Title
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Journal
Cognition, 268

ISSN
0010-0277

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Publication Date
2026-03-01

DOI
10.1016/j.cognition.2025.106376

Issue importance amplifies the effect of gaze on voting decisions

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Acknowledgements:
We thank Nia Cain, James Logan, Ainsley Young, Jeffrey Chladil, Charles Costanzo, Shefali Sinha, Sam Powers, and Natalie Miller for their help in data collection. We thank Katie Ferriby for helping create the stimuli for Study 2. We thank Molly Ritchie for her helpful feedback and comments on early drafts of the manuscript. This project was supported by funds from The Ohio State University's School of Communication. Ian Krajbich acknowledges support from National Science Foundation grant 2333979.

Declaration of Interest statement: The authors have no competing interests.

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Abstract

There are many factors that can influence a voter's decision in the ballot booth but not all of them are policy related. One non-policy factor that may influence voters is the tendency to choose options that attract attention. Here, we investigate this possibility in two proof-of-concept laboratory studies with people choosing between proposed laws. We find that people are slower to vote when their party is split over an issue, and that they tend to vote for laws that they look at more. Moreover, this gaze effect is stronger for more important issues. We also find that we can increase the probability that someone will vote for one of two laws by getting them to look at that option first. Our work harnesses the power of sequential sampling models to explain the relationship between gaze and vote choice. We find support for a goal-based model where overt attention amplifies information supporting a particular law. This model explains why gaze has a stronger effect on choice for more important issues. Our findings indicate that some voting decisions are not predetermined and instead rely on an on-the-spot evaluation. As a result, these decisions can be swayed by attentional manipulations. Thus, visual attention may serve as a unifying framework for understanding different biases that occur in the voting booth, such as ballot-order and candidate-name-familiarity effects.

Keywords: voting, sequential sampling models, decision making, attention, drift diffusion model

1. Introduction

In democratic elections, small features of how choices are presented on a ballot can influence how people vote. For example, candidates listed first, often receive more votes than those listed later (order effects; Miller & Krosnick, 1998; Ho & Imai, 2008). Familiarity can also matter. Incumbents and well-known candidates tend to perform better because voters likely recognize their names (Panagopoulos & Green, 2008; Jacobson, 2006). Visual cues such as election symbols on the ballot can also influence voting decisions (Li & Qi, 2004). For instance, countries such as India use symbols such as diamonds and pressure cookers to help voters identify candidates.

Researchers have invoked different explanations for each of these effects. Some scholars attribute order effects to satisficing, where voters simply choose the first acceptable option (Däubler, & Rudolph, 2018). Familiar names may signal viability and prompt voters to support the candidate they think is more likely to win (Kam & Zechmeister, 2013). Election symbols may influence voters because they evoke a sense of familiarity or connote positive traits (Li & Qi, 2004).

Here, we offer a single explanation that may help account for these seemingly distinct effects. We propose that attention may influence choice via biased evidence accumulation, and that this attentional influence may help explain why these behavioral effects occur. If voters spend more time looking at the first-listed name, a familiar name, or an appealing symbol, that extra attention may influence their decisions. It is important to note that we are not claiming that attention is the sole explanation for these effects. We merely suggest that attention represents a plausible and parsimonious mechanism that may complement other accounts. We do not provide direct evidence on these particular behavioral phenomena, but instead present evidence for a general link between attention and vote-like choice behavior.

Our goal is to provide a proof-of-concept that gaze, and by implication, visual attention, has a causal influence on voting decisions in principle. To do so, we designed a task in which participants read real policy proposals missing a key word (e.g., “Property rights of undocumented immigrants ___ be removed.”). Participants then chose between two words (e.g., “can” or “can’t”) to complete the sentence, indicating their policy preference. Critically, we manipulated visual attention by making one option brighter than the other, based on the expectation that increased brightness would draw participants’ gaze earlier and/or longer. Thus, we aimed to demonstrate a causal effect of gaze on vote choice.

While real-world ballots do not typically present one option as visually brighter than another, our use of a brightness manipulation was intentionally artificial. As argued by Douglas Mook in his classic piece, “In Defense of External Invalidity” (Mook, 1983), it is worth creating idealized study conditions to test the validity of theoretical propositions even if the study conditions do not reflect the complexities of the real-world (for a similar approach in the domain of moral judgments, see Pärnamets et al., 2014; Pärnamets et al., 2015; Newell & Le Pelley, 2018). Furthermore, to our knowledge, this is the first study to examine the role of gaze on evidence accumulation in voting decisions. Thus, it is important to first establish the extent to which vote-like decisions resemble evidence accumulation and can be influenced by shifts in that evidence-accumulation process.

More broadly, our contribution is important to both the literature on voting and the design of democratic institutions. Although a vast literature has shown that features such as option order and candidate familiarity can influence vote choice, the underlying psychological mechanisms remain less well understood. Our study advances this literature by identifying biased evidence accumulation as a mechanism that underlies and unifies these various phenomena. Our study also has practical relevance. Ballots are not always neutral in their design. Actors may intentionally or unintentionally highlight certain features of ballots that could direct voter attention and influence voting outcomes. This could be especially pernicious in countries like the US where many voters are generally unaware of ballot measures. Indeed, studies indicate that in states with upcoming ballot measures, only 40% to 50% of voters correctly identify that such measures will be on the ballot (Donovan et al., 2009; Miller et al., 2016). Furthermore, of those who claim to be aware, 70% to 80% cannot name a single ballot measure they will be voting on (Barth et al., 2020). This suggests that many voters enter the voting booth without clear preferences for many issues, and so their votes may be affected by contextual factors. By isolating the causal influence of gaze on voting decisions, we lay the groundwork for future research on how subtle design choices may influence decision-making in democratic elections.

2. Theory and Hypotheses

To explain the relationship between visual attention and vote choice, we harness the power of sequential sampling models (for reviews, see Forstmann et al., 2016; Krajbich, 2019; Ratcliff et al., 2016). These models provide a biologically plausible account of decision-making (Gold & Shadlen, 2001; Rangel et al., 2008) and have been used to explain various decisions, from perceptual judgments (Ratcliff et al., 2016; Tavares et al., 2017; Evans & Wagenmakers, 2019) to consumer choices (Krajbich et al., 2010; Fisher, 2017; Thomas et al., 2019; Chiong et al., 2024; Izakson et al., 2024). Sequential sampling models assume that the voter accumulates evidence for each option until the net evidence in favor of an alternative reaches a threshold. To illustrate, consider a voter in the booth deciding between a “yes” or “no” option on a proposed law (e.g., Should property taxes be raised by 5% to build new classrooms in schools?). Here, evidence is the subjective value of the information supporting or opposing the law. The voter might consider and evaluate the consequences of the new law such as having to pay higher taxes and having better schools. A large part of the difficulty lies in determining how much they like or dislike each consequence (i.e., negative and positive subjective value, respectively). A voter who has young children would likely find the new law more appealing than a person without a child. Still, even for a parent, determining the proper balance between school funding and tax rates is no easy task. Subjective values are “noisy” - the same voter might not consistently prioritize school funding or tax rates across repeated voting scenarios or even within a single voting decision (Zaller, 1992; Zaller & Feldman, 1992). Sequential sampling models capture the difficulty in evaluating and comparing alternatives based on noisy subjective values.

Of particular interest are several sequential sampling models that explicitly account for the role of gaze in choice (Fisher, 2017; Krajbich et al., 2010; Sepulveda et al., 2020; Smith & Krajbich, 2019). One intuitive possibility is that voters simply direct attention to options they already support. For instance, a voter inclined to support a tax increase will be more likely to look at the “yes” option. This idea aligns with research on partisan selective exposure, which assumes that people's political attitudes will direct their attention to information that is consistent with their preferences (Marquart et al., 2016; Schmuck et al., 2020). However, some research challenges this assumption, suggesting that visual attention can influence choice (e.g., Bhatnagar & Orquin, 2022; Ghaffari & Fiedler, 2018; Gwinn et al., 2019; Krajbich, 2019; Pärnamets et al., 2015). In other words, looking at the “yes” option can increase the probability of selecting the “yes” option. For example, in one influential model (attentional drift diffusion model, aDDM; Thomas et al., 2019; Krajbich et al., 2010; Smith & Krajbich, 2019; **Fig. 1B**; we refer to this as the value-based aDDM), gaze on an option amplifies its subjective value (i.e., utility) (Krajbich et al., 2010; Mrkva et al., 2020; Pleskac et al., 2023). A causal interpretation of this effect predicts that (1) increased gaze on an option with positive value will increase the probability of selecting it, while (2) increased gaze on an option with negative value will decrease the probability of selecting it. Another account, which we refer to as the goal-based aDDM, argues that gaze amplifies goal-consistent information (Sepulveda et al., 2020). If a voter’s goal is to vote for a law, this account predicts that more gaze towards an option will increase the probability of selecting it, even for options with negative subjective value. Both versions of the aDDM assume that choices between more valuable/useful options should be more influenced by gaze.

One of the challenges in modeling voting decisions within the aDDM framework is that past applications of the aDDM have primarily focused on domains where the options are commensurable, such as snack foods or monetary rewards (Krajbich, 2019; Krajbich et al., 2010; Krajbich et al., 2015; Sepulveda et al., 2020; Sheng et al., 2020; Sheng et al., 2023; Smith &

Krajbich, 2019; Thomas et al., 2019, but see Newell & Le Pelley, 2018; Pärnamets et al., 2014). In contrast, voting decisions involve complex and diverse considerations that vary considerably from one decision to the next and are harder to measure on a common scale. Here, we approximate the net effect of these considerations using people's votes. However, for the goal-based account it is not immediately clear how to translate votes into values.

We propose that a critical consideration is the importance that voters ascribe to an issue. Issue importance is central to understanding voters' attitudes toward government policies. When individuals find a policy personally important, they think about it deeply and frequently, gather information, and use it as a basis for voting (Miller et al., 2016). Thus, one might think that manipulating gaze would have little to no effect on important issues, as voters are more likely to deliberate or use diverse information to inform their decisions. Instead, our conjecture is that issue importance contributes to the subjective value/utility of an option and so more important issues should be more affected by gaze. For example, a decision between two candidates for President of the United States should be more influenced by gaze than a decision between two candidates for the state legislature, even if the candidates were the same in the two scenarios. Thus, incorporating issue importance may be critical in developing a goal-based aDDM for voting.

We address two key hypotheses in this study. First, gaze will interact with utility when people make voting decisions. We address this hypothesis in two proof-of-concept eye-tracking laboratory studies using real ballot initiatives and by developing an importance-informed aDDM that predicts stronger gaze effects for more important issues. Second, voting decisions can be altered via attention manipulations. We address this hypothesis in Study 2 where we exogenously manipulate attention by making one option brighter. We emphasize that Study 2 functions as a proof of concept meant to identify whether gaze can, in principle, have a causal influence on voting decisions. Real world ballots are not designed like our attention manipulation, with one option brighter than the other. The manipulation was chosen to test the validity of our theoretical propositions, rather than to encompass real world complexities (see Mook, 1983; for a similar approach in the domain of moral judgements, see Newell & Le Pelley, 2018; Pärnamets et al., 2014; Pärnamets et al., 2015).

To preview our results, in terms of the first hypothesis, we find that participants were more likely to vote for the option they gazed at more, regardless of whether it had positive or negative subjective value. This outcome is consistent with the predictions of a goal-based aDDM. We observe a larger effect of gaze on choice for more important issues, consistent with a magnifying effect of gaze. Also, in line with sequential sampling model predictions, participants took longer to decide when members of their own political party were more split on the issue. These findings indicate that people do not have clear preferences on many political issues and so when asked to vote, they take time to evaluate the options and decide. This evaluation process takes longer for more difficult issues and can be influenced along the way. Thus, political actors may be able to steer voters into selecting aversive options, such as slightly disliked political candidates or laws, by designing ballots that bias visual attention to such options. Consistent with that conjecture, and our second hypothesis, our brightness manipulation influenced voting decisions even for important issues, though not more strongly than for unimportant ones. This suggests that attentional manipulations, intentional or inadvertent, can influence vote choice, even for issues voters consider important.

3. Materials and Methods

3.1. Participants

For both Study 1 and Study 2, we recruited participants from the Communication subject pool at The Ohio State University and compensated them with course credit (Yang et al. 2025). We recruited a total of 78 participants for Study 1 and 159 participants from Study 2. Participants' data were excluded if external factors affected eye tracking accuracy during one or more trials. Individuals whose glasses or contacts caused reflections that hindered calibration were removed (n = 20). When eye tracking data was affected by software problems prohibiting the continuation of the experiment or significantly affected validation, those individuals' data were removed (n = 13). Additionally, participants who fell asleep during the experiment (n = 5), removed their head from the eye tracking mount (n = 2), or clearly did not follow study instructions were also removed (n = 2). In our eye-tracking studies, we generally expect to exclude 10% to 20% of participants. This is because we use strict criteria to ensure high data quality. For example, if an experimenter observes that a participant starts to drift asleep during even just one or two of the 77 trials, we exclude that participant. This helps ensure that only those who are fully engaged and taking the study seriously are included in the analysis.

We analyzed data from the remaining 66 participants for Study 1 (31 females; Age M = 19.87, SD = 2.26, Range = 18-30; Partisan Affiliation: Democrat = 30, Independent = 24, Republican = 12) and 119 participants for Study 2 (83 females; Age M = 19.55, SD = 1.53, Range = 18-25; Partisan Affiliation: Democrat = 49, Independent = 48, Republican = 22). We asked participants who self-reported as Independent to identify which of the two political parties they were closest to. For our analyses, we then classified Independents as either Democrats or Republicans given evidence suggesting that Independents are "hidden partisans" who think and vote much like other partisans (for a review, see Klar & Krupnikov, 2016). We conducted the same study without eye-tracking or gaze manipulation on MTurk with 205 participants (88 females; Age M = 32.51, SD = 9.44 , Range = 18-66). Participants' votes on the various issues were highly correlated between the two studies (Fig. S6).

This study was approved by the Institutional Review Board (IRB) at the Ohio State University. All participants provided informed consent before participating in the research.

3.2. Materials

In both Study 1 and Study 2, the stimuli consisted of 77 real proposed laws that each had two options (Table S1). We adapted policy proposals from both ballot initiatives that have appeared on actual ballots in the US and from ones that were proposed but never reached the ballot. We sourced ballots from independent websites (e.g., Ballotpedia). In general, the issues covered in the ballots apply widely to different states.

We constructed the policy proposals such that they had one keyword missing from the sentence (e.g., Property rights of undocumented immigrants ______ be removed by the state legislature). Each policy proposal had two alternatives that could complete the sentence (e.g., the words "can" and "can't") (**Fig. 1A**). We did so because we wanted participants to form their preferences when the two options were on the screen in order to capture the dynamics of eye movements toward the options as reflecting relative subjective value. If participants were given complete sentences and consistent "yes" and "no" options, they would have known the options ahead of time and might have formed their preferences while still viewing the sentence. Similar to real-world direct democracy elections, our set of policy proposals included a mix of high-partisan and high-salience issues (e.g., abortion, gun control) and low-partisan and low-salience topics (e.g., rules on when legislative seats will be filled; Table S1).

In Study 2, we made one of the options brighter than the other. That is, for every policy proposal we created two versions: one in which A was brighter than B and another in which B was brighter than A. We manipulated the brightness of an option using a similar method as previous research (Nothdurft, 2002; Turatto & Galfano, 2000). In Adobe Illustrator, all policy text were designed on a black background, with the text color varying in brightness. Text color for the options was adjusted using the HSB (Hue, Saturation, Brightness) color system settings in Adobe Illustrator. Seven hues were selected: blue (H = 233.54), pink (H = 304.62), yellow (H = 55.38), orange (H = 32.11), green (H = 120.0), red (H = 358.31), and purple (H = 275.47). A given proposal would present options in just one of these colors, varying in brightness. The policy proposals were randomly assigned to one of these colors, to control for the possibility that vote choice could be influenced by the specific color of the option. Using the HSB settings, the text for both ballot options was set to the same, pre-specified hue. In the HSB color system brightness ranges from 0 to 100. To manipulate brightness, the "bright" option was set to 100 whereas the less bright option was set to 30 (**Fig. 1A**).

3.3. Procedure

For both Study 1 and Study 2, we tested participants individually in a quiet room, where they were seated 100 cm away from a computer monitor (resolution = 1,920 × 1,080 pixels; refresh rate = 60 Hz). Before the start of the experiment, we used a desktop-mounted EyeLink 1000 eye tracker (SR Research, Kanata, Ontario, Canada) that was fitted and calibrated for each participant with a 9-point calibration system. We employed a rigid mount to keep the chin and forehead from moving. Recordings were taken from the right eye, except for instances in which reflection off the participant's glasses or contact lenses necessitated recording from the left eye. We informed participants at the start of the study that they would be reading about real proposed laws. We instructed them to read each proposed law carefully, and to vote on it. Each trial began with a dot in the middle of the screen. Participants controlled the time spent on this screen by fixating on the dot while pressing the advance button on the left side of the handheld controller. Participants were then presented with the proposed law. Participants controlled the time spent on this screen and could advance to the next part of the trial by pressing the advance button. Participants were then instructed to report, via a button press, which of the two options they preferred.

3.4. Norming Study

To understand different partisans' support for the laws, we conducted an online norming study in which we recruited 240 participants from a student subject pool (the same subject pool as the lab studies). A related study (Cohen & Ahn, 2016) used a similar method to understand how moral values influence moral judgements. The purpose of the norming study was to select laws with varying level of support within each political party.

We excluded 41 participants for failing attention check questions. We analyzed the data from the remaining 199 participants (161 females; Age M = 19.79, SD = 3.86, Range = 18-32; Partisan Affiliation: Democrat = 83, Independent = 89, Republican = 57). The participants rated the ballots in terms of (1) how much they supported or opposed the proposed law (strongly oppose = 1, strongly support = 7) and (2) the degree to which the issue is personally important to them (1 = Not at all important, 4 = very important). We also conducted our key behavioral analyses with all participants who completed the full experiment and found the results to be robust (Table S10).

Participants in the norming study were randomly assigned to rate one version of the law in terms of (1) how much they supported or opposed the proposed law (strongly oppose = 1, strongly support = 7) and (2) the degree to which the issue is personally important to them (1 = not at all important, 4 = very important). Specifically, they first saw one version of the law and rated their level of support (from extremely against to extremely support). Immediately after rating their level of support, participants rated how important that issue was to them personally.

3.5. *Statistical regressions and drift diffusion modeling*

For all statistical regressions, we used the lme4, lmerTest, and miceadds packages in R. We specified random effects at the participant level for each variable. If a model did not converge, we used miceadds to adjust the standard errors to account for the non-independence of observations within participants. Predictors in all analyses were mean centered. Choices were analyzed using generalized linear mixed effects models using a binomial link function. RTs were analyzed using generalized linear mixed effects models, with the RTs log-scaled.

For aDDM fitting, we specified the model in Stan and fit it for each individual using Bayesian inference. The model assumes that decisions arise from evidence accumulation favoring one option over the option until reaching a threshold (a). If the options have utilities u_1 and u_2, the baseline drift rate is $v \sim u_1 - u_2$. The aDDM further assumes gaze bias: when Option 1 is looked at, $v \sim u_1 - \theta u_2$; when Option 2 is looked at, $v \sim \theta u_1 - u_2$.

To fit the aDDM, we defined the averaged accumulated rate for Option 1 during a trial as $v_1 = d \cdot (x_1 + \theta x_2)$, where $x_1 = u_1 \cdot g_1 - u_2 \cdot g_2$, and $x_2 = u_1 \cdot g_2 - u_2 \cdot g_1$. Here, g_i is the gaze proportion for option i, and $u_i = w \cdot Support_i + (1 - w) \cdot Importance.$

RTs were modelled using the Wiener first passage time distribution. For a given trial, $RT_i \sim wiener\ (a, ndt, z, v)$, where

- a represents the boundary separation;
- ndt represents the non-decision time;
- z represents the starting point bias, which is the predisposition towards one option over another before any evidence is gathered;
- v is the drift rate.

Thus, the importance-informed aDDM has the following parameters: 1). Boundary separation (a); 2). Non-decision time (ndt) 3). Attentional discounting parameter (θ) 4). Drift scaling d 5). Weight on the support value w. Additionally, when the brighter and less bright options were set as the boundaries, we allowed 6). starting point bias z to vary; in other cases, z was fixed at 0.5.

The priors for all the parameters were uninformative normal distributions (N ~ (0,2)), except for boundary separation (a ~ Gamma(3, 2)) and non-decision time (ndt ~ Gamma(0.8, 2)). We generated two chains of 8000 and discarded the first 4000 samples as burn-in. Model convergence was assessed by Gelman–Rubin statistics. We used the maximum R-hat value across all parameters to assess model convergence. R-hat values are in the range of 1.0007 - 1.04 across the two studies and across variants of the models, below the commonly recommended threshold of 1.05, indicating stable convergence and reliable posterior estimation.

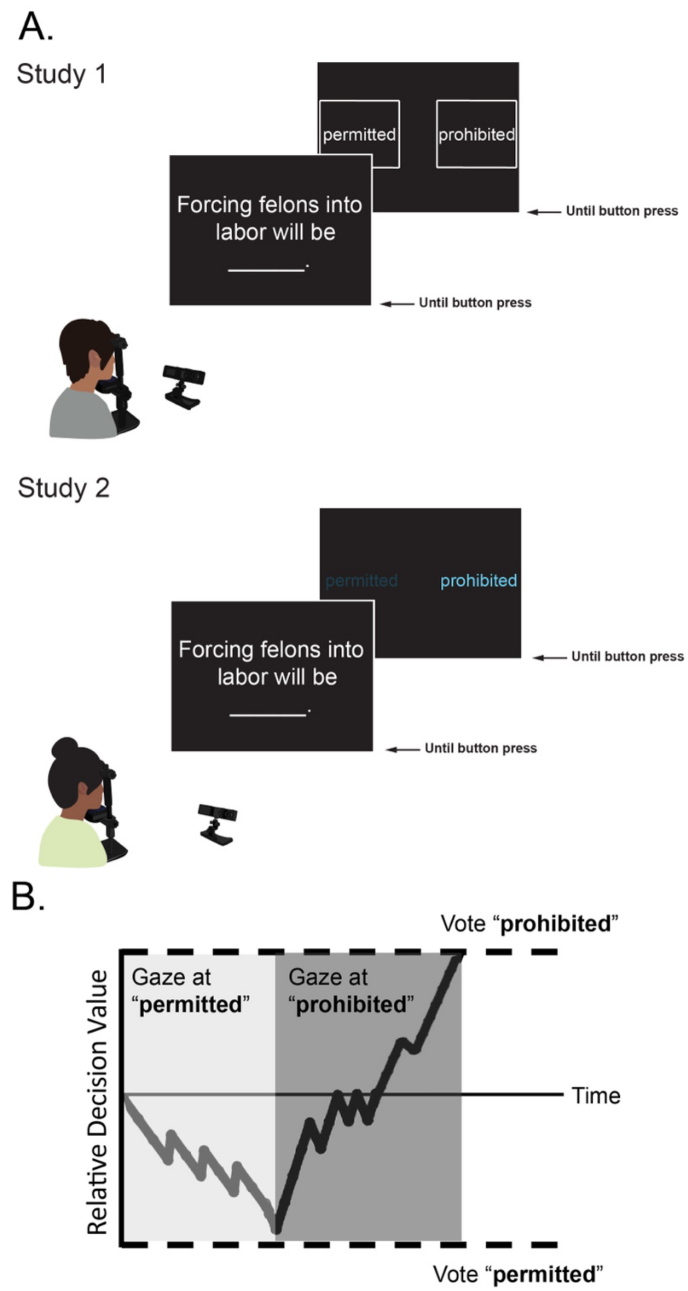

Figure 1. Task and model. A) Schematic design of Study 1 and Study 2. In Study 1, participants could look at options, absent any systematic attempts to bias their viewing behavior towards a specific option. In Study 2, we randomly assigned one option to be brighter than the other. **B**) An illustration of the attentional drift-diffusion model showing how gaze can impact vote choice for the example in A. Initial gaze towards the "permitted" option moves the relative decision value towards that choice while subsequent gaze towards the "prohibited" option moves the relative decision value towards that choice. The two dashed lines represent the choice boundaries for either the "prohibited" or "permitted" option. If the relative decision value crosses a boundary (in this example, the "prohibited" option), the voter then chooses that option.

4. **Results**

4.1. *Voting decisions are noisy*

To begin, two patterns in the data are consistent with the idea that voting decisions are the outcomes of a noisy process – a critical assumption of sequential sampling models. First, participants in both lab studies were more likely to vote for options that had the greatest support among members of their own political party, as measured by a separate norming study (Study 1: $\beta = 0.84$, $p < 10^{-16}$; Study 2: $\beta = 0.88$, $p < 10^{-16}$, Table S2 – Analysis I and Fig. S1). The fact that participants' voting decisions did not perfectly align with their party's preferences in the norming study suggests that the discrepancies may be due to individual differences and/or a noisy choice process.

Our second set of results specifically supports a noisy choice process. Specifically, participants responded more slowly when members of their political party were divided on the issue (Study 1: $\beta = -0.07$, $p = 10^{-7}$; Study 2: $\beta = -0.06$, $p = 10^{-10}$, Table S2 – Analysis II and **Fig. 3C**), indicating that they were likely conflicted. In sequential sampling models, when the evidence does not clearly support one option, decisions are slower and more random.

Taken together, these results suggest that, like many value-based decisions, voting decisions are the outcomes of a noisy process.

Gaze increases choice regardless of the option's subjective value

Our theoretical framework (aDDM) predicts that attention influences choice through gaze, leading to several gaze-based measures that correlate with choice: (1) dwell-time advantage (the total amount of time an option received more gaze than the alternative), (2) first fixation (whether an option was looked at first), and (3) last fixation (whether an option was looked at last). We found support for all three relationships in both Study 1 and Study 2 (see Supplementary Figure S2 and Tables S2–S4).

Our first hypothesis was that gaze interacts with utility (subjective value) to make voting decisions. To begin to test this hypothesis, we now examine the competing predictions of two sequential sampling accounts. The first account, the value-based aDDM, makes specific predictions regarding how gaze should influence choice depending on whether an option has positive or negative subjective value, i.e., general support or opposition (Krajbich et al., 2010; Smith & Krajbich, 2019). Specifically, it predicts that (1) directing more gaze towards an option with a positive value will increase the probability that a voter selects that option while (2) directing more gaze towards an option with a negative value will decrease the probability that a voter selects that option. Thus, when both options have positive value, participants will be more likely to vote for the option that elicited a greater amount of relative total gaze. In contrast, when both options have negative value, participants will be less likely to vote for the option that elicited a greater amount of relative total gaze (**Fig. 2A**). The second, goal-based class of aDDM argues that gaze amplifies goal-consistent information (Sepulveda et al., 2020), and if a voter's goal is to vote for a law, this account would predict that more gaze toward an option will increase the probability that the voter selects that option, even for options with negative subjective value.

Participants' behavior was more in line with a goal-based aDDM. As predicted by both versions of the aDDM, for laws that their party supported, participants were more likely to vote for the option that attracted more gaze (Study 1: β (both positive) = 1.24, $p < 10^{-16}$; Study 2: β (both positive) = 0.97, $p < 10^{-16}$, **Fig. 2B-C** & Table S3 – Analysis I). But for laws that their party opposed, and for laws where their party had mixed attitudes, participants were also more likely to vote for the option that attracted more gaze (Study 1: β (both negative) = 1.20, $p = 10^{-14}$, β (mixed value) = 1.28, $p < 10^{-16}$, Study 2: β (both negative) =1.14, $p < 10^{-16}$, Study 2: β (mixed value) =1.08, $p < 10^{-16}$, **Fig. 2B-C** & Table S3 - Analysis II & III). Together, these results indicate that participants were more likely to vote for the option that attracted more gaze, regardless of whether it had positive or negative value, supporting a goal-based aDDM (additional evidence for the goal-based aDDM (e.g., last fixation effect) can be found in Table S3 Analysis IV -VI).

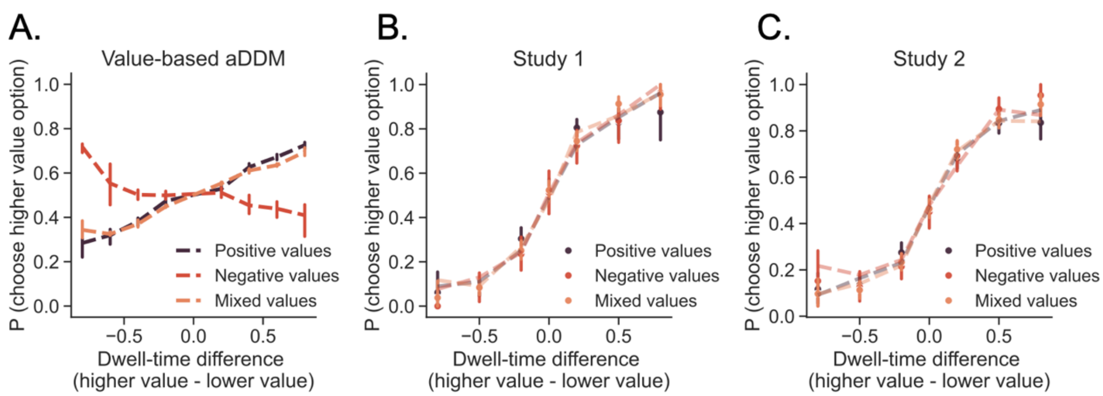

Figure 2. aDDM predictions and results. (A) Simulations from the value-based aDDM: choice probability goes down with dwell time when the options have negative values. We simulated three datasets using support values combined with participants' eye-movements. We set the drift scaling parameter d at 2, boundary separation (a) at 2, non-decision time (ndt) as 0.5 s, and varied the attentional discounting parameter across three levels $\theta \in (0.15, 0.25, \& 0.35)$. Error bars represent 95% confidence intervals clustered by θ. **(B) & (C)** The goal-based, importance-informed aDDM can account for the relationship between dwell time and choice probability for Study 1 and Study 2. Bars represent 95% confidence intervals clustered by participant. Dashed lines indicate aDDM fits. The units of the dwell times are seconds.

4.2. Manipulating gaze to change vote choice

Having established that greater relative attention toward an option, as measured by eye movements, is associated with an increased probability of voting for that option, we then assessed the degree to which this relationship is causal. Thus, to address our second hypothesis, in Study 2, we biased attention by randomly assigning one option to be brighter than the other. We expected that the brighter options would capture early visual attention.

Critically, we found that participants were more likely to vote for the brighter option ($p = 10^{-6}$, **Fig. 3A** & Table S4 – Analysis I) and participants were also marginally faster when selecting the brighter option ($p = 0.07$, Table S4 – Analysis II, controlling for differences in support between the options, where support is from the separate norming study). The probability of selecting the brighter option was 53%. Furthermore, participants were more likely to choose the brighter option when the support level difference was closer to zero ($p = 0.05$, **Fig. 3B** & Table S4 – Analysis III). This indicates that the brightness manipulation exerted stronger effects for decisions in which we expected participants to have weaker preferences.

4.3. Addressing Mechanisms

Having established that our brightness manipulation influenced vote choice, we now ask through what attentional mechanisms the brightness manipulation exerted an effect on vote choice. Given that bright stimuli can capture early attention, we posit that one possible attentional mechanism is a first-fixation bias. We found that participants were more likely to fixate first on the brighter option, after controlling for the subjective value of the brighter option (beta (brightness) = 1.61, $p < 10^{-16}$, **Fig. 4A**; beta (value) = 0.14, $p = 0.0007$, **Fig. 4B**, Table S4 – Analysis V). Furthermore, we found that participants were more likely to choose the first-fixated option, after controlling for the subjective value differences between the options ($p = 10^{-5}$, Fig. S2, Table S4 – Analysis VI).

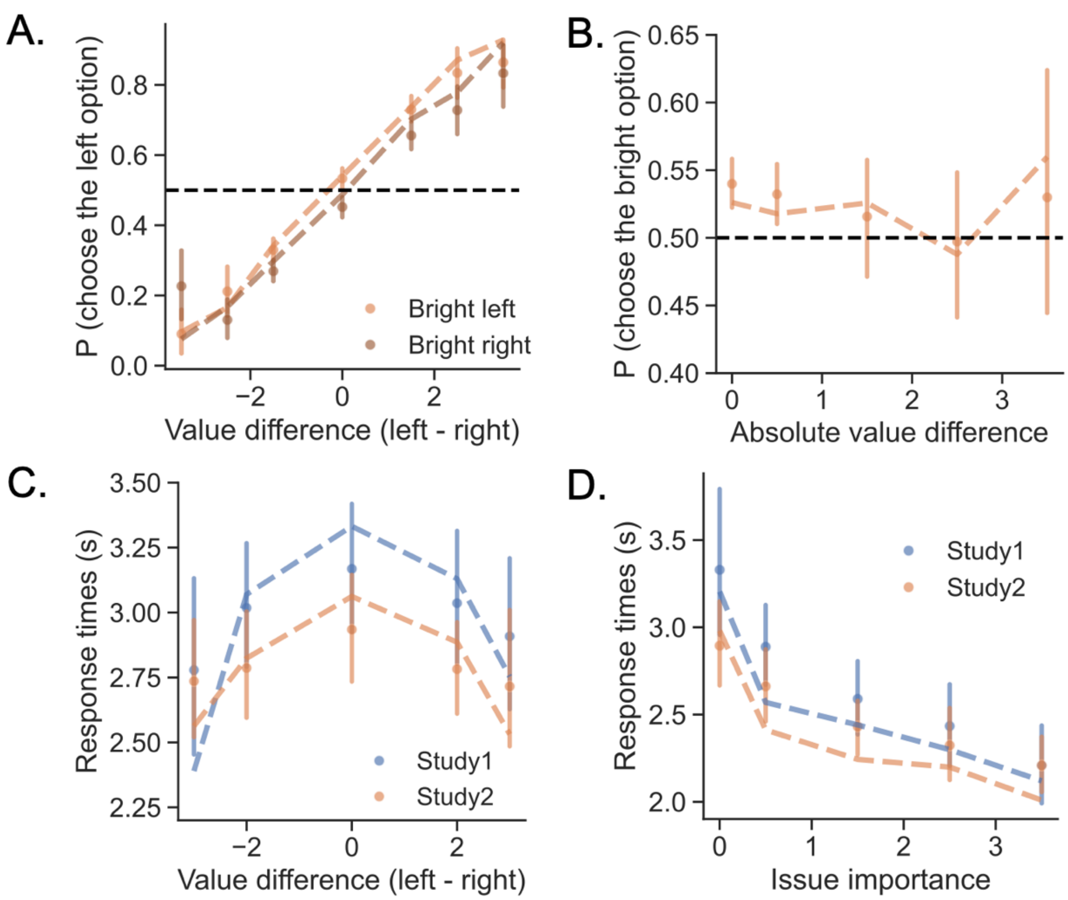

Figure 3. Brightness and response time effects. A) Participants were more likely to vote for the brighter option even after accounting for subjective value differences between the two options. **B)** Participants were more likely to choose the brighter option when the absolute subjective value difference between the two options was closer to zero. **C)** Participants responded more slowly when the subjective value difference was closer to zero**. D)** As issue importance increased, participants were faster to vote. Bars represent 95% confidence intervals clustered by participant. Dashed lines indicate aDDM fits. The units of response times are seconds.

To further examine if the first fixation mediates the effect of brightness on choice, we estimated a causal mediation model in which the dependent variable is whether the participant picked the option on the left (left = 1, right = 0), the independent variable is whether the bright option was on the left side (bright left = 1, bright right = 0), and the mediator is the first-fixation location (left option = 1, right option = 0). We found that 16% of the effect of brightness on choice can be explained by the first fixation (95% CI: [6%, 36%], Table S5). Together, these analyses provide evidence that the effect of brightness on vote choice was at least partially operating through a first-fixation mechanism. Notably, we also found that the effect of brightness on choice remained significant even after controlling for first fixation ($p = 10^{-8}$, Table S4 – Analysis VII), suggesting that brightness exerted an influence on choice beyond early attentional capture.

4.4. Computational models of voting behavior

To systematically understand the influence of variables related to gaze, issue importance, and the level of support on the choice process, we employed the aDDM, which conceives of the decision process as one where the decision maker accumulates and compares evidence in favor of one option over the other until the net evidence reaches a pre-specified threshold (a). If the decision maker has underlying values/utilities u_1 and u_2 for the two options, then their evidence accumulation rate (i.e., drift rate) is $v \sim u_1 - u_2$. In the goal-consistent account of voting, the evidence being accumulated are the decision maker's positively valenced subjective evaluations of the options.

In addition, the aDDM assumes that the decision maker gathers more evidence for the option that they are looking at. If the decision maker is looking at Option 1, then the drift rate is $v \sim u_1 - \theta u_2$, while if the decision maker is looking at Option 2 then the drift rate is $v \sim \theta u_1 - u_2$.

In the aDDM, the absolute utility of the options is important. Holding the utility difference constant, larger utilities lead to greater changes in the drift rate as gaze shifts between the two options (Krajbich et al., 2010; Smith & Krajbich, 2019). When the utilities are zero, gaze should have no correlation with drift rate. Thus, we must consider the underlying utilities of the options, and not just their relative support.

With voting, we hypothesized that one factor that should contribute to absolute utility is the importance of the issue. Important political issues should have higher variance in evidence than less important ones. Under the goal-consistent account, if decision makers are primarily gathering positive evidence, then higher variance options should receive more support.

Indeed, more important issues do show higher variance. Participants in the norming study exhibited more variance in opinions for actions related to more important issues (correlation (variance in levels of support, importance) = 0.72, $p < 0.01$). And for more important issues, participants were more inclined to vote against members of their political party (p (Study 1) = 10^{-13}; p (Study 2) = 10^{-11}, Table S6). Together, these results indicate that issue importance increases the variance in support of proposed laws.

If voters are focused on the positive features of their options when voting, and importance increases the magnitude of those positive features, then we would predict stronger effects of attention for more important issues, resulting in more gaze-aligned choices and shorter RT (Smith & Krajbich, 2019) in those cases. After accounting for subjective value and dwell time, we observed a larger effect of gaze on choice for more important issues (p (Study1) = 0.01, p (Study2) = 0.07, Table S6 and Fig. S3). Also, participants responded faster to more important issues (p (Study1) = 10^{-7} , p (Study2) = 10^{-11}, Table S6 & **Fig. 3D**), after accounting for the absolute difference and magnitude of subjective value.

Having confirmed that importance does indeed strongly affect voting decisions, we next considered a specification of a goal-directed aDDM where the utilities of the options are a weighted combination of party support plus importance, i.e., $u_i = w \cdot Support_i + (1-w) \cdot Importance$. If w = 1, then importance has no impact on the decision. Otherwise, for more important political issues, voters are more likely to gather more positive evidence. We refer to this model as the importance-informed aDDM.

In addition to the importance-informed aDDM, we explored several variations of the aDDM. First, we considered a baseline model (i.e., value-based aDDM) that omits the influence of importance, where the drift rate is defined as $v \sim u_1 - \theta u_2$ with u_i = $Support_i$, given that the decision maker is gazing at Option 1. Second, we considered a model where individuals adjust their decision boundaries (a) based on the importance of the issue. Finally, we also considered a model where importance affects both the drift rate and the decision boundaries. In these latter models, the upper boundary is defined as a ~ a_0 + β* $Importance$.

We found that the importance-informed aDDM outperformed other variants that ignored issue importance in the drift rate (Study 1: relative WAIC = 1147; Study 2: relative WAIC = 2726) or instead allowed issue importance to affect boundary separation (Study 1: relative WAIC = 128; Study 2: relative WAIC = 182, Table S7). We further confirmed that issue importance mainly affects the drift rate, rather than the decision threshold. Specifically, the coefficient of issue importance on the decision boundaries was not significantly different from zero (Study 1: t(65) = 0.89, p = 0.37, 95%CI : [-0.05 0.13], M = 0.04; Study 2: t(118) = 1.51, p = 0.13, 95%CI : [-0.016, 0.12], M = 0.05), but the weight of issue importance on the drift rate was significantly different from 0 (Study 1: w = 0.25, t(65) = 21.39, p =10^{-16} , 95%CI : [0.22, 0.27] ; Study 2: w = 0.24, t(118) = 22.27, p = 10^{-16}, 95%CI : [0.22, 0.26]). These results indicate that more important issues had larger drift rates.

Regarding model performance, the importance-informed aDDM was also able to accurately predict the marginal and joint distributions between choice and RT in the data (Figs. S4-S5). Importantly, the importance-informed aDDM also explained the relationship between dwell advantage and choice across different value combinations (**Fig. 2B-C**).

At the individual level, participants with stronger partisan leanings were less influenced by gaze in their choices (Table S8; combined Study 1 & 2 correlation between θ and absolute partisanship: ρ = 0.21, p = 0.005). Additionally, participants with stronger partisan affiliations were also more sensitive to utility differences between the options (combined Study 1 & 2 correlation between drift scaling parameter d and absolute partisanship: ρ = 0.16, p = 0.02).

Lastly, we investigated the effect of salience manipulation on the choice process. We fitted the importance-informed aDDM to the data, setting the upper boundary as choice for the salient option. We found a significant starting point bias towards the salient option (one sample t-test against zero: t(118) = 2.00, p = 0.048, 95%CI : [0.50, 0.52], M = 0.51, **Fig. 4C**) and a constant drift bias towards the salient option (one sample t-test against zero: t(118) = 3.43, p = 0.0008, 95%CI : [0.018, 0.067], M = 0.042**, Fig. 4C**), indicating that brightness changes both the initial bias and the evaluation of the options. Drift bias also weakly correlates with the first-fixation bias at the individual level (r = 0.17, p = 0.06), indicating that brightness influences choice by producing a first-fixation bias, and within the DDM, a starting-point bias and constant drift-rate bias.

One remaining question is whether in addition to this constant drift bias, brightness also affects choices through the attentional mechanisms proposed by the importance-driven aDDM. If so, then brightness should further enhance the effects of overall value on choice. However, the data did not support this hypothesis (p = 0.78, Table S9 – Analysis I ; p = 0.52, Table S9 – Analysis II). Interestingly, when the left option was brighter, dwell advantage had a smaller impact on the choice of the brighter option (β (dwell advantage X left is brighter) = -0.19, p = 0.003, Table S9 – Analysis II).

4.5. Addressing Alternative Explanations

Here, we address several alternative explanations that could account for the results. One possibility is that individuals are generally unfamiliar with these issues and thus rely on quick heuristics such as choosing the brighter option. We conducted three analyses to examine this possibility. First, if this were true, we would expect the brightness manipulation to have a stronger influence on issues perceived as less important than those viewed as more important. However, the brightness manipulation's effect on choice was the same regardless of the issue's importance (p = 0.57, Table S4 - Analysis III). Second, we would expect that less politically knowledgeable individuals would be more susceptible to the brightness manipulation than individuals with higher levels of political knowledge. Yet, we found no interaction between brightness and political knowledge levels (see Supplementary Text, Cor = 0.06, t= 0.66, 95% CI: [-0.12, 0.24], p = 0.51). Finally, we compared the effect of the options' utilities on choice across the two studies. If participants were relying on a brightness heuristic to make some of their choices in Study 2, we would expect a smaller average effect of the options' utilities on choice in that study. Instead, the coefficient on utility difference was slightly larger in Study 2 than in Study 1 (β (Study 1) = 0.84, β (Study 2) = 0.88).

Another alternative explanation for the brightness effect is experimenter demand. That is, participants could have thought that we wanted them to pick the brighter option, and they did so to meet those expectations. After the voting task, we asked participants to speculate on the purpose of the study and only four of them had guesses that were remotely close to the idea that brighter options should be more likely to be selected. We replicated the main results even after excluding those participants (Table S4). Thus, it is unlikely that participants chose the brighter option because of experimenter demand.

Finally, it is possible that participants only looked at the brighter option and ignored the other one entirely. However, this seems unlikely, as participants spent a similar amount of time viewing both the brighter and less bright options within a trial—even after accounting for differences in word count between the options (p = 0.72; Table S4, Analysis IV).

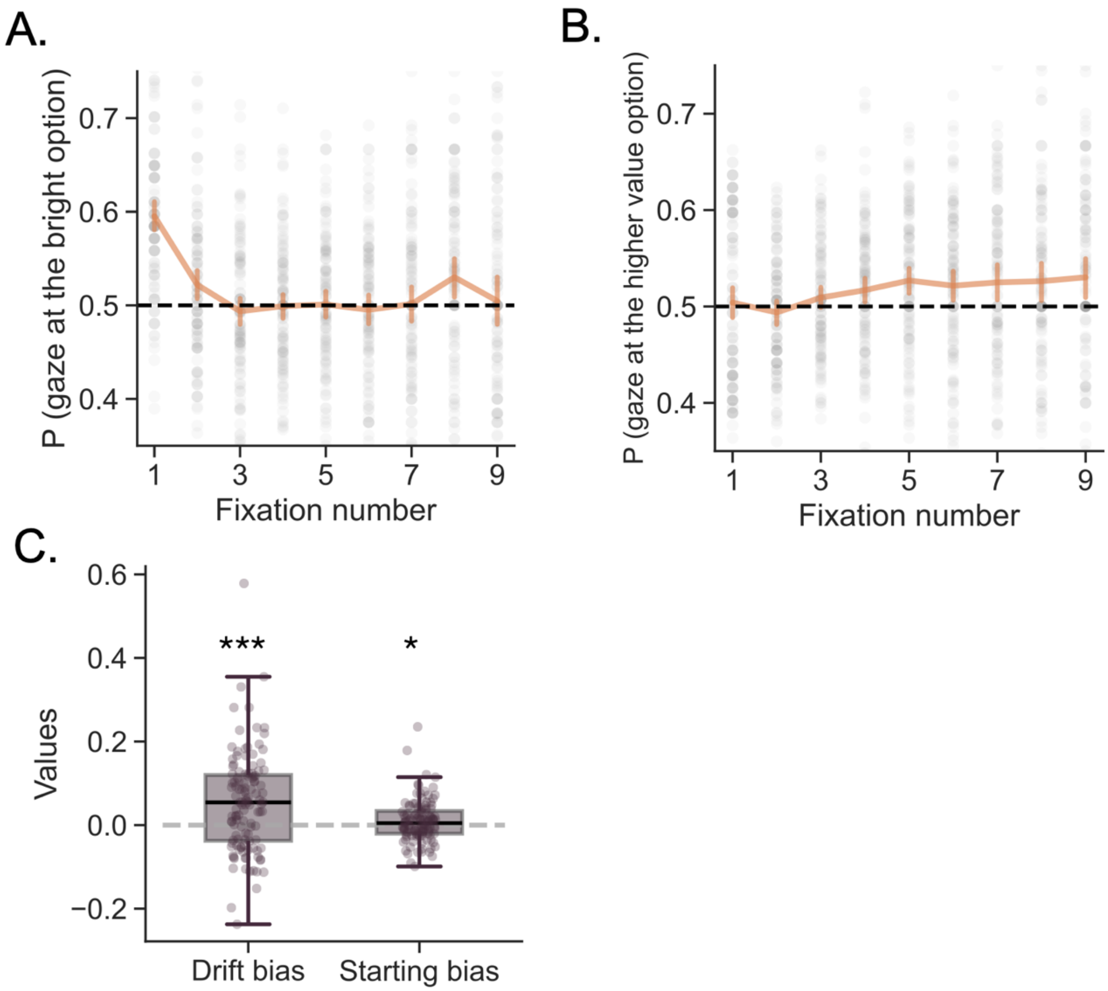

Figure 4. Choice process results. A) Participants favored looking at the bright option in the first two fixations but then showed no gaze bias in subsequent fixations. **B)** Participants initially showed no value-based gaze bias but over time showed a slight tendency to look at the higher value option. **C)** Parameter estimates of the importance-driven aDDM: the drift rate bias and starting point favor the salient option. The center lines represent the median parameter estimates across participants. The boxes represent the interquartile range (IQR) of the parameter estimates. The whiskers represent 1.5 times the IQR. * indicates p<0.05, *** indicates p<0.001. Each dot represents a participant.

5. Discussion

Our work represents the first effort to harness the power of sequential sampling models to understand the biases that underlie voting decisions, and thus draw attention to a new way of studying political decisions more broadly. Indeed, many people likely intuit that one's political preferences drive their attention towards a voting option. We flip this relationship and demonstrate instead that attention has a causal influence on voting decisions. Our central findings are that voting decisions take more time for issues where a political party's opinions are more divided, that gaze correlates with people's choices, particularly for important issues, and that biasing people's gaze – via a first-fixation bias – toward a specific voting option increases the probability that they will choose that option.

The first finding indicates that people often do not have clear opinions on political issues. Participants in our study took longer to choose when faced with divisive (e.g., a 1-unit increase in difficulty increased RT by ~0.19 seconds in Study 1 and 0.16 seconds in Study 2), or less important laws (e.g., a 1-unit decrease in importance increased RT by ~0.16 seconds in both studies), indicating that they had to deliberate over these issues. This deliberation involves collecting and evaluating information relevant to the decision - a highly subjective and noisy process. This view aligns with classic works in public opinion, such as Zaller (1992), that suggest that political attitudes are likely constructed on the spot. As a result, votes on individual ballot measures may be subject to a lot of randomness and therefore vulnerable to manipulation.

To better understand the nature of political preference construction, we employed sequential sampling models. These models provide a formal framework for understanding the stochasticity in decision-making and the role of attention in the choice process. They view the choice process as a noisy accumulation and comparison of evidence, up to a predetermined threshold (Ratcliff et al., 2016). They predict that decisions involving more conflict will take more time, as we observed.

To explain the finding that gaze correlates with people's voting decisions, we leveraged our modeling framework, using more recent versions that have incorporated the effects of visual attention, namely that gaze amplifies evidence. The aDDM predicts that more gaze will only benefit positively valued options (Krajbich et al., 2010; Armel et al. 2008), while other versions predict that more gaze will benefit all options (Sepulveda et al., 2020). In line with the latter prediction, when we examined instances in which individuals were evaluating two options with negative subjective value, we found that more gaze towards one option over another increased, rather than decreased, the probability that participants voted for that option. This finding is consistent with the idea that gaze amplifies the information relevant to the decision-maker's goal, in this case voting for a law. Since voting is typically framed as selection, rather than rejection, voters may focus on the positive considerations. Future studies could investigate whether framing the vote as a rejection might reverse the effect of gaze on voting (Bizer et al., 2011).

We also observed that issue importance plays a crucial role during the choice process. We found that people were faster to decide on more important issues, consistent with evidence that people choose faster when faced with options that have high overall value (Smith & Krajbich, 2019; Shevlin et al., 2022; Hunt et al., 2012; Pirrone et al., 2018). This runs counter to common intuitions that voters should spend more time on important issues. To better understand why voters spend more time on less important issues, future work might use a thought listing paradigm to study their considerations (Zhao et al., 2022). Additionally, we observed that people are more likely to go against their political party for more important issues. This likely reflects the fact that people are less informed about less important issues and so default to voting with their party (Kam, 2005; Chen & Krajbich, 2018). Finally, we found that gaze exerted a stronger effect on choice for the more important issues, consistent with our computational framework suggesting that more important issues elicit stronger value signals. Although this effect was not statistically significant in Study 2, choice in that study was likely influenced by other factors (i.e., text brightness). Also, when determining the sample size for Study 2, we prioritized power for detecting the brightness manipulation rather than the importance effect.

Our third finding, that attention manipulations lead to voting choice biases, speaks to the debate on the link between gaze and choice. Some research has shown that preference influences attention (Sepulveda et al., 2020), leading some to argue that there is insufficient evidence for the role of gaze in the choice process (Mormann & Russo, 2021). However, a more recent meta-analysis examined exogenous gaze manipulations and found that gaze does influence choice (Bhatnagar & Orquin, 2022). Here, we demonstrated that visual saliency causally influences choice in the voting domain, mediated by the first fixation, supporting the latter account (though the meta-analysis did not find significant evidence for first-fixation effects on choice).

A causal effect of gaze on choice does not rule out the reverse causality as well. There may be some cases, for instance in multi-alternative choice, where preference influences gaze (Callaway et al., 2021; Gluth et al., 2020; Thomas et al., 2019). Here, we found individual differences in attentional biases in both studies: people with weaker partisan bias are more likely to be influenced by what they attend to during the decision process. Additionally, prior research has shown that people often direct a confirmatory glance toward their selected option just before making a choice (Westbrook et al., 2020; Pleskac et al., 2023; Zylberberg et al., 2024). These findings suggest that gaze and preference can become intertwined and so it is challenging to determine the directionality of influence without external manipulation.

Our modeling results for the effect of brightness on choice are not entirely consistent with the aDDM nor with other gaze-informed models like the additive model (Cavanagh et al., 2014; Westbrook et al., 2020) or a fluency account (Oppenheimer, 2008). The gaze-informed DDMs would explain the brightness effect on choice as being due to an increase in dwell time for the salient option, which we did not observe. If instead the bright option is more fluent and thus easier to evaluate, we would expect it to show a stronger effect of dwell time on choice, which we also did not observe. Instead, brightness seems to operate via biases in first fixations rather than total dwell time, and in a way that does not interact with issue importance. In contrast, a related study (Towal et al., 2013) using consumer stimuli (snack foods) found that options with higher saliency are looked at longer. Using computational models, they found that saliency increases the value of the option during the evaluation process through longer dwell times. More work is needed to understand how different gaze manipulations operate via different attentional mechanisms.

5.1. *Implications for political science*

These findings have broad implications and contribute to scholarly literature on voting in four major ways.

First, our study exposes concerns that strategically-minded political actors may increase electoral support for a candidate or proposed law by designing ballots that bias voters' visual attention to the political actor's desired option. For example, over 30 countries present photos of political candidates' faces alongside text on their ballots (e.g., Greece, Portugal, Ireland, and South Africa; Lev-On & Waismel-Manor, 2016; Reynolds & Steenbergen, 2006). Furthermore, many countries include an image of either an everyday object or a complex logo next to a candidate's name (e.g., India, South Africa, Italy, Egypt, and Singapore) to assist illiterate voters (Lee & Qi, 2024). Politicians may strategically select photos or images that are visually salient and attract visual attention for the purpose of influencing electoral outcomes. In India, politicians deliberately pick household items that are familiar to their constituents as their ballot symbols (Lee & Qi, 2024).

Second, our work suggests that visual attention may provide a novel mechanistic explanation for biases that occur in the voting booth. A vast literature suggests that voting decisions can be influenced by a multitude of policy-irrelevant factors including the order of choices presented on the ballot (Miller & Krosnick, 1998), familiarity with the candidate's name (Kam & Zechmeister, 2013), and the use of difficult-to-understand words on a ballot measure (Coronel et al., 2021). Our findings open the possibility that these biases may, in part, be driven by visual attention. For example, the names of political candidates listed first on a ballot or candidate names that are familiar to many voters (e.g., names of incumbents) may elicit biased visual attention. In addition, the attentional bias on choice has also been shown when the options are not visible (Eum et al., 2023), and when decisions are made from memory (Weilbächer et al., 2021). Thus, attention may serve as a common and unifying framework that explains choice biases in different voting situations (Jenke & Sullivan, 2024).

For example, we find evidence for a *ballot option-position effect*. That is, while our participants were not more likely to choose the left option in the aggregate, they were more likely to choose the left option when they looked at it first (see supplementary Table S4). This finding is important since much of the direct democracy literature on ballots has focused on ballot order effects (Bowler & Donovam, 1998). For example, some studies have also found that people are more likely to vote against ballot measures at the end of a sequence, likely due to a status quo bias induced by fatigue (Augenblick & Nicholson, 2016; but see Matsusaka, 2016). Note that there is also a vast literature on ballot order effects for candidate elections (Meredith & Salant, 2013). In this separate literature, the term “ballot order effect” refers to the influence of a candidate’s name placement relative to other candidates for the same office. In the context of proposed laws, studies have yet to examine whether and why the position of the ballot options can elicit biases. The aDDM potentially provides a mechanism for such ballot option-position effects.

Third, our work also demonstrates the potential of eye-tracking technology for advancing research on political decision-making and communication. To date, most work in the political domain has used eye-tracking to measure attention or other cognitive processes. For instance, prior studies have examined how people attend news (Dunaway et al., 2018), social media content (Vraga et al., 2016; Ohme et al., 2021), political ads (Marquart et al., 2016; Schmuck et al., 2020), candidate traits (Jenke et al., 2020; Sülfow & Maurer, 2019), negative versus positive content across ideological groups (Dodd et al., 2012), political stereotypes (Coronel et al., 2020), and the comprehension of ballot measures (Coronel et al., 2021). Our study differs from prior work by showing how eye-tracking, when integrated with formal models from cognitive science, can explain how attention can causally influence voting decisions.

Fourth, our work contributes to the broader literature on psychological biases in ballot measures within direct democracy. This literature has largely focused on the effects of complex or legalistic language (Reilly & Richey, 2011; Coronel et al., 2021; Shulman et al., 2022; Shockley & Fairdosi, 2015), framing of ballot language (Burnett & Kogan, 2013), and voter fatigue from long ballots (Matsusaka, 2016) on voting behaviors. We extend this literature by showing that (1) the spatial placement of options alone can influence voting decisions and (2) by identifying a mechanism that helps explain this effect.

In general, our work speaks both to the fundamental cognitive processes underlying attention-driven choice and to their applied relevance for understanding real-world political behavior. In politics, even small shifts in choice probabilities can have far-reaching consequences. One well-established source of such choice biases in other domains is visual attention. It is therefore natural to ask how attention may shape political decision-making specifically. In addressing this question, we had to tackle a couple of broader theoretical issues, namely whether attention amplifies value or goal-congruent information, and relatedly, how to account for the influence of issue importance on choice. Our approach thus bridges two issues—extending the aDDM framework to a socially consequential domain while using a tightly controlled laboratory paradigm to test theoretically grounded mechanisms.

5.2. *Limitations*

One limitation of our study is that we relied on support and issue importance ratings from a separate norming sample, rather than collecting individual-level ratings from participants in the main experiments. While group-level support differences significantly predicted individual choice patterns, it remains possible that ignoring individual-level variation introduced additional noise into our measurements. Future research should incorporate individual-level ratings to better assess the robustness of these findings.

Another potential concern with our study design is its generalizability. Specifically, the sample may not represent the voting population accurately, especially since the makeup of voters in direct democracy elections can vary by state, and the study was conducted in a lab setting. While we agree that caution is needed when applying these findings more broadly and that further studies are required, we believe that the mechanisms we are examining are likely applicable beyond the lab and across different populations. Indeed, previous work has demonstrated that eye-tracking data collected from 240 lab participants (all registered voters)--evaluating real ballot measures with varying language difficulty--successfully predicted real-world voting behavior for millions of voters (137 million total votes) in actual elections (Coronel et al., 2021). Aggregate voting decisions made in the lab have been shown to mirror those made by real voters in elections (Shulman et al., 2022). The studies obtained these findings even though the lab participants were not representative -- being Ohio-based voters assessing ballot measures from other states. Similar studies have shown that undergraduates' and even children's trait judgments of unfamiliar political candidates in the lab can predict election outcomes for those same candidates (Antonakis & Dalgas, 2009; Todorov et al., 2005). These findings indicate that one cannot easily dismiss the generalizability of lab-based research on voting.

Relatedly, while our task was designed to approximate real-world voting behavior, we acknowledge important differences between our paradigm and actual ballot voting. Unlike typical ballots, which involve Yes/No votes on proposed changes, our task presented direct A/B choices. In addition, participants first learned the topic of the vote before learning their options, which may cognitively differ from real-world ballot decisions. Here we've assumed that real-world voters understand the status quo, implicitly mapping Yes/No responses onto competing options, but that should be investigated in future work. Nonetheless, our task preserves key features of real elections: participants voted on multiple, unrelated issues using real ballot language, often with limited prior knowledge—mirroring conditions faced by many real-world voters.

Furthermore, many ballots in the U.S. present options vertically rather than horizontally. Given that English readers typically process information from left to right and from top to bottom, future research should examine whether vertical arrangements of ballot options produce similar biases.

Regarding the results, our brightness manipulation exerted modest effects (53% vs 47%) and primarily influenced vote choice for options that others initially had weak feelings of support for or opposition to. The size of this effect is similar to ones obtained by studies that exogenously manipulate attention in other decision-making domains (Ghaffari & Fiedler, 2018; Gwinn et al., 2019; Newell & Le Pelley, 2018; Pärnamets et al., 2015). Extrapolating to real-world elections, this finding suggests that exogenous manipulations of visual attention will likely have small effects for highly partisan issues in which voters already possess strong prior preferences. On the other hand, undecided/moderate voters can sometimes determine the outcome of these elections, and these are the voters most vulnerable to manipulation. In competitive elections, political candidates and ballot measures can win by a razor-thin margin. It is also important to note that in direct-democracy elections and non-partisan local elections, many voters are often unfamiliar with the ballot measures and political candidates, respectively, that they encounter (Barth et al., 2020).

5.3. *Conclusion*

Our studies highlight the usefulness of sequential sampling models in understanding voting decisions. Indeed, our analyses have only scratched the surface of what can be learned from sequential sampling models of political decision-making. Although we focused on the context of direct democracy elections, the causal role of visual attention on vote choice can be extended to other contexts, such as political candidate elections. More generally, the analytical approach we use here can be used to study a wide range of political contexts in which individuals are evaluating competing options, from televised debates of candidates to back-and-forth public communication on social media between politicians.

In summary, through these proof-of-concept studies, we offer a unifying psychological mechanism, visual attention, that may explain the various behavioral effects on people's voting decisions. We demonstrate that getting voters to look first at one of two voting options can increase the chance that they vote for that option. We raise awareness of this phenomenon given the many ways strategically-minded actors can influence voters' political preferences and behaviors by biasing their visual attention.

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Transparency and Openness

Data, analysis code, and research materials are available in the Open Science Framework. Analyses were conducted using R. This study's design and its analysis were not preregistered. We determined sample size based on the opening window for recruitment in our department's subject pool. The data and code generated in this study have been deposited in the Open Science Framework (https://osf.io/byzwg/).

We confirm that for all experiments reported in this paper, we have disclosed all measures, conditions, data exclusions, and how our sample sizes were determined. This statement is made in accordance with the transparency standards recommended by the Center for Open Science (https://osf.io/hadz3).