Language Shapes People's Time Perspective and Support for Future-Oriented Policies

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Abstract: *Can the way we speak affect the way we perceive time and think about politics? Languages vary by how much they require speakers to grammatically encode temporal differences. Futureless tongues (e.g., Estonian) do not oblige speakers to distinguish between the present and future tense, whereas futured tongues do (e.g., Russian). By grammatically conflating "today" and "tomorrow," we hypothesize that speakers of futureless tongues will view the future as temporally closer to the present, causing them to discount the future less and support future-oriented policies more. Using an original survey experiment that randomly assigned the interview language to Estonian/Russian bilinguals, we find support for this proposition and document the absence of this language effect when a policy has no obvious time referent. We then replicate and extend our principal result through a cross-national analysis of survey data. Our results imply that language may have significant consequences for mass opinion.*

Does the language we speak affect the degree to which we endorse future-oriented policies? Cognitive science has produced solid empirical evidence showing that linguistic differences in grammar often shape our thinking, knowledge, and construction of reality (for an overview, see Pérez 2015). Language guides our understanding of such fundamental phenomena as space, time, causality, and relations with others. The language we speak can affect whether we interpret events as accidents or foul play (Fausey and Boroditsky 2011), whether we save money and exercise (Chen 2013), whether we express prejudice (Danziger and Ward 2010), and whether we are inclined to solve conflicts (Laitin 1977). These results have important implications for politics, law, and society, but with few exceptions (Laitin 1977; Lee and Pérez 2014; Pérez 2015, 2016; Pérez and Tavits 2016), political scientists have so far chosen to ignore language effects. This is surprising given how much political science research focuses on understanding attitudes and behavior.

This article takes a new step in this research field by studying whether language influences individual policy preferences. People frequently encounter choices whose repercussions are hard to immediately appreciate. Take the many individuals among us who procrastinate, leaving their present tasks and chores for another day. For these people, the future is both distinctive and more remote from now—a mental space to where they can defer unfinished business. Research shows that there is considerable variation across individuals in their level of short-termism, that is, in the extent to which they discount the future (Frederick, Loewenstein, and O'Donoghue 2002). Importantly, such views about time seem to also influence people's politics. Some citizens, for example, might choose to postpone a "green" tax today in order to protect the environment tomorrow if the complete deterioration of the latter seems decades away (e.g., Yeager et al. 2011). In turn, other citizens might delay reforming expensive entitlement programs now (e.g., Social Security) if their full collapse feels distant (e.g., Shaw and

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Mysiewicz 2004). Still others may oppose democratization and market reforms if the immediate effects of these processes include a breakdown of order and economic insecurity, while the rewards of freedom and prosperity seem far away (e.g., Przeworski 1991). Just as in their private lives, then, people can find it easier to discount the future consequences of their present political choices. But where do people's time perspectives come from in the first place? And can they impact individuals' political views?

Part of the answer to these questions, we believe, has to do with the language one speaks. Languages vary by the degree to which they require speakers to attend to and encode time (Dahl 2000; Slobin 1996, 2003; Thieroff 2000). *Futureless* languages, such as Estonian or Finnish, do not require speakers to grammatically distinguish between now and then—the present tense serves the same function as the future tense (Bittner 2005; Chen 2013; Dahl and Velupillai 2011). In contrast, *futured* languages, like Spanish and Russian, require speakers to differentiate between the present and future by using verbs with distinct and obligatory future forms. Spanish speakers, for instance, must use a different tense to indicate when an act takes place, as in *escribiré mañana* ("I will write tomorrow") versus *escribo hoy* ("I write today"). Finnish speakers, however, simply say *kirjoitan* ("I write") regardless of whether it refers to writing today or tomorrow.

Drawing on cognitive and cultural psychology, we theorize that speaking a *futured* tongue leads to a frame of mind that discounts the future consequences of current political choices. In *futured* languages, it is grammatically obligatory to mark off "today" from "tomorrow" (Slobin 1996). This highlights to speakers that the future is distinct and distant from the present (Chen 2013; Dahl 2000; Dahl and Vilupillai 2011; Thieroff 2000). But for speakers of *futureless* tongues, grammar does not highlight the distinctions between now and then (Slobin 1996; Thieroff 2000). As a consequence, speaking such tongues makes tomorrow seem temporally closer and more similar to today (Chen 2013). Speakers of *futured* languages should therefore treat pending rewards as more distant and less pressing than speakers of *futureless* languages. If our reasoning is correct, then whether or not a language is *futured* should causally impact not only speakers' time perspectives but also their political choices with temporally far-off ramifications.

We break new ground by manipulating the language of interview in a public opinion survey of bilingual adults who speak equally well a *futured* (Russian) and a *futureless* (Estonian) language. This parsimonious design lets us clearly identify the effect of speaking a *futured* or *futureless*

language on people's conception of time (Dunning 2016; Green 2004). Consistent with our theoretical reasoning, we find that respondents who were assigned to interview in Estonian were significantly more likely to endorse a gas tax increase in order to protect the environment (i.e., to address a policy problem with future ramifications) than those who were assigned to interview in Russian. We further validate the psychological mechanism underlying this effect by showing that respondents assigned to interview in Estonian are likely to value future rewards more than those who were assigned to interview in Russian. Finally, a placebo test shows that interview language fails to affect opinions about a policy proposal with no clear time reference. Building on this experiment, we then conduct a cross-national analysis of survey data. Consistent with our theorizing, we find that individuals who speak a *futured* tongue at home are less likely to report attitudes (i.e., pro-environment opinion) and behaviors (i.e., greater propensity to save) that reflect longer time horizons.

Ours is the first study to show that whether or not language requires its speakers to distinguish between the present and future has significant effects on mass opinion about politics. This is a novel interpretation of the determinants of people's policy preferences. It suggests that simple quirks in language can impose important constraints on one's temporal thinking and affect how mentally receptive people can be to solving problems whose full ramifications will not materialize until a seemingly distant future arrives.

While we explore the effect of just one linguistic nuance—the coding of time—the broader implications of our findings for political scientists are arguably more far-reaching. If the language we speak can shape how we construct reality, as our results imply, then it behooves political scientists to further explore how other linguistic differences might shape mass political choices, pushing forward research in various subfields. For example, better understanding how language shapes thought can advance research in political psychology by broadening our understandings of attitude formation and change (Taber and Young 2013). In addition, greater knowledge of language effects on people's attitudes, behavior, and preferences can shed new light on cross-country variation in policy choices and outcomes (Dalton 2014), relations between ethnic groups (Horowitz 1985), international interactions (Bueno de Mesquita and Smith 2012), and many other phenomena. Finally, scholars can advance research on political culture by using language nuances as a way to systematically analyze and quantify cultural effects (Almond and Verba 1963).

Theory: How Language Affects Time Perspectives and Political Attitudes

Languages differ in the degree to which they contain markings for future tense. Prior research classifies as *futureless* those tongues that lack systematic grammatical future-time markings (GFTM; e.g., Estonian, Finnish, Mandarin), as well as those that do not *require* GFTM when making future predictions (e.g., most Germanic tongues). *Futured* tongues often include those languages requiring inflectional future (e.g., Russian, Spanish, Italian), as well as those requiring *any* systematic GFTM when making future predictions (e.g., the English *will*). Using these criteria, Chen (2013) classifies 34 out of 123 world languages included in his study as *futureless* (i.e., having "weak future-time reference").

We argue that the distinction between *futured* and *futureless* languages has real consequences on politically relevant attitudes. Our central hypothesis is that speakers of *futured* languages are less likely to support future-oriented policies. This claim flows directly from the following four insights. First, grammatical rules affect thinking by drawing speakers' attention to certain distinctions or categories in the world over others (i.e., habits of speech affect habits of mind). Second, in the case of grammatical rules about future tense, this implies that *futured* languages draw speakers' attention to differences between the present and the future, whereas *futureless* languages do not. Third, when speakers see the future as similar to the present, they are less likely to discount the future and more likely to engage in future-oriented behaviors. Finally, because many policies explicitly rely on people's willingness to invest in the future, speakers of *futureless* languages are more likely to be supportive of such future-oriented policies as, for example, environmental protection. We explain this causal chain in more detail below.

Language and Time Perspectives

Differences in grammatical rules across languages oblige speakers to focus on different aspects of their experience when using a specific language. That is, if speaking a language requires one to make certain distinctions between objects, such as colors, gender, and time orderings, then speakers take for granted that these categories actually exist in the world and are significant (cf. Boroditsky 2001; Boroditsky, Schmidt, and Phillips 2003; Cubelli et al. 2011; Fuhrman et al. 2011; Viglioccio et al. 2005). Because of these obligatory distinctions, the speakers of those languages will think differently than the speakers of other languages that do not require making similar distinctions

(Slobin 1996). For example, individuals are less likely to see the differences between different shades of blue if their language does not require them to designate the shades with different words (Winawer et al. 2007); individuals whose languages use absolute cardinal directions (north, south, east, west, etc.) to talk about space are capable of locating themselves in relation to these directions even in unfamiliar surroundings and inside buildings (Levinson 1996); and individuals are more likely to express gender-blind political attitudes if they speak a language that does not use gender distinctions in pronouns or designate the gender of nouns (Pérez and Tavits 2016). These are incredible differences in cognition across individuals that prior research attributes to the quirks of grammar in their language. Critically, effects like these are known to emerge on nonlinguistic tasks, indicating that language can impact cognition with little or no verbalization (Fausey and Boroditsky 2011; Fuhrman et al. 2011).

In terms of *futured* and *futureless* languages, this implies that people who are required by their language to grammatically distinguish between the present and the future will have different temporal perceptions than those whose language does not require them to do so (Bittner 2005; Chen 2013; Dahl 2000; Dahl and Velupillai 2011; Thieroff 2000; see also Zimbardo and Boyd 1999). *Futured* tongues force speakers to decouple "tomorrow" from "today" and thereby interpret the former as discernibly different and temporally distant from the latter. In contrast, *futureless* languages conflate the present and the future, making it harder for the speakers of these languages to perceive the future as distant and different from today. Thus, speakers of *futureless* tongues sense the future is more similar and temporally closer to the present.[1] In short, using different grammatical rules in everyday speech predisposes *futured* and *futureless* language speakers to interpret the same temporal reality differently.

The way language biases people's perception of time affects how much they value future rewards. Speakers of *futured* languages are likely to see future rewards as

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[1] One might argue that speakers of a *futureless* language can use other means besides grammatical tense to mark event timings, and that the absence of grammatical future time referents may actually force them to be more precise about when specific events take place. The linguistic research we consulted suggests this is not the case (Dahl 2000; Dahl and Velupillai 2011). To the contrary, using the text of a weather forecast in English (*futured* language) and Finnish (*futureless* language), Dahl (2000) shows that both languages use an equal number of nongrammatical time markings (Monday, mid-week). We reach a similar conclusion using United Nations texts on sustainable development to better match the subject of our study (see the supporting information (SI), Section SI.1, for details). Ultimately, if any asymmetry exists in the use of nongrammatical time markings, then it will make it harder (rather than easier) for us to detect our hypothesized relationships.

more distant and therefore less compelling (Chen 2013). This will affect the nature of people's current choices. If speakers of a *futured* tongue are more likely to discount the future, then they are also *less* likely to engage in future-oriented behavior by choosing immediate rewards over future ones. Speakers of *futureless* tongues, on the other hand, are less likely to discount the future. Because of this, they are more likely to invest in the future and engage in future-oriented behaviors.

Our study, as well as cognitive science research on language, treats grammatical rules (i.e., the presence or absence of future tense) and the related linguistic environment (i.e., general timing orientation of languages) as tightly intertwined and conceptually inseparable. The presence or absence of grammatical future time reference is a stable linguistic feature that originated centuries ago (Dahl 2000), yielding a precise mechanism to which the general timing orientation of languages can be traced. Hence, the varied use of tenses to mark time is encoded into languages, and its effect is invoked automatically and unconsciously, producing a significant "impact on how we understand everyday life" (Lakoff 1987, 335).[2]

Language and Political Attitudes

The argument that speakers of *futureless* tongues will value the future more than speakers of *futured* languages has clear implications for the political realm.

Many policy choices have distant payoffs but immediate costs. For example, reforms of entitlement programs, austerity policies, and other economic reforms all imply short-term costs for a potential long-term gain. Large-scale processes such as democratization and market reforms also require sacrifices today in the name of freedom and prosperity in the future. Similarly, investment in science and technology requires longer time horizons (Yearley 2014), as do personal and national choices with regard to savings and preventive health measures (Chen 2013), and participation in long-term international integration efforts, such as the European Union (Pierson 1996).

One major and pressing area of global concern, where payoffs are distant, is the realm of environmental protection and climate control. The latest report by the Intergovernmental Panel on Climate Change (IPCC; 2014) concludes that the earth's temperature is climbing,

with most of this rise driven by man-made activities, especially the use of fossil fuels. The IPCC anticipates that going forward, global warming will continue to adversely impact the earth on a wider scale through severe droughts, coastal erosion and rising sea levels, further deterioration of ecosystems, and major disruptions to food production. Mitigating these effects requires a coordinated and sustained international response, which hinges on elected officials marshaling their mass publics behind government responses to this ecological threat (Bechtel and Scheve 2013; Brechin and Brandari 2011). That is, governments face the challenge of rallying their publics around a future-oriented policy with temporally remote effects.

Environmental protection, then, is an appropriate test case for the political implications of our linguistic argument. Accordingly, we hypothesize that in comparison to individuals who speak a *futured* tongue, those who speak a *futureless* language will be (1) less likely to discount the future, and (2) be more supportive of initiatives to protect the environment.

Research Design: Study 1

We first test our claims with an original public opinion survey fielded in Estonia from May 26 to June 12, 2014.[3] Estonia is a linguistically and ethnically diverse society, with about 69% of the population identifying Estonian and 29% Russian as their first language. Roughly 44% of the former group and 36% of the latter speak the other language well enough to qualify as bilingual, according to our definition. The survey randomly assigned 1,200 Estonian-Russian bilingual adults to interview in Estonian (i.e., a *futureless* tongue) or Russian (i.e., a *futured* tongue),[4] making for a straightforward between-subjects design (Dunning 2016; Green 2004; Shadish, Cook, and Campbell 2002).[5]

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[2]In even broader terms, language is a component of culture (e.g., Boroditsky, Fuhrman, and McCormick. 2010; Boroditsky and Gaby 2010; Fedden and Boroditsky 2012; Fuhrman et al. 2011; see also Laitin 1977). While we acknowledge that language and culture are intertwined, the former is what we isolate via the research design we describe below.

[3]Further details about the Estonian context, the survey protocol, description of the language manipulation, and precise question wordings for the outcome measures are presented in SI.2.

[4]Power is set at 0.90 for this study. Mean differences with Cohen's $d = 0.20$ and two-tailed $p < .05$ require N = 1,054. Hence, our sample (N = 1,200) can unearth meaningful language effects in either direction, if they in fact exist.

[5]Arguably, an alternative research design would be to examine tense differences *within* a language, such as English. However, that type of research design can force grammatical comparisons that are not privileged in a language's natural use. For example, English is formally classified as a *futured* tongue, which means that its grammar directs speakers to crisply distinguish between present and future (Chen 2013). Thus, even if tenses within this language can be modified to de-emphasize this distinction, this "lighter"

Eligible bilinguals were identified via self-rated skill in Estonian and Russian. Bilingual respondents who said they "can understand, speak, and write" or are "fluent" in both languages were randomly assigned to interview in Estonian or Russian. Thirty-eight percent of our sample consists of bilinguals whose first language is Russian, and who, on average, learned Estonian at the age of 15. In turn, those bilinguals in our sample (62%) whose first language is Estonian learned Russian, on average, at the age of 14. Finally, 61% of our respondents are female, with a median age of 52 and secondary level of education.[6] We collected pretreatment information on these and a few other demographic characteristics of each respondent. These pretreatment variables are balanced across both experimental conditions (see SI.3).

Measures of Political Opinion and Time Perspective

Posttreatment, respondents answered a question regarding their political views about a proposed "green tax," as well as several items related to their perceptions of time. These serve as the dependent variables in our analyses.

The question about a *Green gas tax* allows a direct test of our claim that the presence or absence of future tense in a language causes individual-level changes in support for policy proposals with long-run implications. The question was worded, "Do you favor or oppose a government increase of the excise tax on gasoline to try to protect the environment?" with "yes, I favor it" keyed as 1 and "no, I oppose it" keyed as 0.[7] This item is an adaptation inspired by similar political questions

stress on future time reference is not a habitual feature of English. For this reason, we chose to exploit variation *between* languages and their degree of grammatical emphasis on the future, since this better reflects variation that naturally occurs in languages (Dahl 2000; Slobin 1996, 2003).

[6]See SI.2 for details on the identification of bilinguals and language assignment. By design, our respondents are a subset (but not a random sample) of highly bilingual Estonian adults who were randomly assigned to interview in Estonian or Russian in a phone survey. We did not calculate sample weights since we are only interested in estimating the causal effect of our manipulation in this research setting.

[7]The Russian translation of this question uses grammatical future tense markers as part of the question and response options. However, such markers are not used in reference to "protecting the environment." Recall, however, that language can impact cognition with little or no verbalization (Fausey and Boroditsky 2011; Fuhrman et al. 2011). That is, speaking a *futured* language should trigger resistance to future-oriented behaviors and attitudes even when the questions about those attitudes do not explicitly make use of the grammatical future tense markers. Thus, we believe such question wording offers a more stringent test of our hypothesis.

in established surveys like the General Social Survey and the Americas Barometer. By linking preservation of the environment to a possible tax increase, we aimed to present respondents with a fairly nontrivial proposal, which makes it less likely that any opinion differences on this item are due to "non-attitudes" (Converse 1964; Tourangeau, Rips, and Rasinski 2000).

In order to measure subjects' time perspective, we directly borrowed items from prior work conducted on this topic by Phillip Zambardo and his associates (Zimbardo and Boyd 1999). Among other things, this research has developed a set of items to measure the extent to which an individual's decision making and behavior is "present-oriented" (i.e., tends to rely on "the immediate, salient aspects of the stimulus and social setting") or "future-oriented" (i.e., tends to rely "on anticipated consequences of imagined future scenarios"; Zimbardo, Keough, and Boyd 1997, 1008). These items allow us to validate our proposed psychological mechanism by testing whether interviewing in a *futureless* tongue yields a more future-oriented outlook while interviewing in a *futured* language yields a more present-oriented time perspective.

More specifically, our items *Don't worry*, *Take each day*, *Keep working*, and *Resist temptation* ask respondents to indicate on a 4-point scale how characteristic a specific time-related statement is of them, with "very uncharacteristic" keyed as 1 and "very characteristic" keyed as 4. The first two of these four items capture a present time frame, what Zimbardo and Boyd (1999, 1275) describe as a "hedonistic, risk-taking, 'devil may care' attitude toward time." *Don't worry* asks, "If things don't get done on time, you don't worry about it," whereas *Take each day* states, "You take each day as it is rather than try to plan it out." If speaking a *futureless* language leads people to conflate the present and future, individuals who are assigned to interview in Estonian should construe these items as being less characteristic of them than those who are assigned to interview in Russian.

In contrast, the last two items in this battery, *Keep working* and *Resist temptation*, tap into a future time perspective, whereby people's "behavior is dominated by a striving for future goals and rewards" (Zimbardo and Boyd 1999, 1275). *Keep working* states, "You keep working at difficult, uninteresting tasks if they will help you get ahead," whereas *Resist temptation* says, "You are able to resist temptations when you know that there is work to be done." Respondents who are assigned to interview in Estonian should find such statements to be more characteristic of them than those who are assigned to interview in Russian.

TABLE 1 **The Effects of Futureless Language on Time Perspective and Individual Support for a Green Gas Tax**

	Political Choice	Present Time		Future Time	
	Model 1: *Green gas tax* (Probit)	Model 2: *Don't worry* (Ordered Probit)	Model 3: *Take each day* (Ordered Probit)	Model 4: *Keep working* (Ordered Probit)	Model 5: *Resist temptation* (Ordered Probit)
Estonian interview	0.24***	−0.31***	−0.05	0.18***	0.47***
	(0.08)	(0.07)	(0.06)	(0.07)	(0.07)
Constant	−0.44***	—	—	—	—
	(0.06)				
N	1,104	1,162	1,166	1,145	1,112

Note: Dependent variables are indicated in column headings.
***p < .01, **p < .05, two-tailed.

Results: Study 1

Do language differences in the use of grammatical future time reference matter for how individuals judge politics? Model 1 in Table 1 provides the relevant result. In particular, it reveals that respondents interviewing in Estonian are reliably more supportive of a *Green gas tax* than are those interviewing in Russian (0.24, SE = 0.08, p < .05). Thus, language nuances about time do seem to cause reliable and meaningful shifts in people's political decision-making. Indeed, this estimated language effect remains intact if we include as covariates individual differences in age, education, gender, and ideology (see Table SI.4.1). This latter exercise also reveals that the raw effect for interviewing in Estonian is similar in strength to the raw association between personal endorsement of this gas tax and a respondent's political ideology and gender, which underlines the substance of this language effect.[8] Specifically, in comparison to a respondent reporting no ideology, a respondent who reports being left-of-center ideologically is more likely to support this proposed gas tax (effect size = 0.28). Similarly, females are more likely than males to endorse this gas tax (effect size = 0.24). Both of these relationships are similar in magnitude to the language effect of 0.26.

To obtain a firmer sense about whether our hypothesized psychological mechanism has any validity to it, we next examine the impact of interviewing in a *futureless*

tongue (i.e., Estonian) on items capturing a present and future time perspective. These results are presented in Models 2 and 3, under the heading "Present Time." There we see that relative to respondents assigned to interview in Russian, those interviewing in Estonian were less likely to say that not completing things on time does not worry them—a difference that is highly reliable (−0.31, SE = 0.07, p < .001). We obtain a coefficient in the same substantive direction for the item *Take each day*, although this effect is imprecisely estimated and therefore fails to reach conventional significance levels (−0.05, SE = 0.06, p < .47). This is likely due to a greater amount of unreliability that stems from analyzing any one single item (Brown 2006), for scaling *Don't worry* and *Take each day* (ρ = 0.29) yields a highly reliable result in the same direction (−0.33, SE = 0.10, p < .002).[9] As theorized, then, interviewing in a *futureless* language leads to a more blurred distinction between the present and the future.

When we turn to the results under the heading "Future Time," we also find evidence that is in the expected direction and, this time, consistently reliable. Models 4 and 5 reveal, respectively, that in comparison to respondents interviewing in Russian, those who were assigned to interview in Estonian are more likely to report that working on uninteresting tasks to get ahead is more characteristic of them (0.18, SE = 0.07, p < .009), and to state that resisting temptation when there is work to do is more typical of them (0.47, SE = 0.07, p < .001). Thus, interviewing in a *futureless* tongue causes one to more strongly emphasize a future time perspective. The results for these time perspective items also serve as a manipulation check, since variation in language type appears to meaningfully

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[8]In another analysis (Table SI.4.2), we also show that our estimated treatment effects remain largely intact if we adjust them for bilinguals' preferred interview language, which we can treat as a coarse indicator of respondents' default cultural knowledge. In Table SI.4.3, we demonstrate that our language treatment is not moderated by the gender of respondents despite the fact that all of our interviewers were women (see SI.2 for details on interview protocol).

[9]Indeed, these two items are part of a larger scale tapping into a present time perspective, which Zimbardo and Boyd (1999) validated in several diverse convenience samples.

FIGURE 1 Substantive Shifts in Political Judgment and Time Perspective
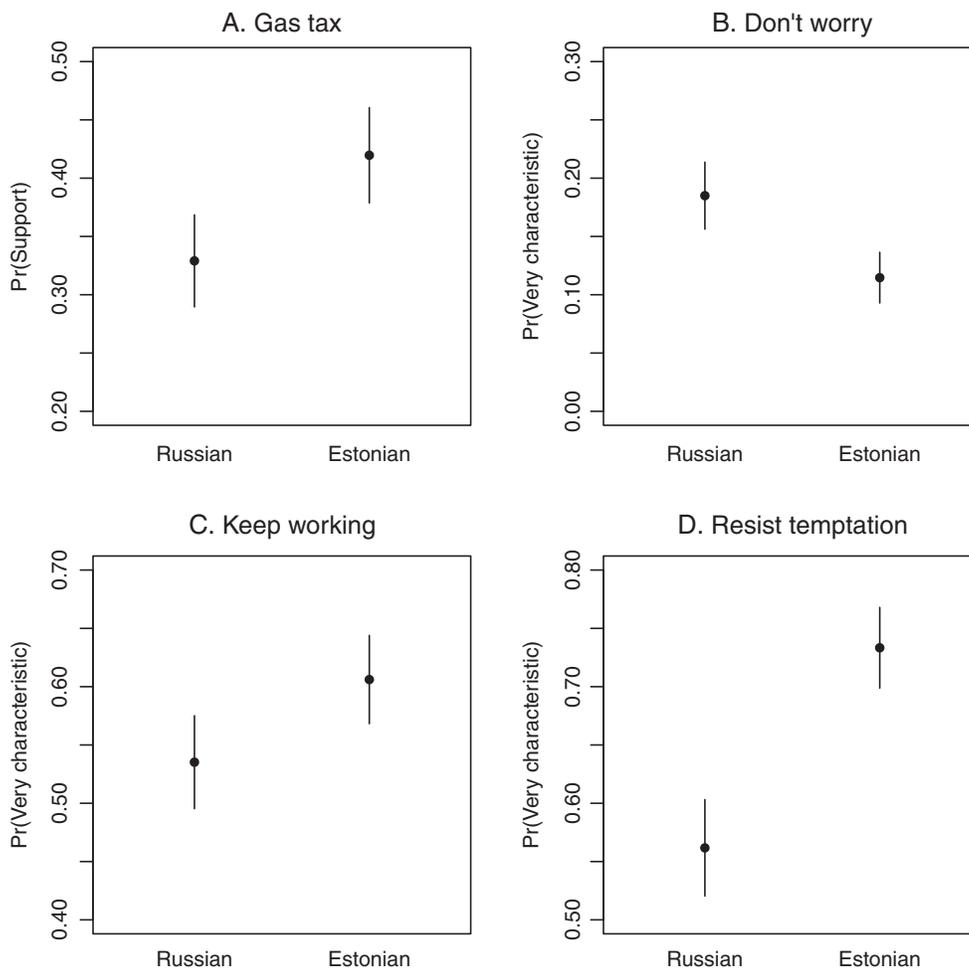
Note: The dots represent predicted probabilities, and the bars refer to the corresponding 95% confidence intervals.

map onto differences in people's reported views about the present and future. This gives us more confidence that the causal effect of language that we observe on the policy item is indeed driven by the habitual grammatical distinctions about time that languages oblige their speakers to make.

Given the nonlinear nature of our main estimates of interest, we translate the raw coefficients into predicted probabilities that we present graphically in Figure 1 (we omit *Take each day* since it yielded an unreliable estimate in Table 1). Panel A in Figure 1 shows that among respondents who interviewed in Russian, the probability of supporting an increased gas tax to protect the environment is 33%. But among respondents who interviewed in Estonian, the probability of supporting this *Green gas tax* climbs reliably by 9 percentage points to 42% (first difference [FD] = 0.09, 95% confidence interval [CI]: 0.03, 0.15).

In Panel B, the likelihood of affirming that it is "very characteristic" of oneself not to worry if things don't get done on time is 19% for respondents assigned to interview in Russian. This drops reliably by 7 points to 12% for those assigned to speak Estonian (FD = 0.07, 95% CI: –0.10, –0.04). Turning to Panel C, the probability of endorsing that it is "very characteristic" of oneself to keep working at difficult tasks if it helps one get ahead is 54% among respondents assigned to interview in Russian. This rises to 61% for those assigned to interview in Estonian, a reliable 7-point increase (FD = 0.07, 95% CI: 0.02, 0.12). A comparable pattern emerges in Panel D: Respondents interviewing in Russian have a 56% probability of stating that being able to resist temptation when there is work to be done is "very characteristic" of them. However, this probability rockets to 73% for those assigned to speak Estonian: a massive and reliable 17-point shift in support (FD = 0.17, 95% CI: 0.12, 0.22).

All in all, the preceding results boost confidence in our argument regarding the effect of language on time perceptions and political choice. We find that interviewing in a *futureless* language makes respondents more supportive of a political effort to address a problem with long-range ramifications (i.e., the environment)—an effect that arises from people seeing less distance between the present and the future.

We deem these results substantively relevant for the following reasons. First, the effect sizes we unearth average out to a ten percentage point difference in opinion on the basis of the language in which one interviews. Opinion gaps of this magnitude parallel those often reported in many public opinion studies, including those that observe sizable deficits in political knowledge among women and racial/ethnic minorities (e.g., Mondak and Anderson 2004), and those that detect a robust connection between national identities and political attitudes (e.g., Carter and Pérez 2016). Hence, our results suggest that language is an important, but understudied, influence on survey response.

Second, unlike prior laboratory research, we unearth our language effects in a large and heterogeneous survey sample where the treatment was administered by phone. The fact that we observe the influence of language on political thinking in this new research setting enhances the external validity of language effects research, thus bolstering the claim that language affects human cognition (Campbell and Stanley 1963; McDermott 2011).

Third, these language effects are what emerge *after* using randomization to hold constant all other (un)observed differences between bilinguals, which suggests that the effect of language on individual opinions is both real and independent of other highly plausible confounders (cf. Adida et al. 2016; Chen 2013; Lee and Pérez 2014; Pérez 2009). Fourth, our bilinguals, like most bilinguals in related studies, acquired one of their tongues earlier than the other (Phillips and Boroditsky 2003). This means they are more dominant in one of their tongues, which makes it particularly difficult to detect any linguistic difference, since our bilinguals are able to emphasize *and* ignore the grammatical distinction between the present and future tense. Finally, in order to be effective, our manipulation must overcome any inertia among those who are asked to interview in a language that is not their typical or preferred one, which further makes the estimates we have reported conservative ones.[10]

Placebo Test

In order to bolster our claim about language and time construal, we must also show that this linguistic effect does not emerge when people are asked to judge a policy that has no obvious time referent. For this, we rely on a question that inquires about respondents' attitudes regarding another issue relevant in Estonian public discourse—policy toward prostitution, which we dub *Buy sex.* Specifically, this question asked respondents whether they agreed or disagreed that "buying sex should be made illegal." We do not expect to observe a systematic difference of opinion by interview language because, unlike *Green gas tax,* time is not salient in *Buy sex.* In addition, this test allows us to probe a potential alternative explanation for our language effect: that speaking a language activates ideological thinking. For example, one might argue that respondents speaking in Estonian support the green gas tax, not because of the grammar distinction we propose, but because speaking Estonian primes respondents to think in more socially liberal terms.[11] If this is the case, then respondents interviewing in Estonian should also be more likely to agree that buying sex should be criminalized.

Our results show that interview language has no effect on this item. Specifically, 63% of those respondents who were assigned to interview in Russian agreed with this policy proposal. Among respondents who were assigned to interview in Estonian, the level of support is slightly lower, but statistically similar (61%). The difference between these proportions is indistinguishable from zero, $\chi^2 (1) = 0.853$, p < .36, two-tailed (Rainey 2014). This null result, which we glean from a highly powered experiment, suggests to us that our linguistic effect fails to emerge when policy issues do not imply a clear time perspective (see Dunning 2016). Moreover, this test suggests that speaking Estonian does not simply prompt people to give more liberal answers, for it is the respondents who were assigned to interview in Russian who were more likely (although unreliably) to agree that buying sex should be criminalized.

Research Design: Study 2

We designed our experiment to detect language's causal effects, thus imbuing Study 1 with a high degree of internal validity. But can we find evidence that language

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[10]Indeed, our results are unchanged if we adjust our estimated treatment effects for one's preferred interview language (see Table SI.4.3).

[11]In Estonia, criminalizing the purchase of sex is a socially liberal (leftist) position, promoted by the leftist Social Democratic Party (SDE). They initiated legislation to achieve this goal and included this issue in their most recent election manifesto (see, e.g., Anvelt 2014).

is associated with similar political outcomes in other contexts? And, can we uncover such evidence with a different operationalization of a language's grammatical emphasis on the future? To answer these questions, Study 2 presents analyses of cross-national survey data with the goal of replicating our experimental findings and extending them to a new domain. Specifically, we used the World Values Survey (WVS; Wave 6) to conduct a cross-national analysis of language effects spanning close to 60 countries and containing more than 60,000 individuals. This trove of survey data furnishes us with an opportunity to replicate our results in a global sample of respondents speaking either a *futured* or *futureless* language. Of course, the difficulty with cross-national correlational analyses like this one is that they cannot convincingly pin causality to language. However, they can uncover broad cross-national patterns, which help us to further validate that it is the distinction between *futured* and *futureless* languages (rather than just between Estonian and Russian) that drives differences in attitudes about future-oriented policies. Combined, our experimental and observational results paint a more convincing picture of the political relevance of language than either would be able to do on its own.

We replicate our main experimental result by analyzing the item *Protect environment*, which parallels Study 1's main outcome. This variable queries respondents about which statement better reflects their view: "Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs" (coded as 1) or "Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent" (coded as 0). We then extend our basic finding to a new domain by analyzing the item *Saved*, which inquired: "During the past year, did your family save money, just get by, spent some savings, or spent savings and borrowed money?" Those respondents who indicated "save money" are coded as 1, with all others coded as 0.[12]

In order to measure the language nuances we are interested in, we utilize a theoretically grounded, dichotomous measure tapping into a language's future time reference (FTR; Chen 2013). FTR is coded as 1 if a language has a strong FTR; that is, it demands that speakers grammatically mark future events when making predictions, as in the English phrase "I *will go* to dinner later." In contrast, 0 indicates a language with weak FTR; that is, it does not oblige speakers to grammatically mark future events, as

in the Mandarin phrase "I *go* to dinner later." We match individual responses to this strong/weak FTR distinction by using their reported language spoken at home. The advantage of this measure is that the languages we examined in Study 1 fall neatly into this typology, with Estonian being a weak-FTR language and Russian a strong-FTR tongue.

Besides FTR, our analyses here include a host of covariates to assess the robustness of any language influence we uncover. We include controls for a respondent's gender (*Sex*), age (*Age*), education (*Education*), income (*Income*), unemployment status (*Unemployed*), and marital status (*Married*).[13] On the political side, we include controls for the respondent's support for democracy (*Democracy*), as well as for social capital (*Trust*).[14] Our modeling strategy follows Chen (2013, 703), who uses a logit model (calling it "fixed effects or conditional logit"), and treats sex and age as exogenous (non-choice) variables. He interacts these fixed effects to form groups for the basis of analysis: Individuals are compared to others who are identical on sex and age, but who speak a different language. All analyses also use robust standard errors clustered at the country level.

Results: Study 2

Model 1 in Table 2 reports the most basic model, summarizing the average difference in propensity to prioritize the environment between strong- and weak-FTR individuals of the same sex and age. We can see that the coefficient on strong FTR is both statistically reliable and correctly signed. More specifically, respondents who report speaking a strong-FTR language (e.g., Russian) are less likely to prioritize protection of the environment than those who report speaking a weak-FTR tongue (e.g., Estonian). This result closely mirrors our experimental findings, where those assigned to interview in Russian reported less support for a gas tax to protect the environment. Critically, this pattern is robust to additional demographic (Model 2) and political factors (Model 3). Using the model that includes both sets of covariates

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[12]This item has been previously analyzed by economists, who show that speaking a *futured* language reduces the propensity to save (Chen 2013). Our effort here, then, is a conceptual replication of that result, since we use the newest wave of the WVS and our models emphasize more overtly political covariates, including support for democracy.

[13]*Income* measures a respondent's income decile; *Unemployed*, *Married*, and *Sex* are binary variables recording whether the respondent is unemployed, married, and male, respectively; *Age* is the respondent's age categorized into 10-year bins; *Education* records the highest level of education for the respondent (eight categories).

[14]*Democracy* measures the respondent's opinion on whether "having a democratic political system" is "very good" (1), "fairly good" (2), "fairly bad" (3), or "very bad" (4). *Trust* measures agreement (1) or disagreement (0) with the statement that "most people can be trusted."

TABLE 2 **The Effect of Futured Language on Future-Oriented Behaviors, World Values Survey Analysis**

	Model 1 Protect Environment	Model 2 Protect Environment	Model 3 Protect Environment	Model 4 Saved	Model 5 Saved	Model 6 Saved
Strong FTR	−0.309**	−0.324**	−0.342**	−0.761***	−0.860***	−0.817***
	(0.157)	(0.155)	(0.156)	(0.204)	(0.204)	(0.191)
Unemployed		−0.143**	−0.160**		−0.682***	−0.699***
		(0.070)	(0.073)		(0.116)	(0.108)
Trust			−0.007			0.305***
			(0.073)			(0.069)
Democracy			−0.067			−0.054
			(0.040)			(0.037)
Income	no	yes	yes	no	yes	yes
Education	no	yes	yes	no	yes	yes
Married	no	yes	yes	no	yes	yes
Fixed Effects:						
Sex × Age	yes	yes	yes	yes	yes	yes
Constant	0.396***	0.196	0.338	−0.114	−1.822***	−1.787***
	(0.145)	(0.260)	(0.292)	(0.190)	(0.320)	(0.334)
N	64,666	61,029	56,172	66,843	62,973	57,714

Note: Dependent variables are indicated in column headings. Table entries are logit coefficients with robust country-clustered standard errors in parentheses.
***$p < .01$, **$p < .05$, two-tailed.

(Model 3), we find that net of these controls, a respondent who reports speaking a weak-FTR language at home has a 0.59 predicted probability of prioritizing environmental protection; this decreases to 0.51 for strong-FTR speakers (FD = –0.08, 95% CI: –0.16, –0.01). The language one speaks can make a significant difference in supporting versus opposing environmental protection.

Turning to a domain outside of environmental politics, where a language's time perspective might arguably matter, we see a similar pattern. If we look at the simplest model (Model 4), we find that speaking a strong-FTR tongue is also reliably associated with one's propensity to save money, a relationship that is also robust to our menu of political, social, and economic covariates. Indeed, using our fully specified model, we find that independently of these demographic and political controls, respondents who speak a weak-FTR language (e.g., Estonian) have a 0.39 predicted probability of having saved. This decreases to 0.22 for weak-FTR speakers (FD = –0.17, 95% CI: –0.25, –0.09).

In sum, this cross-national analysis corroborates our experimental findings. Additionally, we can say with some confidence that these observational results are not a fluke of the WVS. Using survey data from the International Social Survey Programme and a different operational-

ization of language, we find reliable associations between language and comparable outcomes (see SI.5 for details). Of course, an observational analysis of survey data is not equivalent to a tightly controlled experiment. But the fact that we were able to replicate our basic finding in different contexts, with different kinds of individuals and dependent variables, and with a different operationalization of language nuances bolsters the external validity of our experimental results (Campbell and Stanley 1963).[15]

Summary and Implications

We have argued that speaking a *futureless* tongue leads people to more strongly associate the future with the present, making it harder for them to discount the

[15]To be sure, our pair of studies does not exhaust the realm of possible research designs. One potentially fruitful avenue here is the use of fMRI techniques to illuminate the neural substrates that underpin the language differences in time perspective and policy support we have uncovered (see Haas 2016; Schreiber 2011). Such work could, for example, usefully draw on the theoretical insights of researchers who have pinpointed specific parts of the brain that individuals recruit in forecasting future events (e.g., the medial temporal lobe; Okuda et al. 2003; Schacter and Addis 2009).

long-term consequences of their present choices, thus inclining them to support political measures that address issues with temporally distant implications. We tested and found strong support for this proposition by manipulating whether bilinguals interviewed in Estonian (i.e., *futureless* tongue) or Russian (i.e., *futured* tongue), thus allowing us to isolate our proposed mechanism (i.e., grammatical distinction between the present and the future). We then replicated and extended our main experimental result with an alternate research design: cross-national survey analyses. Taken together, the results of our two studies provide robust and converging evidence that language plays a crucial role in shaping people's time perspectives and their endorsement of policies with long time horizons.

By highlighting language differences in support for a gas tax increase to help protect the environment, our study also helps to illuminate why support for such efforts are sometimes not stronger and varies significantly across countries (Brechin and Bhandari 2011; Villar and Krosnick 2011). For example, Yeager et al. (2011) show that voter short-termism is a potential issue in rallying support in this realm: English (i.e., *futured*) language respondents rarely list global warming or climate change as one of the "most important issues facing this country." It is only after being prompted to think about serious problems facing the country *in the future* that concern about the environment rises. By delving into the political psychology behind mass support for such efforts, our framework reveals that some people cannot be more supportive of efforts to more fully reach this goal simply because of the language they speak and the time horizons their tongue imposes. In this way, we show that language can operate as a ceiling, dampening down what might otherwise be stronger public support for pro-environmental and other future-oriented policies.

We conclude by noting that the language effects we have unearthed are more than just an intellectual curiosity. Among the 34 member nations of the Organization for Economic Cooperation and Development (OECD), for example, 23 speak a majority language where the grammatical distinction between present and future is emphasized, whereas the remaining 11 do not (Chen 2013).[16] Of the global players with regard to climate change that are not in the OECD—China and India—the former uses a *futureless* (Mandarin) language, whereas the latter is dominated by *futured*

(Hindi, English) language speakers. Thus, even among economic powerhouses, meaningful variation exists in terms of whether members of mass publics must construe the present and future as largely (in)distinct—a grammatical rule that we argue affects how receptive mass publics can be to efforts that address challenges with temporally remote implications. The implications of this for global cooperation to combat climate change and other comparable issues are potentially enormous.

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[16]The former include, for example, Australia, Canada, France, Mexico, Russia, Spain, Turkey, the United Kingdom, and the United States. The latter include, for instance, countries that speak German, a Finno-Ugric language, or a Scandinavian language, as well as Japan.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

SI.1 Comparison of Texts about Climate Change in Futured and Futureless Languages

SI.2 Additional Information about the Experiment

SI.3 Randomization and Balance Checks

SI.4 Robustness Tests

SI.5 Cross-National Analysis with the ISSP Data