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(Sympathy for) the Devil You Know: Openness, Psychological Entropy, and the Case of the Incumbency Advantage

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Why do some individuals prefer lesser-known, riskier experiences over more well-known options in life? In this paper, we focus on the case of the electoral advantage to incumbency, and the role that psychological entropy reduction can play in undermining that advantage among individuals who lack simplifying heuristics, such as party brand loyalty. We build on recent work in political psychology, applying a more general political psychology framework linking the Big Five personality trait of Openness to a compulsion to gather and process information. Using data from the 2014 and 2016 Cooperative Congressional Election Studies, we find more Open respondents are more willing to vote for more uncertain House challengers at higher rates, but only among Independent respondents who are unable to rely on partisan cues to simplify the psychological entropy presented by such challengers. This suggests Openness captures relative preferences for encountering and reducing psychological entropy rather than traditionally defined risk preferences.

Keywords: personality psychology, psychological entropy, risk, uncertainty, incumbency advantage

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1. INTRODUCTION

One of the most consistent truths in American politics is that incumbent Congress members are reelected at staggering rates. Since 1982, at least 85% of incumbent representatives and 75% of incumbent Senators have won reelection each year.[1] Many reasons for this dynamic have been proffered, including fund raising advantages (Goodliffe, 2001), "scaring off" quality challengers (Jacobson and Kernell, 1983; Stone et al., 2004),[2] the emergence of mass media (Prior, 2006), casework and other office perquisites (Fenno, 1978), and so on.

These dynamics typically result in incumbents being more well-known to their constituents than their challengers, and this name recognition has its own (albeit small) independent effect (Kam and Zechmeister, 2013). However, being more well-known has other benefits. One possible benefit takes advantage of risk aversion, with risk-acceptant voters more likely to vote for challengers and policies altering the status quo (Morgenstern and Zechmeister, 2001; Kam and Simas, 2012; Eckles et al., 2014). Another possibility, thus far unexamined, is that well-known candidates present a

[1] See https://www.opensecrets.org/overview/reelect.php.
[2] But see Hall and Snyder (2015).

simpler set of possible outcomes (and reactions) to voters who prefer simpler consideration of stimuli (Hirsh et al., 2012). However, some individuals, due to differences in cognitive function, may derive utility from encountering more complex and uncertain stimuli in order to resolve that complexity through learning (Hirsh et al., 2012).

Building on this, we draw on the case of the incumbency advantage to further develop a political psychology framework linking personality traits to political choice, particularly the relationship between Openness and preferences for risky outcomes. We do this by leveraging Ramey et al. (2017)'s framework for linking Big Five personality traits to latent behavioral, economic, and psychological traits (deemed "core cognitive constraints"); within their framework, Openness (to Experience) is associated with risk acceptance.[3] We bring in new research from personality neuroscience to refine this earlier framework and model Openness as a preference for encountering and reducing *psychological entropy*, and use this to consider voters' decisions between relatively well-known, low-entropy incumbents and relatively unknown, high-entropy challengers (Hirsh et al., 2012; DeYoung, 2013).

In this paper, we empirically examine the relationship between Openness and the willingness to vote for challengers. We show more Open respondents are more likely to vote for challengers with unknown policy preferences—even after accounting for respondents' perceptions of the ideological difference between them and the two candidates. Importantly, the effects are only apparent for self-styled political Independents. This suggests the effects of Openness on voting for incumbents only manifests in the absence of strong partisan cues, which constrain the complexity of the responses voters could experience while observing a victorious challenger in office. These findings suggest that Openness captures preferences for experiencing and subsequently reducing psychological entropy when choices are made in a political context. Before showing these results however, we review recent research in neuropsychology in order to establish a more precise relationship between measured Openness and observed uncertainty-seeking behavior.

2. THEORY

2.1. Openness and Psychological Entropy

The Big Five personality traits have gained popularity among trait psychologists over the past three decades as five factors, which capture the most important persistent individual differences in human interactions (Costa and McCrae, 1989; Goldberg, 1990). The importance of the Big Five in predicting human behavior in numerous contexts as varied as educational outcomes, romantic satisfaction, and mortality suggests that integrating these persistent individual differences into traditional formal models would provide a useful tool in the development of behavioral models (Roberts et al., 2007). Within Ramey et al. (2017)'s personality modeling framework, salient biological divergences in cognitive functioning are said to manifest as variations in Big Five personality traits, which are then linked to "core cognitive constraints" —or abilities—representable as modelable parameters of interest (thus enabling their incorporation into economic models of social phenomena). Since this framework links Openness to the compulsion to gather and process information, the authors argue it is representable as a tendency toward lower risk aversion (p. 50):

> "…[S]ituations with multiple possible outcomes require individuals to devote costly cognitive resources to the imagination (and retention) of alternative scenarios, such as [policy] outcomes, and Open individuals pay a lower net cost for the collection and retention of this information. Thus, Openness is associated with relatively higher utilities for convex combinations of outcomes, and reduced risk aversion by implication…."

Several prevailing theories of risk preference base the concave utility functions, which define risk aversion in underlying loss aversion (Kahneman and Tversky, 1979; Kahneman and Thaler, 1986). Interestingly, while Open individuals might be associated with high levels of observed risk-loving behavior—in that they seem to take risky gambles over unknown outcomes—they may not be particularly loss averse. Instead, Openness may influence preferences for risky-loving behavior by enhancing the utility individuals experience from some other psychological phenomenon related to complexity or uncertainty, but unrelated to loss aversion. This other, unrelated source of utility could be added to concave utility functions implied by loss aversion.

For example, consider classical Expected Utility Theory (EUT), where individuals evaluate gambles on the basis of the gamble g's expected utility $EU(g) = \sum U(x_i)p_i$, where x_i and p_i, respectively, denote the payoff and probability of outcome i. This approach contrasts with one in which individuals evaluate choices on the basis of a gamble's expected payoff $\hat{x} = \sum x_i p_i$, since individuals with convex utility functions will prefer to take a gamble with expected payoff $\hat{x}$ instead of a sure payment of $\hat{x}$, whereas individuals with concave utility functions will choose the sure payment instead of the gamble (Machina, 1992; Starmer, 2000).

However, if an individual's utility function includes an additive component increasing in the complexity of the choice set—for example, $U(g) = U(\hat{x}) + \beta$, where β is the additive component in question—then the link between traditional risk aversion (having a concave utility function) and observed risky behavior (e.g., choosing a gamble instead of a sure outcome) is weakened, if not broken. Notably, this concept of an additive component is consistent with the concept of *psychological entropy*, which Hirsh et al. (2012) defines as "the experience of conflicting perceptual and behavioral affordances," where affordances are potential scenarios which demand action (p. 304).

More simply put, every time an individual encounters an uncertain situation, they must consider each potential outcome and their optimal response to each of those outcomes. As individuals must expend cognitive effort to think about a given

[3]Throughout the paper, we refer to the factor of Openness to Experience, sometimes called Openness/Intellect, as Openness (Costa and McCrae, 1992; DeYoung and Gray, 2009). This label is not used in this paper to refer to the underlying aspect of Openness in DeYoung and Gray (2009).

outcome and decide on what they would do if that outcome were realized, individuals expend less effort considering less likely situations, and effectively ignore highly improbable scenarios. Psychological entropy is low in uncertain situations in which one option is highly likely and the alternatives are relatively unlikely, and high when there are many options which are all equally likely. As an example from everyday life, suppose one must choose between two restaurants for dinner, each with a prix fixe menu. One restaurant is very familiar, with the aging but perfectionist owner/chef working nearly every day offering only Columbian rice and chicken, while his apprentice takes over on a random day each week, offering a dish from among his own known repertoire of five options. The other restaurant opened today, and the menu is totally unknown. Visiting the first restaurant requires consideration of a single very likely scenario (chicken and rice) and five other less likely outcomes, while visiting the second restaurant requires consideration of a nearly uncountable number of equally likely scenarios, including, but certainly not limited to, getting food poisoning from undercooked fried chicken, enjoying Ramen worthy of a Michelin star, or even simply eating mediocre "artisanal" macaroni and cheese. As such, the experience of visiting the second restaurant would present much more psychological entropy than dining at the first.

Resolving psychological entropy is essential for survival, and Hirsh et al. (2012) argue that uncertainty "poses a critical adaptive challenge" (p. 305) to organisms. This challenge creates an evolutionary motivation for organisms to develop nervous systems, which may seek experiences and information that serve to integrate perceptual frames and reduce the subjectively plausible number of "conflicting actions and perceptions that can be potentially brought to bear on a given situation" (p. 306). In light of this proposed evolutionary drive to confront uncertainty, gain information, and improve neurological adaptation to uncertainty, individuals ought to vary in their biological tolerance of (and preferences for) psychological entropy.

While psychological entropy is detrimental to fitness over the long term, in the short term, biological drives to encounter psychological entropy in order that it be resolved may increase fitness. In fact, it has been suggested that some of the biochemical foundations of Openness can be found in the parts of the brain, which respond to psychological entropy (DeYoung, 2013). For example, several cognitive functions linked to Openness are caused by variation in the brain's salience coding dopaminergic system, where salience coding neurons "respond to incentive cues for the value of information that can potentially be obtained following any increase in psychological entropy" (p. 763). This suggests measures of Openness capture variation in the activity of several dopamine-related cognitive functions rewarding experiencing and resolving abstract and experiential uncertainty, and that more Open individuals possess more active reward systems directed toward experiencing and resolving psychological entropy than others (DeYoung, 2013).

Notably, this theory is supported by a wide body of evidence connecting Openness with cognitive functions providing individuals with increased abilities and motivations to engage with complexity (DeYoung et al., 2011). First of all, Openness has been linked to resting state functional connectivity (RSFC) within areas of the prefrontal cortex (PFC) associated with working memory (e.g., Allen and DeYoung, 2017). In addition, through its subsummation of intellect, Openness has been associated with higher levels of cognitive engagement, thus allowing individuals to allocate more cognitive resources to abstract cognitive tasks (Smillie et al., 2016). Additionally, Openness has been linked with cognitive processes allowing the brain to engage with complex sensory information, such as implicit learning and lower levels of latent inhibition—that block irrelevant stimuli from consciousness (e.g., Peterson et al., 2002; Kaufman, 2013). These processes allow more Open individuals to allocate attention to wider ranges of experiential stimuli and retain complex information gained through experience. In sum, each of the aforementioned cognitive functions associated with Openness serve to increase the abilities of individuals to process complex information or the motivation to collect complex information, increasing encounters with high entropy stimuli. Hence, Ramey et al. (2017)'s characterization of Openness as a "compulsion to gather and process information" (p. 40), which is consistent with DeYoung (2015)'s recent characterization of Openness as "cognitive exploration and engagement with information" (p. 42), as well as his claim Openness reflects variation in reward for abstract and experiential uncertainty (DeYoung, 2013).

Overall, the implications of the relationship between Openness and psychological entropy for expected utility formulations of choice under uncertainty are profound. Of particular note to scholars seeking to formalize models of personality, the foundational literature on psychological entropy included mathematical expressions of the concept (Hirsh et al., 2012). As psychological entropy captures the entropy present in the number of affordances, which must be made in a given context weighted by the probability of those affordances, Hirsh et al. (2012) adapt the mathematical expression of entropy [built around $p(x_i)$, the probability of outcome x_i] developed by Shannon (1948):

$$N = -\sum_{i=1}^{n} p(x_i) \log_2 p(x_i)$$

Following from this expression, Hirsh et al. (2012) describes how uncertainty in the possible perceptions and behavioral outcomes from a given situation/gamble generates psychological entropy (p. 307):

> "Entropy increases as the number of possible outcomes increases and the probability of any particular outcome, $p(x_i)$, decreases...Low psychological entropy occurs during situations in which there is a high probability of employing a particular action or perceptual frame, x_i...High psychological entropy occurs during situations in which there are multiple competing frames and behavioral options...none of which is clearly more strongly activated than the others."

Indeed, it suggests a preference for the additive form of the expected utility function for a gamble, $U(g) = U(\hat{x}) + \beta$, where the additive component β can be decomposed into a multiplicative term χN; in this context, N is the

psychological entropy utility of the gamble, which is a function of the probabilities of the potential outcomes, and χ is the preference for psychological entropy, manifested as an individual's Openness. As individuals compare gambles with their certain equivalents, more Open individuals will derive more utility from experiencing and resolving gambles with high psychological entropy.[4] Given sufficient Openness and the potential for sufficient psychological entropy, even individuals with concave utility functions—derived from loss aversion and diminishing marginal returns—will accept the gamble over the certain equivalent, thus appearing to be "risk-loving" or "risk-acceptant."

Under these conditions, individual preferences for resolving gambles with high psychological entropy serve as a complement to Kahneman-style preferences for risk based on loss aversion in explaining individual preferences for accepting gambles. In other words, a person can be highly loss-averse but entropy-loving, and their entropy utility from the gamble will be dependent on both their Openness and the number of subjectively plausible affordances present in the gamble, while their loss-aversion utility from the gamble will be based on the curvature of their utility function. Thus, instruments measuring the risk preferences of individuals should observe more Open people being more willing to accept gambles when the sure payment is less than the corresponding lottery's expected value, which is consistent with existing research (Barsky et al., 1997; Dohmen et al., 2010). Though we do not argue Openness influences the curvature of utility functions, the role of psychological entropy in evaluating gambles should lead more Open people to be more willing to take risky gambles over certain equivalents—in part due to their increased utility from psychological entropy. It is in this sense (i.e., greater willingness to take risky gambles) that we discuss the connection between Openness and risk in the rest of this paper.

2.2. Psychological Entropy in the Voting Booth

We now move from the biochemical relationship between Openness and risky behavior and focus on the inherent uncertainty of politics, as many decisions entail delegating authority to another actor who is more willing or able to affect policy. This question of moral hazard permeates nearly every decision at the elite level, and the decisions made inside the voting booth are no different, since voters must collectively decide which individual(s) will be responsible for legislating on their behalf, which is often done in an environment bereft of information (Delli Carpini and Keeter, 1996) and therefore rife with uncertainty. Moreover, this uncertainty is often asymmetric, as voters are often asked to choose between a safe option maintaining the status quo (e.g., voting for the incumbent) or a risky option promising to upend the status quo (e.g., voting for a challenger), with uncertain outcomes thereafter. The victory of personally familiar incumbents should also be considered to be low psychological entropy outcomes, as these are defined as options in which "the distributions of possible meanings and actions are heavily weighted toward a single dominant affordance" or cognitive/behavioral response (p. 307) (Hirsh et al., 2012). In general, voting for an incumbent is a vote for a low uncertainty and low psychological entropy outcome.

However, not all challengers pose equal uncertainty. Some are well-known figures whose policy preferences are widely known, and others are virtual unknowns. Challengers in the latter category should be perceived as more uncertain, since their possible effects on future policy outcomes are more likely to be unknown at the time of the vote. Thus, if Openness captures loss aversion-driven risk preferences, it should play a stronger role in voters' decisions when faced with these riskier challengers.[5] Conversely, when challengers' preferences are well-known, the uncertainty is minimal compared to that inherent in voting for the incumbent, and Openness should play little—if any—role in these cases, if Openness captures risk preferences. Thus, Hypotheses 1 and 2 are derived:

Hypothesis 1. *More Open respondents should be more likely to vote for uncertain, risky challengers.*

Hypothesis 2. *Openness should play no role when challengers are not perceived as uncertain and risky.*

Challenger uncertainty is not the sole—or even main—factor driving vote choice in Congressional elections. Instead, that role arguably belongs to partisanship, especially given increased partisan polarization in recent years (Bafumi and Shapiro, 2009). Therefore, we should expect, in any given contest, members of the incumbent's party ("inpartisans") will be more likely to vote for him or her, and members of the major party challenger's party ("outpartisans") should be more likely to vote for the challenger, *ceteris paribus*.[6]

In the face of a highly uncertain, high entropy challenger, individuals will likely utilize cognitive shortcuts to simplify their consideration of that outcome. The availability of these heuristics determines the potential psychological entropy reduction, which can be experienced from observing the challenger in office. Importantly, a challenger's nomination by a major party should provide just that simplifying heuristic to voters who are members of the two major parties. These partisans have been sorted into

[4] Although several cognitive functions linked to Openness and the salience coding dopaminergic system reduce the costs or provide benefits for engaging with psychological entropy, psychological entropy still poses a challenge to organisms, and it is likely χ is negative for individuals with sufficiently low Openness.

[5] While Eckles et al. (2014) did not find the effect of risk aversion (though they did not operationalize it using Openness) was modulated by whether a challenger was a "quality challenger" (i.e., those that have previously held elected office), this is a somewhat different dynamic than the one discussed here. Quality challengers, while perhaps having higher valence attributes than challengers of lower quality, are not necessarily less "risky" in the sense that their effects on eventual policy outcomes are well-known. Rather, being unsure of the policy preferences of challengers—and therefore their possible effects on policy outcomes—is arguably a better measure of the perceived "riskiness" of a challenger. This is especially true given the emergence of more extreme primary challengers in recent years. Those candidates who are so little-known that partisan cues cannot provide reliable indications of their policy preferences are likely to be perceived as presenting particularly high potential reduction of psychological entropy if they can be observed in office.

[6] This assumes no third-party or independent incumbents, which has been true for the House since the 2006 midterms.

similar "bins" or through negative partisanship, these have been filtered into dissimilar "bins." A major party voter can choose to support/defend the behavior of a victorious copartisan challenger by default, or oppose the behavior of a victorious challenger in the other party by default. This serves to reduce the subjectively plausible reactions to an uncertain challenger for partisans, while Independents must leave themselves open to a wider variety of reactions should the uncertain challenger win, as they are nominally committed to processing all of the possible behaviors of the challenger as potentially worthy of support or opposition. Independents should not only experience a much wider scope of anticipated responses to the candidate than inpartisans or outpartisans, but a larger potential reduction in psychological entropy if the challenger is observed in office.

Regardless of the potential reduction in psychological entropy, which could be enjoyed by observing a candidate in office, the potential utility from that reduction is a function of the observer's Openness. This leads us to expect that changes in Openness should have a stronger effect for Independents than for partisans in determining vote choice for a high entropy, poorly known challenger.[7] We therefore derive our final hypothesis, and provide an outline of the hypothesized decision-making process in **Figure 1**:

Hypothesis 3. *Openness should play a stronger role in the decisions of Independent voters.*

3. DATA AND METHODS

We examine our hypotheses using the 2014 and 2016 Cooperative Congressional Election Studies (CCESes), focusing on House incumbents (Schaffner and Ansolabehere, 2017; Ansolabehere and Schaffner, 2018). In both years, we asked respondents to take the Ten-Item Personality Inventory ("TIPI") to estimate their Big Five personality traits on a 1–7 scale, which we subsequently rescale to a 0–1 scale (*Openness*: mean $\approx$ 0.657, s.d. $\approx$ 0.189; *Conscientiousness*: mean $\approx$ 0.760, s.d. $\approx$ 0.196; *Extraversion*: mean $\approx$ 0.470, s.d. $\approx$ 0.237; *Agreeableness*: mean $\approx$ 0.676, s.d. $\approx$ 0.193; *Neuroticism*: mean $\approx$ 0.352, s.d. $\approx$ 0.219).[8] In 2014, 1,000 respondents were asked, and 3,000 were asked in 2016. Additionally, respondents were asked to place their representatives and major-party challengers on an seven-point ideological scale, ranging from "Very Liberal" to "Very Conservative" (*Incumbents*: mean $\approx$ 4.330, s.d. $\approx$ 1.915; *Challengers*: mean $\approx$ 3.946, s.d. $\approx$ 1.778). Respondents were also asked their own party registrations, and these were used to determine whether the respondent was an *Inpartisan* (having the same party affiliation as the incumbent Representative; mean $\approx$ 0.380, s.d. $\approx$ 0.485), an *Outpartisan* (having the same major-party affiliation as the major-party challenger; mean $\approx$ 0.249, s.d. $\approx$ 0.433), or an *Independent* (not having a major-party affiliation; mean $\approx$ 0.371, s.d. $\approx$ 0.483).[9]

Along with the variables derived from the Big Five and ideology, we include as covariates respondents' age (*Age*/100: mean $\approx$ 0.489, s.d. $\approx$ 0.168), race (*Non-white*: mean $\approx$ 0.267, s.d. $\approx$ 0.442), gender (*Male*: mean $\approx$ 0.470, s.d. $\approx$ 0.499), income (*Income [1 =< 10 k; 12 => 150 k; 13 = Refused]*: mean $\approx$ 7.040, s.d. $\approx$ 3.669; *Income Refused*: mean $\approx$ 0.109, s.d. $\approx$ 0.312), education (*Education [1 = No HS; 6 = Post-graduate]*: mean $\approx$ 3.677, s.d. $\approx$ 1.479), marital status (*Married*: mean $\approx$ 0.439, s.d. $\approx$ 0.496), feelings about the economy (*State of National Economy [1 = Gotten much better; 5 = Gotten much worse]*: mean $\approx$ 3.080, s.d. $\approx$ 1.040), and a political knowledge variable equaling one if the respondent knew the party in control of the House (Republicans in both years) and zero otherwise (*Knowledge of House Control*: mean $\approx$ 0.616, s.d. $\approx$ 0.486). We also include contest-level variables including the extent of the race's competition (*Competitive Election*: mean $\approx$ 0.610, s.d. $\approx$ 0.291), which ranges from 0 (meaning one major-party candidate received 100% of the vote in the previous election) to 1 (the hypothetical maximum where both major-party candidates were tied), whether the incumbent is a freshman (*Freshman Representative*: mean $\approx$ 0.181, s.d. $\approx$ 0.385), whether or not the challenger had previously held elected office (*Quality Challenger*: mean $\approx$ 0.142, s.d. $\approx$ 0.349), and whether the race is a midterm election (*Midterm Election*: mean $\approx$ 0.201, s.d. $\approx$ 0.401).

We operationalize the riskiness of challengers in two ways. First, we create an indicator variable (*Unknown Challenger Ideology*: mean $\approx$ 0.662, s.d. $\approx$ 0.473) equaling one if the respondent was unable to place the challenger on the ideological scale, and zero otherwise; at the individual voter level, a "risky" challenger will be one they are unable to place on the ideological scale, since the resulting effect on policy outcomes will be unknown.[10] Combined with the aforementioned Big Five traits (focusing on Openness in particular), these will be our key covariates of interest. Additionally, we interact *Unknown Challenger Ideology* with the Big Five traits to account for the dynamics suggested by Hypothesis 3.

Additionally, we consider a more theoretically grounded approach accounting for the role of ideological uncertainty for those who were able to provide candidate placements (but leaves us with fewer observations as not everyone was able to place the candidates on the ideological scale). Suppose respondent

[7]This is in line with the findings of Eckles et al. (2014), who found the influence of risk aversion on incumbent voting was strongest among Independents. We do note that Eckles et al. (2014) uses the risk tolerance measure of Barsky et al. (1997), which was validated against risky behaviors that should also be high psychological entropy behaviors. Furthermore, Eckles et al. (2014) uses a version of the measure that compares a current job with a new job, allowing "status quo bias" to enter into the measure according to Barsky et al. (1997), which we hold is an implication of aversion to psychological entropy.

[8]While the TIPI is shorter than standard instruments, it is well-suited to time-limited tasks like the CCES, and results from the TIPI tend to be highly correlated with the results one would get from longer batteries of questions (Gosling et al., 2003; Ehrhart et al., 2009). The question wording is given in the Appendix in **Supplementary Material**.

[9]We drop those districts without major-party challengers or incumbents running for reelection.

[10]There were no cases in which a respondent was unable to place the incumbent on the ideological scale but able to place the challenger on the ideological scale. Thus, challengers are always weakly riskier than incumbents by this measure.

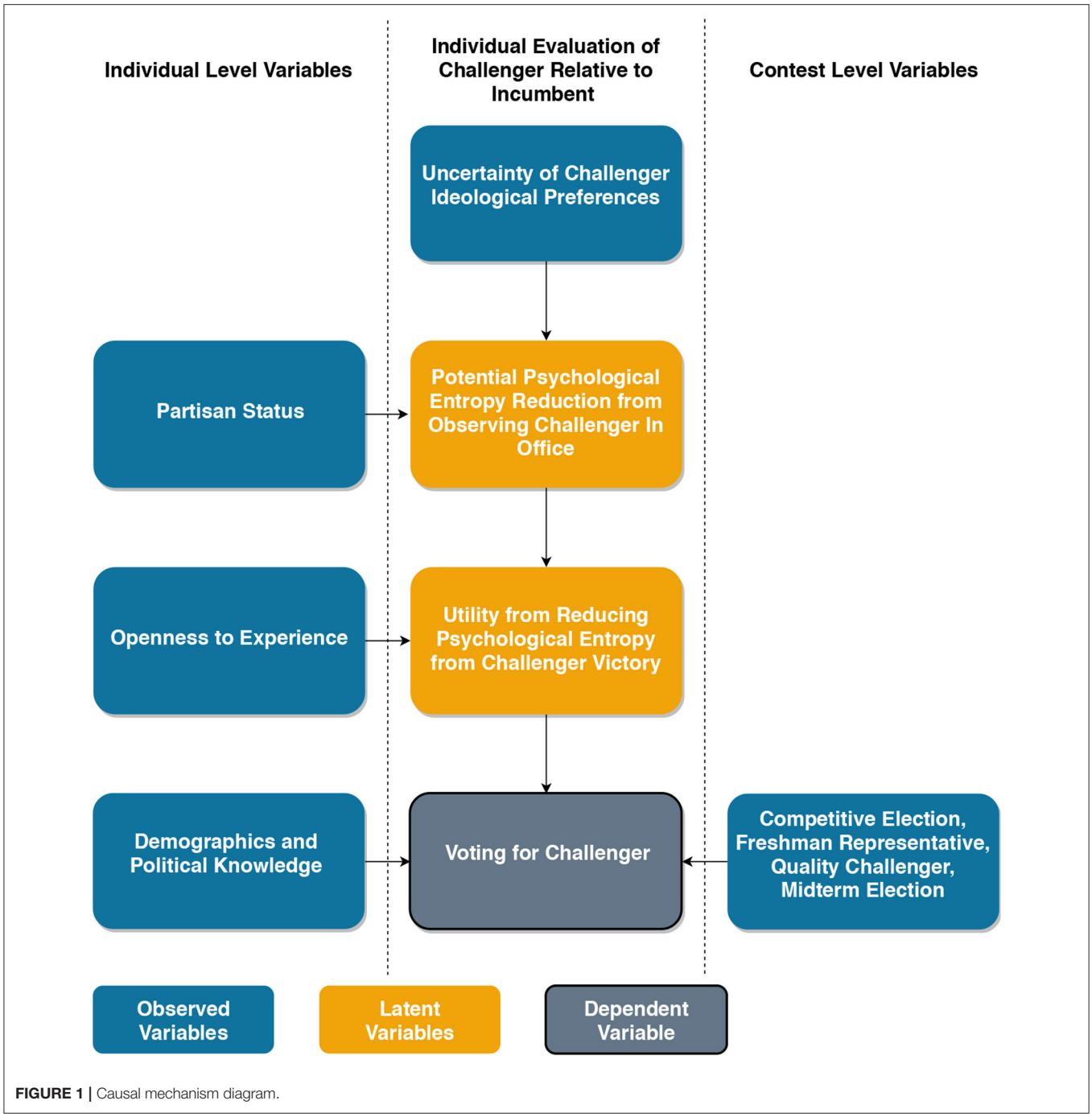

FIGURE 1 | Causal mechanism diagram.

i has self-reported ideology θ_i. While respondent i does not know the ideologies of either the incumbent or the challenger, i does possess a prior belief regarding candidate j's ideology, ϕ_j. Specifically, i believes ϕ_j is drawn from a Normal distribution with known mean and variance, i.e., $\phi_j \sim N(\mu_j, \sigma_j^2)$. If i's utility for candidate j is given by the standard quadratic form,

$$u_i(\phi_j) = -(\theta_i - \phi_j)^2, \tag{1}$$

it is straightforward to show i's expected utility—given the uncertainty in ϕ_j—is

$$\mathbb{E}[u_i(\phi_j)] = -(\theta_i - \mu_j)^2 - \sigma_j^2. \tag{2}$$

We can compute the above the equation for each candidate (incumbent, I, and challenger, C) and then calculate the

difference in utilities:

$$\mathbb{E}[u_i(\phi_I)] - \mathbb{E}[u_i(\phi_C)] = \underbrace{(\theta_i - \mu_C)^2 - (\theta_i - \mu_I)^2}_{\text{Mean dissimilarity between } I \text{ and } C} + \underbrace{(\sigma_C^2 - \sigma_I^2)}_{\text{Variance difference}} . \quad (3)$$

In other words, if I is closer (in expectation) to i than C, the respondent gets more utility from the incumbent. However, if I is perceived as more variable than C, this proximity advantage can be mitigated. Our estimates of this difference are denoted as *Relative Ideological Difference*.

In the spirit of Somer-Topcu (2015) and Rogowski and Tucker (2018), we assume (μ_I,μ_C) and (σ_I^2,σ_C^2) are, respectively, given by the means and variances of the ideological scale placements of incumbents and challengers among all respondents in a given congressional district in the *Common Content* of the CCES. Since our personality-related questions are only available for the 4,000 respondents in our samples, we use the Common Content data (which pools respondents across all teams participating in the CCES) to gauge the prior means and variances of candidate positions. This gives us about 100 respondents per district in 2014 and 140 per district in 2016, which is sufficient to estimate these positions.[11] Thus, we use the estimates of the differences in variances—denoted as *Relative Variance Difference* ($\mu \approx 0.307$, $\sigma \approx 0.654$)—as our second measure of challenger riskiness.[12]

Our dependent variable in all analyses is a binary variable equaling one if the respondent voted for the incumbent, and zero otherwise (*Incumbent Vote*: $\mu \approx 0.624$, $\sigma \approx 0.484$); as we are estimating a binary-dependent variable model, we estimate four probit models—one including all *"True" Independents* (i.e., those who initially responded as having no partisan affiliation and did not indicate they "leaned" toward one particular party), one including *"Self-Described" Independents* (i.e., those who initially responded as having no partisan affiliation but did indicate they "leaned" toward one particular party upon further probing), one including only *Inpartisans*, one including only *Outpartisans*, and an *All Respondents* model.[13] We estimate separate models because the effects of Openness likely vary depending on the partisan relationship between respondents and incumbents, as per Hypothesis 3.

4. RESULTS AND DISCUSSION

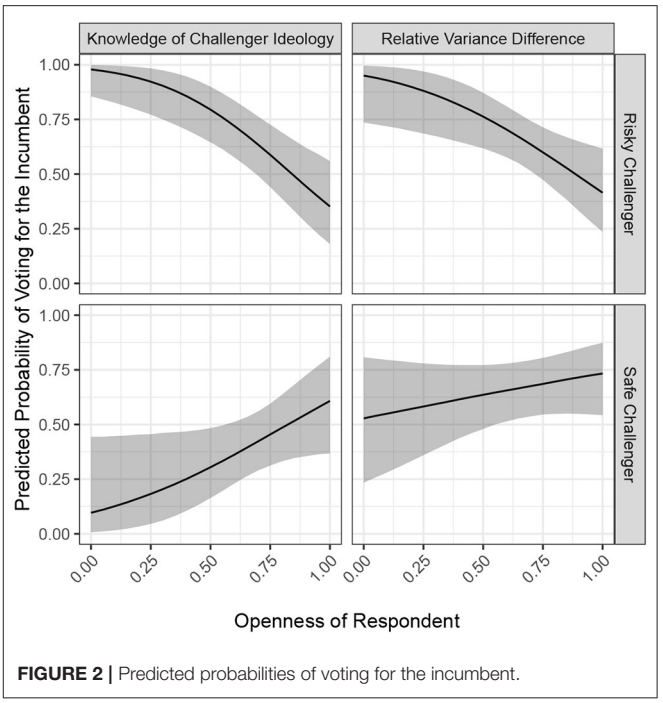

FIGURE 2 | Predicted probabilities of voting for the incumbent.

Using these measures, we estimate a series of probit models, with results in Tables B-1 (where *Relative Variance Difference* is used) and B-2 (where *Unknown Challenger Ideology* is used), both of which are in the Appendix in **Supplementary Material**. The results align with our expectations; namely, Openness strongly mitigates the role of perceived ideological uncertainty in Independents' propensity to vote for incumbents, who cannot rely on partisan cues to reduce the psychological entropy posed by uncertain challengers. More specifically, neither *Openness* nor *Relative Variance Difference* are significant at conventional levels in the partisan models.[14] Thus, it suggests the results in the pooled model might be driven entirely by independents, in line with Hypothesis 3. Thus, we focus on independents for the rest of this paper, with a particular focus on the "Self-Described" Independents model.[15]

For ease of interpretation, we present predicted probabilities of voting for the incumbent as a function of Openness (shown in **Figure 2**), as well as the marginal effects of Openness (shown in **Figure 3**). In both **Figures 2**, **3**, we fix the mean ideological

[11] Ramey (2016) suggests samples as small as 50 respondents per district are sufficient for assessing positions.

[12] In the event that the challenger's variance is smaller than the incumbent's variance (suggesting that the incumbent is riskier than the challenger), the *Relative Variance Difference* will have a negative value. If the incumbent is riskier than the challenger, observing the incumbent in office will offer greater potential psychological entropy reduction. More Open respondents will gain more psychological entropy reduction utility from voting for the incumbent, so we should expect the coefficient for the interaction between *Openness* and *Relative Variance Difference* to remain negative for this subset.

[13] We use survey weights constructed to match the demographics of the American Community Survey.

[14] Results (see Appendix in **Supplementary Material**) are substantively similar if we estimate models without any variables aside from our measures of personality and psychological entropy. Additionally, to account for the possibility that more Open respondents are more liberal, on average, we estimate models where we include *Ideological Self-Placement* ($\mu \approx 4.106, \sigma \approx 1.788$)—which we define as the respondent's self-placement on the seven-point ideological scale—as an additional control variable; results, which are in the Appendix in **Supplementary Material**, are substantively similar to those presented here.

[15] Our results for "Self-Described" Independents and "True" Independents are substantively similar when *Relative Variance Difference* is used, though the results for "True" Independents are substantially weaker than those for "Self-Described Independents" when *Unknown Challenger Ideology* is used (though the point estimates for the relevant coefficients are in the same direction).

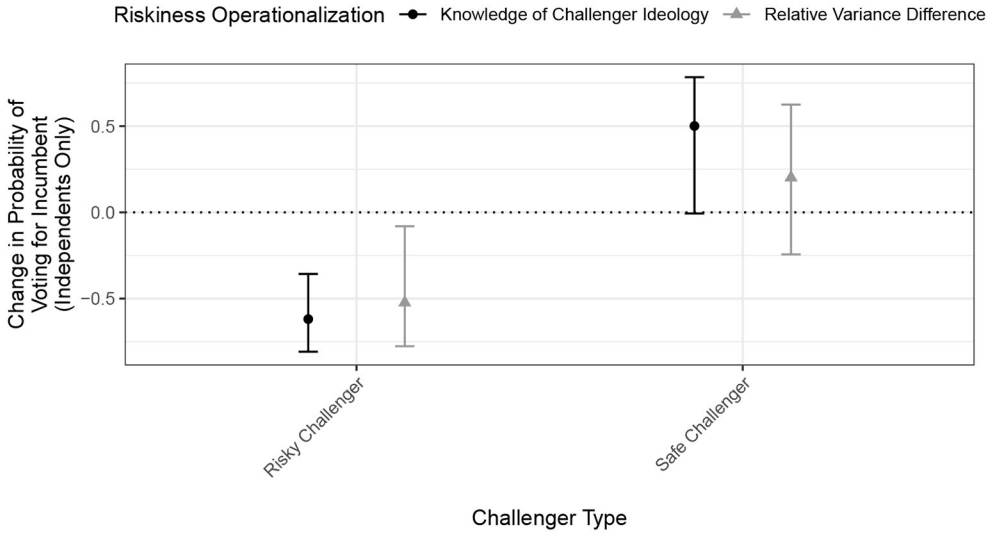

FIGURE 3 | Predicted changes in probability of voting for the incumbent (varying Openness from one standard deviation below its mean to one above).

proximity at 0 (for the *Relative Variance Difference* measure) and vary both Openness and the differences in relative ideological variances. When there is no difference in variance, or when the respondent is able to place the challenger on the ideological scale, Openness does not affect the probability of voting for an incumbent, as per **Figure 2**; indeed, the 95% confidence intervals about the expected percentage changes in the probability of voting for the incumbent both contain zero (see **Figure 3**). However, when the challenger is one standard deviation more variable than the incumbent, or when the respondent is unable to place the challenger, the least Open respondents nearly all vote for the incumbent, whereas the most Open have under a 50% probability of doing so (per **Figure 2**); for these challengers, as shown in **Figure 3**, the effect of moving Openness from its minimum to the maximum decreases the probability of voting for the incumbent by ∼50% points, regardless of how uncertainty is operationalized. Both results are consistent with Hypotheses 1 and 2.

5. CONCLUSIONS

This project uses the case of the electoral advantage to incumbency to examine the role that preferences for encountering and reducing psychological entropy can play in guiding choice under uncertainty. We find that more Open voters are more likely to vote for uncertain challengers, but only among Independent voters who cannot rely on partisan cues to simplify the set of possible reactions to viewing the uncertain challenger in office. This is in line with DeYoung (2013)'s argument that Openness represents variation in reward for engaging psychological entropy, and Ramey et al. (2017)'s argument that Openness represents a compulsion to gather and process information.

An underlying assumption of Hypothesis 1 is that challengers who are virtual unknowns should be perceived as more uncertain and generate a wider variety of subjectively plausible reactions to their election. The lack of empirical support for Hypothesis 1 and finding of support for Hypothesis 3 suggests that partisan voters may not in fact perceive unknown challengers as presenting a wider variety of plausible reactions if they are elected. We suggest that partisanship fully simplifies partisan voters' reactions to the election of an uncertain challenger and leaves little variation in the potential reduction in psychological entropy from observing known or unknown challengers. As a result, Openness only is associated with a preference for unknown challengers among individuals who cannot rely on partisan heuristics to simplify their consideration of the election of a virtual unknown candidate.

These findings do not provide evidence that Openness generally represents a general preference for uncertainty or risk, as the relationship between Openness, challenger ideological uncertainty, and vote choice did not hold for partisans. Since we find a significant relationship only among those voters for whom partisan attachments (and thus the psychological entropy-reducing power of partisan heuristics) are weakest, the evidence supports a refinement of that framework of Openness as a preference for encountering and reducing psychological entropy. For partisan voters, the party brand label attached to a candidate appears to simplify potential responses to uncertain agreement or disagreement with candidate policy preferences to the point where the difference in psychological entropy is low and Openness has little influence. These findings further highlight the importance of context in understanding the broad impact of personality traits on choice under uncertainty, and the role of partisan heuristics in not only conveying information but reducing the psychological entropy experienced by partisan voters.

There are several opportunities for future researchers to build upon this study. First, while the TIPI is a widely used measure of personality due to its brevity and ease of administration, using a more detailed personality inventory, such as the NEO-PI-R or the IPIP to measure voters' personality traits could potentially increase confidence in the findings and also allow for examination of the role individual facets of Openness play in driving preferences for uncertain challengers. Second, including multi-item measures of political knowledge, evaluations of government performance, and candidate quality could provide additional confirmatory evidence for the overall result. Finally, expanding upon the results of this observational study with experimental designs that could prime and vary probable outcomes associated with the election of different candidates, along with the partisanship and incumbency of those candidates, would allow the causal effects of candidate psychological entropy to be investigated directly.

Finally, while our results are only apparent for Independent voters, and especially self-described Independent voters, it should be noted that such voters comprise one of the largest—if not the single largest—voting blocs in the United States, and have done so for some time. For example, a Pew study conducted in 2019 found that 38% of voters were self-described Independents, with 31% identifying as Democrats, 26% as Republicans, and the rest either refusing to answer the question, not knowing, or identifying with a third party; these figures are comparable to those in our sample (Pew Research Center, 2019). Even then, most self-described Independents are partisan "leaners" who generally prefer one major party to the other (Keith et al., 1992; Hajnal and Lee, 2011); this is evident in the Pew sample as well as our own. While our results for this subset of "true" Independents are somewhat weaker (as previously mentioned, see Appendix in **Supplementary Material** for full results for this subsample), they are generally consistent with the results for self-described Independents. Depending on how Independents are defined, our results speak to the voting behavior of between one-quarter and one-third of American voters and provide further evidence of the importance of personality traits in the process.[16]

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by New York University and University of Notre Dame IRBs. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpos.2021.636874/full#supplementary-material

[16]However, it is unclear how much our results might generalize to contexts outside the United States. For example, party membership in Europe is extremely low relative to the United States, below 5% of the electorate on average and below 2% in a few countries (Mair and Van Biezen, 2001). Additionally, a recent study of Latin American party membership suggested that, on average, about 30% of the electorate across 12 different countries were members of formal political parties (Došek, 2016). As such, while there are more "independent" voters on paper in many countries outside of the United States, it seems unlikely that the dynamics uncovered here would manifest in the exact same way, given the different voting systems and party dynamics present elsewhere. Future research is needed to fully establish the generalizability of our findings.

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