint between those who selected a past increase and all other groups (all *p's* < .018), but no other pairwise comparisons reached significance (all *p's* > .18). This provides only partial support for this hypothesis, as only those who perceived an increase in music quality in the past varied significantly from the other groups in their perception of future trends.

The third hypothesis was also partially shown, in that *no change* was continued into the future. The overall main effect was $F(3,76) = 4.02$, $p = .01$, $n_p^2 = .14$. The absolute differences were calculated by subtracting the end point from the midpoint (we expected those who selected *increase* or *decrease* in music quality would have a greater variance than no change and future only because they should continue their trend. Post-hoc comparisons showed that *No Change* group showed significantly less deviation from the scale midpoint than all other groups (all *p*'s <

.007). There was partial strong support for hypothesis because the no-change group was anchored, but there were no other significant pairwise comparisons.

Study 3

For the third study, we hypothesized that the *environmental nostalgia* condition would affect attitudes on climate change, specifically leading participants to be more concerned with environmental issues. Our results contradicted this hypothesis. Analyses were done primarily comparing the *environmental nostalgia* condition with the others. The items in the spreadsheet marked with and "R" were reverse-scored, such that higher responses indicate stronger pro-environmental attitudes on all items. Comparing *environmental nostalgia* and *indoor nostalgia*, there was moderate significance for "*Climate change is a natural fluctuation,*" $t(67) = 1.84$, $p = .07$, and less strong for "*claims are exaggerated,*" $t(67) = 1.34$, $p = .18$. All other p's > .23. Comparing *environmental nostalgia* against both other groups (*indoor* and *no nostalgia* combined), there was a significance for "*Climate change is a natural fluctuation*," $t(129) = 2.06$, $p = .041$, and for "*claims are exaggerated*," $t(129) = 2.10$, $p = .037$. There was moderate significance for "*Too early to tell if climate change is real,*" $t(129) = 1.46$, $p = .146$, and moderate significance for "*pleasure in environmental protection*," $t(129) = 1.38$, $p = .171$. All other p's > .22. Contrary to our hypothesis, in the *no nostalgia* condition, beliefs in climate change and beliefs in environmental concern are exaggerated. The only trend that was seen in the expected direction was "*pleasure in environmental protection.*"

The more the memory caused a "*yearning for the past*," the more participants reported that claims about environmental issues are exaggerated $r(131) = -.198$, $p = .024$, and they felt that talking about climate change was moderately more boring, $r(131) = -.146$, $p = .096$.

However, these correlations only existed when those in the "no nostalgia" condition were included. Without them, these correlations disappear (*r*'s = approximately +/- .06). We hypothesized that yearning for past would increase climate change concerns, but the opposite was shown. The less the memory caused yearning for the past, the less they claimed climate change was exaggerated.

The only significant correlation occur between "*yearning for the past,"* and the *no nostalgia* condition. More yearning for the past relates to less responsibility to protect environment, $r(62) = -.296$, $p = .02$, more belief that environmental dangers are exaggerated, $r(62) = -.225$, $p = .079$, more belief that it is too early to tell if climate change is real $r(62) = -.228$, $p = .075$, and more dread when thinking about climate change, $r(62) = .332$, $p = .008$. In the *no nostalgia* condition, when they yearned for the past they felt more dread, less responsibility, etc. The *nostalgia conditions* had an insignificant correlation with these environmental concerns.

Discussion

Our findings showed very little from what was hypothesized, which was that considering nostalgic and/or past events would affect future predictions on trends- specifically, climate change. In Study 1, participants tended to report more WC, higher child mortality and more White men in Congress in the past than the future. Those who reported past and future did not tend to differ with those who only reported on the future condition. If anything, WCs tended in the opposite direction to what was hypothesized. Study 2 showed potential hope, as our hypotheses were partially shown: 17% of the endpoints could be predicted by the past trends.

Unfortunately, Study 3 showed, if anything, the opposite reactions to climate change that we hypothesized.

For Study 1, a potential explanation of the lacking correlation between the past and future was that the past served as an anchor for the future, as opposed to anchoring on the trend from past to present, and then present to future. This might be remedied by having participants report the actual number of WCs over time, or something else that emphasizes the *trend over time*, as opposed to just a comparison of the past and future. Additionally, the domain specificity could have been problematic for this initial study. We hypothesized that visualizing trends could improve the findings, and adjusted accordingly for Study 2.

For Study 2, the initial trend reported could have served as an anchor in one of two ways: 1) if the quantitative figure of the reported past trend is a valid, direct anchor, and insufficient adjustment is made from this anchor, the future trend reported should be similar to the past trend (i.e., music quality was *better* in the past, more likely to also report quality as *better* in the future), 2) the figure serves as an anchor, but the trend reported in the future will be a continuation of the trend in the past, such that adjustment on an actual scale will be greater due to the anchor (i.e., music quality was *better* in the past, and therefore will be even *worse* in the future). The latter was shown, and seemed to indicate hope for our hypotheses.

For study 3, a potential explanation for the results is that priming them with a positive, nostalgic memory caused them to be positive about the environment but less concerned for it. This is particularly shown with the "*pleasure in environmental protection,"* the only response to which those in the *environmental nostalgia* condition seemed to answer positively regarding the environment. By idealizing the past, it potentially leads to an idealization of the future. Nostalgia

involves feelings of negativity (i.e. disappointment and loss) and positivity (i.e. triumphs over adversity), and it is difficult to ascertain when which one is being felt. It can cause for optimism (Cheun et al., 2013), redemptive-like feelings (Sedikides et al., 2006; Wildschut et al., 2006) or bleakness. Overall, nostalgia is a complex process and is difficult to simply manipulate and ascertain subsequent results. Positive memories can lead to positive attitudes in general.

Future research should specifically articulate and draw out the comparisons with the past and present in order to anchor with a comparison as opposed to only anchoring with the past.

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