R-10

James Johnson
City of Long Beach
Councilmember, Seventh District

Date: November 2, 2010

To: Honorable Mayor and Members of the City Council

From: Councilmember James Johnson, Seventh District
Councilmember Dee Andrews, Sixth District
Councilmember Steve Neal, Ninth District

Subject: Request to Implement Ballot Rotations

RECOMMENDATION:

Request the City Clerk to implement ballot rotation, consistent with the practice of Los Angeles County and other jurisdictions, to enhance the integrity and fairness of our local elections.

DISCUSSION

To the extent possible, the election of local representatives should be based on the merit of the candidates, as assessed by the electorate. While this is generally the case in Long Beach, the current practice of allowing a candidate to be listed first on all ballots currently gives some candidates an unfair advantage that should be eliminated to maintain an even playing field.

Presently, a lottery is held that determines the ballot order of candidates for all ballots in a particular election. For example, in an election between hypothetical candidates Alfonso, Bonnie, and Charles, it may be determined that Charles will be listed first for all ballots.

On average, California City Council and School Board candidates listed first on the ballot are 5.6% more likely to win their election as a result of their ballot position (see attached analysis of the California Elections Data Archive [CEDA] results from 1996 to 2005 as gathered by Meredith and Salant from the Stanford Institute For Economic Policy Research, page 15, as highlighted.) This is significant enough to change the outcome in future elections and make future representatives the result of chance, not merit.

Many jurisdictions have eliminated this problem by introducing ballot rotation, in which candidates rotate their position on the ballot. All counties, including Los Angeles County, require ballot rotation to ensure fair elections. (California Elections Code Sections 13111-13114) We should require the same high standard in our municipal elections.

Using ballot rotation, in our above hypothetical example, Charles would be listed first on 1/3 of the ballots, Alfonso would be listed first on 1/3 of the ballots, and Bonnie would be listed first on 1/3 of the ballots.

FISCAL IMPACT

The City Clerk has communicated that his staff is willing and able to implement ballot rotation, if desired by the City Council. Staff time needed to implement this proposal is estimated at $2,500 in election years. This cost is a result of staff hours necessary to prepare, verify and format the ballots and the reports that would accompany each rotation. The cost could vary slightly depending on the number of candidates in a given election cycle. The Clerk has indicated he can absorb this cost within his budget.

The Causes and Consequences of Ballot Order-Effects

Marc Meredith and Yuval Salant*

Stanford GSB

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Abstract:

To better understand how list orderings affect choices of economic significance, we explore how ballot order affects election outcomes. Unlike previous work, we show that ballot order significantly affects the results of elections. In more than five percent of the elections in our dataset of California multi-member district local elections, the candidate listed first won office as a result of the ballot ordering. Using multi-member district elections allows us to isolate the mechanisms leading to order-effects in a way unavailable in single-member districts. We reject the hypothesis that ballot order-effects only result from voters running out of available votes prior to reaching the end of the ballot. We also demonstrate that ballot order-effects are history-dependent: candidates perform worse when they are listed immediately after higher quality candidates. This suggests that policy makers should use more sophisticated rotation schemes to mitigate order-effects. Finally, we find evidence that our point estimates are robust to the presence of partisan cues.

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I. Introduction

Classic models of choice assume that decision makers choose from sets of alternatives. Alternatives in many real world choice situations are instead presented to decision makers in the form of a list. Individuals select candidates from ordered ballots, entrées from menus, and products from catalogs. In such cases, the list order may be a substantive factor affecting choice. Decision makers may examine the first few alternatives on the list more attentively or recall the last few alternatives more vividly (Krosnick and Alwin 1987). This could result in alternatives in certain list positions being systematically more likely to be chosen. The evaluation of an alternative may also be affected by characteristics of other alternatives listed in its immediate proximity (Bruine de Bruin and Keren 2003; Schuman and Presser 1981; Tourangeau and Rasinski 1988). This may cause the likelihood that alternatives are selected from a given list position to depend on the ordering of the remaining alternatives in the list.

In this paper we examine how list orderings influence the outcomes of one of the most important social and political activities individuals are involved in – elections. Elections provide a fertile ground for an empirical analysis of order-effects for a number of reasons. While order-effects have been widely studied in survey and experimental research, often choices have no real-world consequences in these settings. In addition, the randomization and rotation of candidate names on ballots in some U.S. states provides a substantial amount of quasi-experimental data. Finally, strategic responses may magnify or attenuate observed order-effects in many real world settings. For example, Miller (1980) advises restaurant managers to place their highest profit margin items first, second, and last on their menus. Elections provide a real world setting to estimate the magnitude of order-effects unconfounded by strategic ordering.

The analysis in this paper focuses on how ballot ordering affects election outcomes in city council and school district elections in California and Ohio. We choose to investigate such elections for several reasons. Our identification strategies rely on having a large number of different elections for which ballot order is either randomly assigned or rotated across precincts. In California alone there are over 1600 municipalities and school districts that hold elections in which candidates are randomly assigned to ballot positions. In addition, unlike most federal and state elections, many city council and school district elections are in multi-member districts. Using multi-member district elections allows us to isolate mechanisms leading to order-effects, because unlike in single-member districts, voting for the first candidate does not exhaust all available votes. It is also important from a policy perspective to understand how ballot ordering affects local elections. States are currently the least likely to utilize ballot rotation or randomization for local elections (Krosnick, Miller, Tichy 2004). Moreover, because past research on ballot order-effects has not directly studied local elections, policy recommendations have been based on evidence from state level elections (Alverez, Sinclair, Hasen 2006). This is problematic if significant differences in the magnitudes of order-effects exist in local and state level elections.

Our work extends previous research on ballot order-effects in four important ways. First, unlike previous work, we show that ballot order has a significant influence on the outcomes of the elections. In more than five percent of the California city council and school board elections in our dataset, the candidate listed first on the ballot won office as a result of the ballot ordering. Second, we reject the hypothesis that ballot order-effects result solely from voters running out of available votes prior to reaching the end of the list. Candidates listed second perform significantly worse than candidates listed first in multi-member district elections, even though voters have votes remaining when evaluating the second candidate. Third, we demonstrate that order-effects are not just position-dependent, but also history-dependent. We find that candidates perform worse when listed behind higher quality candidates. Moreover, this effect comes primarily from the immediately preceding candidate. This result implies that the rotation schemes currently used to mitigate ballot order-effects are not sufficient to eliminate them. Fourth, we take advantage of variation in the partisan nature of races to more accurately test how the presence of party cues influences the magnitude of ballot order-effects. We find no difference in the estimated advantage for the first positioned candidate in Ohio city council elections with and without partisan cues.

The remainder of the paper proceeds as follows. Section II discusses related literature on order-effects. Section III provides a theoretical model. Section IV describes the data and discusses its quasi-experimental nature. Section V analyzes the effect of ballot order on the outcome of elections. Section VI expands these results to demonstrate that order-effects are not only position-dependent, but also history-dependent. Section VII looks at how the presence of partisan cues affects the magnitude of ballot order-effects. Section VIII concludes.

II. Related Literature

The theoretical foundations for ballot order-effects come from psychological literature on response order-effects. Krosnick and Alwin (1987) give a number of reasons to expect a primacy effect in response order-effects when alternatives are presented visually. First, elements presented early in a list are advantaged because they affect the criteria for evaluating subsequent alternatives. For example, the element listed first may become the reference point from which other elements are evaluated (Tversky and Kahneman 1991). Second, alternatives presented earlier in the list are likely to receive greater consideration, because unlike later alternatives, they do not have to compete for cognitive attention (Smyth, Morris, Levy, and Ellis 1987). Third, decision makers are likely to satisfice, and select the first acceptable alternatives (Simon 1955; Krosnick 1999). As a result, alternatives listed later may be preferred to earlier alternatives, but not chosen because decision makers will have already exhausted their available choices.

Researchers have long recognized the potential for ballot ordering to influence candidate selection. Miller and Krosnick (1998) cite 28 papers dating back as far as the 1950s that look how ballot positions affect electoral outcomes. As Miller and Krosnick note, however, most of these papers suffer from serious research design flaws. Nearly all of these papers use cross sectional, non-random variation in candidate orderings (typically alphabetical) to identify the effect of ballot order on election outcomes.[1] To overcome this identification problem, most subsequent research on ballot order-effects has utilized within race variation in the ordering of candidates generated by ballot rotations (Alvarez, Sinclair, and Hasen, 2005; Ho and Imai, 2006; Koppell and Steen, 2004; Krosnick, Miller, and Tichy, 2004; Miller and Krosnick, 1998; Sinclair, 2006). By assuming that ballot order is randomly assigned within races (potentially conditional on some observables), these papers identify how ballot order affects candidates' vote shares by comparing the same candidate's observed vote shares in different ballot positions.

Many recent papers report significant effects of ballot position on vote shares. Miller and Krosnick (1998) find in 57 of the 118 races that they analyze during the 1992 Ohio Presidential election that candidates received significantly more votes when they were listed

[1] This may confound the effects of incumbency status and candidate name preferences with order-effects.

first. They also conclude that the benefits from being listed first increase in non-partisan races, and in races with more abstention and less media coverage. Krosnick, Miller, and Tichy (2004) report primacy effects in 89 of the 306 races they analyze during the 2000 presidential election in California, North Dakota, and Ohio. Koppell and Steen (2004) estimate that candidates for major offices (governor, lieutenant governor, U.S Senator, and state attorney general) in the 1998 New York City Democratic primary gained between 1.6 and 2.3 percentage points more votes when listed first on the ballot. Ho and Imai (2006) show evidence of primacy effects in California primary elections and for third party and non-partisan candidates in California's general elections. King and Leigh (2006) also conclude that significant primacy effects exist in Australian House of Representative elections. Given the magnitudes of their estimates, Koppell and Steen, Ho and Imai, and King and Leigh all conjecture that ballot ordering could influence the results of elections. None of these papers identification strategies, however, allows them to directly test this claim.[2]

A number of other recent papers question the importance of ballot order-effects. Alvarez, Sinclair, and Hasen (2006), Ho and Imai (2006), and Sinclair (2006) all find no evidence that ballot order-effects exist for major party candidates in California state-office elections. These null results bring into question whether the benefits of ballot rotation and randomization schemes used to counteract order-effects outweigh their costs. As Alvarez, Sinclair, and Hasen note, rotation schemes increase the administrative costs of running elections. In addition, both randomization and rotation schemes increase the potential for voter confusion. From a policy perspective, randomization and rotation schemes are primarily valuable to the extent that they prevent ballot order-effects from influencing the outcomes of elections. If ballot order-effects are only significantly affecting election outcomes for third party candidates, who have no chance of winning office, then the costs of randomization and rotation schemes may outweigh the benefits.

Unlike previous work, we directly address the question to what extent ballot order affects the outcome of elections. Specifically, we look at how ballot order influences the outcomes of multi-member district city council and school board elections in California. We disagree

[2] These papers estimate the average treatment effect of ballot position on vote shares, and then count the number of races in which the final margin was smaller than the average treatment effect. It is not necessarily true, however, that the average treatment effect correctly reflects the magnitude of order-effects in close elections.

with the claim of Alvarez, Sinclair, and Hasen (2006) that "as rotation is not required for municipal elections in California, it is simply impossible to determine using past election data, whether the lack of rotation influences California's municipal elections (54)." Instead, we use the combination of random assignment of candidates to ballot positions and the lack of rotation across precincts to identify the effects of ballot order on the outcome of elections.

We also extend the literature on ballot order-effect by not only testing for position dependence, but also history dependence. Previous psychological literature on context effects has found that previous questions and judgments affect subsequent responses (Ferris, Kempton, Deary, Austin, and Shotter 2001; Jesteadt, Luce, and Green 1977; Schuman 1991, Schuman and Presser 1981; Tourangeau and Rasinski 1988). It also shows that decision makers form impressions on an alternative by comparing it to alternatives that precede it (Houston, Sherman, and Baker 1989; Houston and Sherman 1995; Bruine De Bruin and Keren 2003). Because characteristics of immediately preceding alternatives on a list can affect decision makers' evaluations, this suggests that ballot order-effects may not only depend on position, but also on the identity of alternatives within the list.

Using multi-member district elections generates additional testable predictions with which to test for history dependence. The primary empirical challenge when testing for history dependence is distinguishing history dependence from voters' exhausting their available votes. For example, in single-member district elections, the candidate listed second may perform worse when listed behind a high quality candidate either because of history dependence (the first candidate may make the second candidate look bad), or because satisficing voters sequentially searching their ballot are more likely to have used their vote on the first candidate. The key distinction between single and multi-member district elections is that in multi-member districts voting for the first candidate does not exhaust a voter's available votes.

Finally, we examine how the availability of partisan cues affects the magnitude of ballot order-effects. Ho and Imai (2006) and Miller and Krosnick (1998) findings that the advantage to the first candidate is larger in non-partisan elections suggest that the availability of partisan cues may be an important determinant of the magnitude of ballot order-effects. Ho and Imai and Koppell and Steen (2004) results demonstrating that the relatively large magnitude of ballot order-effects in primary elections also supports this conclusion. One problem with this line of evidence is that it does not test partisan cues ceteris paribus; there are other aspects of non-partisan and primary elections that may affect the magnitude of order-effects. In contrast to previous work, we take advantage of variation across a single type of office to study the effect of partisan cues. Comparing the magnitude of order-effects in partisan and non-partisan city council elections allows us to more directly test how partisan cues affect the magnitude of ballot order-effects.

III. The Model

Our model is based on the theoretical framework of Rubinstein and Salant (2006). We postulate a model of choice from lists, where a *list* is simply a sequence of candidates. The decision maker examines the elements of the list sequentially. He assigns to every element a value which may in principal be a function of the quality of the element, its location in the list, and the quality of the elements that appear before it in the list. He uses this quality measure in order to choose k elements from the list. This model allows for a variety of choice procedures. Consider the following examples:

1. **Order-independent utility maximization:** The decision maker's utility function over candidates is independent of list position or the ordering of candidates. He chooses from every list the k elements with the highest utility. This example corresponds to rational choice without search costs since the ordering of candidates in the elections we examine is random, and thus conveys no information about the intrinsic quality of a candidate.[3]

2. **Satisficing:** The decision maker scans the list sequentially assigning utilities to candidates independently of their list position or the elements that appear before them in the list. He chooses the first k candidates that are above some fixed aspiration level η, or the k candidates with highest utility if there are fewer than k candidates above η. Rational choice with search costs can be modeled using satisficing.[4]

[3] There are cases in which location conveys important information about the quality or the relevance of an alternative such as in the case of the results returned by a search engine.

[4] Rational choice with search costs corresponds to setting $\eta = \arg\max_{\bar{q}} E(q \mid \bar{q}) - c \geq 0$ where $E(q \mid \bar{q})$ is the marginal expected (stationary) increase in the quality of the kth best candidate from considering another candidate given a reservation quality of $\bar{q}$, and c is the cost of evaluating a candidate.

3. **Reference-dependent choice:** The decision maker's utility function over candidates is a function of both the intrinsic quality of a candidate and the quality of the candidate listed immediately before him on the ballot. He chooses as detailed in example 1 or 2.

4. **Sampling:** The decision maker selects the first element, the last element, and $k-2$ elements from the center of the list.

Formally, let $X=\{1, 2, \ldots, n\}$ be the set of candidates. A permutation σ is a one-to-one mapping from X to X. A voter v chooses k candidates from $\sigma^v(X)$, where $\sigma^v(X)$ is a list of candidates in which candidate i appears in location $\sigma^v(i)$. The choice procedure of a voter is divided to two stages.

Stage 1: Evaluation. Let q^*_{v,i,σ^v} be the quality that voter v assigns to candidate i located in position $\sigma^v(i)$ in the list $\sigma^v(X)$. The quality q^*_{v,i,σ^v} is defined inductively by:

(1) $q^*_{v,i,\sigma^v} = \theta_i + \varepsilon_{i,v} + \gamma_1$ for $\sigma^v(i) = 1$ and

(2) $q^*_{v,i,\sigma^v} = \theta_i + \varepsilon_{i,v} + \gamma_{\sigma^v(i)} + \sum_{\sigma^v(j)<\sigma^v(i)} \beta_{\sigma^v(i)-\sigma^v(j)} q^*_{v,j,\sigma^v}$ for $\sigma^v(i) > 1$.

Equation 1 states that the quality of the first candidate in the list is the sum of the average quality of a candidate which is normalized to zero, a candidate specific shock θ_i, the decision maker's idiosyncratic preference for candidate i $\varepsilon_{i,v}$, and a possible preference for the first position in the list γ_1. Equation 2 states that the quality of candidate i appearing in position $\sigma^v(i)$ is the sum of the same parameters plus a possible effect on i's quality of the quality of the candidates which appear before i in the list. The assumption embodied in the equations is that the evaluation process of a voter is sequential in the sense that the quality of a candidate is affected only by candidates that appear before her in the list. This approach captures the idea that the list-quality of a candidate may be affected not only by her position but also by more subtle list effects that correspond to the quality of proximal candidates on the list.

Stage 2: Choice. A voter v chooses the first k candidates in the list such that $q^*_{v,i,\sigma^v} \geq c(q^*_{v,1,\sigma^v}, \ldots, q^*_{v,n,\sigma^v})$. The function $c(q^*_{v,1,\sigma^v}, \ldots, q^*_{v,n,\sigma^v})$ is a quality threshold and is assumed to satisfy the following:

a. c is *symmetric* in its n arguments and is fixed across positions.

b. c is bounded above by the k'th highest quality value in the vector $(q^*_{v,1,\sigma^v},\ldots,q^*_{v,n,\sigma^v})$ denoted by $k_{\max}(q^*_{v,1,\sigma^v},\ldots,q^*_{v,n,\sigma^v})$.

This specification fits nicely to the examples discussed above. Order-independent utility maximization and satisficing correspond to defining $q^*_{v,i,\sigma^v} = q + \theta_i + \varepsilon_{i,v}$. The quality threshold $c(q^*_{v,1,\sigma^v},\ldots,q^*_{v,n,\sigma^v})$ is set to $k_{\max}(q^*_{v,1,\sigma^v},\ldots,q^*_{v,n,\sigma^v})$ in the case of utility maximization and to $\min\{\eta, k_{\max}(q^*_{v,1,\sigma^v},\ldots,q^*_{v,n,\sigma^v})\}$ in the case of satisficing. Reference-dependent choice corresponds to setting $\beta_1 \neq 0$ and the remaining β's to zero, and sampling corresponds to setting $q^*_{v,i,\sigma^v} = \gamma_{\sigma^v(i)}$.

It remains to specify the distributional properties of the parameters of the model. The candidate-specific shocks θ_i's (which are identical across voters) are drawn i.i.d. from a distribution with expected value zero. The representative voter v draws her idiosyncratic preferences $\varepsilon_{i,v}$ i.i.d. from a distribution with expected value zero. The $\varepsilon_{i,v}$'s are drawn independently of the ordering of the candidates σ^v which is drawn uniformly and independently. The threshold function $c(q^*_{v,1,\sigma^v},\ldots,q^*_{v,n,\sigma^v})$ and the vectors γ and β are fixed along the analysis.

As a general motivation, our first empirical test examines whether the choice procedure of the decision maker is order-independent.

Order-independent choice. A decision rule of a voter is *order-independent* if the voter chooses the same k candidates from every ordering of the candidates. Since locations are randomly assigned to candidates, the distribution of $\theta_i + \varepsilon_{i,v}$ is expected to be identical across locations. Thus, order-independent choice implies that the expected vote share (or the probability of winning office) of candidates in location j is identical across j's. Invalidating the order-independent choice property refutes the hypothesis of order-independent utility maximization.

The first potential source of order-dependent choice in the model is that the evaluation process of a voter is order-independent, yet choice is order dependent because the voter chooses the *first* k candidates above the quality threshold. For example, a satisficing procedure will result in order-dependent choice even though the evaluation of candidates is order-independent.

Order-independent evaluation. The evaluation process of a voter is *order independent* if it assigns the same quality to a candidate irrespective of her location ($\gamma = 0$) or the qualities of the candidates appearing before her ($\beta = 0$) in the list. The setting of multi-candidate elections allows for the refuting of this property. In k-candidate elections a voter does not run out of votes prior to reaching location $k + 1$ in the list, and thus we are sure to observe the qualities of the first k candidates. Invalidating the order-independent evaluation property implies refuting the hypothesis that order-dependent choice results only from satisficing.

In order to refute the order-independent evaluation property, it is enough to refute the position-independent evaluation or the history-independent evaluation properties discussed below.

Position-independent evaluation. The evaluation process of a voter satisfies *position-independence* if the evaluation of a candidate is independent of her position in the list ($\gamma = 0$) except maybe through the candidates appearing before her (β can take any value). In the setting of multi-candidate elections, position-independent evaluation implies that the only difference in vote shares (or the probability of winning office) between the candidates listed first and second is through the quality of the candidate listed first. Since the expected quality of the candidate listed first is zero, position-independent evaluation implies that in expectation the vote shares of the first two locations are the same. Refuting the position-independent evaluation property implies that there are locations with certain intrinsic value.

History-independent evaluation. The evaluation process of a voter satisfies *history-independence* if the evaluation of a candidate is independent of the quality of the candidates listed before her ($\beta = 0$). Multi-member district elections provide a direct test of this property. Because voters necessarily have votes remaining when considering the second candidate, the quality of the first candidate should not affect the quality assessment and thus the likelihood of choosing the second candidate under history-independent evaluation. Any observed difference in the performance of the second candidate as a function of quality of the first candidate can therefore rule out that all voters are using history-independent evaluation.

One possible form of history-dependent evaluation is that in assessing the quality of a candidate in location i, the voter takes into account only the quality of the candidate that appears in location $i-1$.

Markovian evaluation. The evaluation process of a voter is Markovian if the only history dependence in evaluating a candidate occurs from the immediately preceding candidate on the list (i.e., $\beta_1 \neq 0$ and the remaining β's are zero). To test for Markov history-dependence, we look at how the qualities of both the first and second candidates on the list affect the likelihood that the third is selected. Markov history-dependence implies that only quality of the second candidate should affect the performance of third. We restrict our analysis to races with at least three winners to ensure that voters' have votes remaining when considering the third candidate.

The analysis is summarized in Figure 1. Our empirical tests partition the space of all evaluation processes (represented by the intersection of the two large ovals) according to position dependence and history dependence. We find strong evidence that the evaluation process is both position and history dependent. We also find support for the hypothesis that history dependence takes a Markovian form.

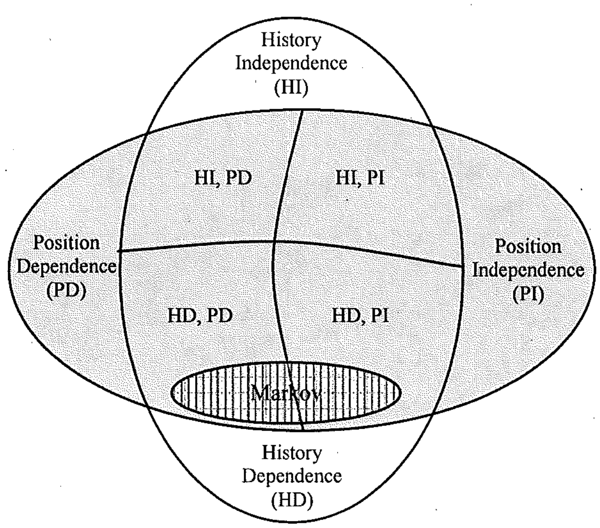

Figure 1: Order-Dependent Choice

IV. Data

We want to test whether voters' choices are order-dependent, and more importantly, whether this order-dependence affects the results of elections. This requires that we use a different source of variation in candidate ordering than what is used in other recent papers on ballot order-effects. Rather than focusing on how within race variation in candidate ordering affects vote shares, we look at how the likelihood of winning office varies across races with respect to candidates' ballot positions. Two necessary elements to implement this identification strategy are a large number of elections for which both the ballot ordering and outcomes are known and the random assignment of candidates to a single ballot position. California local elections satisfy both of these properties. California's 500 incorporated cities and 1100 school and community college election districts provide a large number of city council and school boards elections from which we can observe outcomes. In addition, unlike many states which list candidates for local office in alphabetical order, ballot ordering in California is determined via a lottery system.[5] After the deadline has passed for candidates to enter the race, the California Secretary of State's office draws a random ordering of the alphabet according to which candidates names are ordered on the ballot. In municipal and school board elections, candidates are listed according to this ordering across all precincts.[6]

California local election results come from the California Elections Data Archive (CEDA). The CEDA archives election results from 1996 to 2005 for county, city, community college, and school district elections in over 6,000 jurisdictions throughout California. The CEDA contains information on candidates' names, incumbency status, vote totals, and an indicator about whether the candidate was elected.[7] Information on candidates' names, combined with information about the outcomes of the California alphabet lottery, allows us to reconstruct the order in which candidates appeared on the ballot without actually seeing the physical ballots. The biggest advantage of the CEDA data is the large number of

[5] Alphabetic ordering is problematic for identifying the casual effect of ballot order on electoral outcomes because any effect of ballot order is likely to be confounded by incumbency status (and hence incumbency advantage). In addition, candidates with certain last names may also be likely to receive more votes than others (Miller and Krosnick 1998).

[6] In contrast, in elections for federal and state office the ordering of candidates is rotated across assembly districts.

[7] Since election results are listed at the county level, election results for elections that span multiple counties are combined into a single observation.

elections in the dataset; we focus on the 5754 competitive city council, community college, and school district elections for which we are able to determine the ballot order.

Information on the outcomes of the California alphabet lotteries come from a number of sources.[8] Lottery outcomes for the 1996, 1998, 2000, and 2002 elections are taken from Imai and Ho (2006). For the 1997, 1999, 2001, and 2003 elections, lottery outcomes are derived from the ordering of candidates' names in counties' Statement of Votes, which are also ordered in accordance with the random alphabet lottery.[9] Lottery outcomes for 2004 and 2005 are acquired directly from the California Secretary of State's office.

We also use within race variation in ballot ordering in Ohio local elections as a second source of variation from which we identify ballot order-effects. Each county creates an ordering of all precincts within the county. For each race, a sub-ordering of precincts is constructed consisting only of those precincts in which at least one voter within the precinct is eligible to vote in the race. In the first precinct of the sub-ordering, candidate names are listed in alphabetical order. In each subsequent precinct in the sub-ordering, the candidate listed first in the previous precinct is listed last, with all other candidates moving up one spot in the ordering. This rotation results in the quasi-random assignment of candidates to ballot positions, because each candidate is rotated to each spot of the ordering approximately an equal number of times.

For Ohio, precinct level election data comes from counties' Statement of Votes. We collect all available counties' Statement of Votes from the November 1999, 2001, 2003, and 2005 elections. From these files, we extract precinct level election results for all multi-member district city council, town trustee, or school board elections that are voted on in sixteen or more precincts. Table 1 lists the number of elections for which we have data and meet these criteria by county and year. The ordering of precincts in the Statement of Votes is the same as the sub-ordering of precincts for the ballot rotation procedure described in the

[8] Information on the alphabet lotteries is available in even numbered years for both the statewide primary and general elections dates, while information on the alphabet lotteries in odd years is available for the November consolidated election date.

[9] For example, if an individual with a last name beginning with R is listed in a Statement of Votes before an individual with a last name of B, then we know that R comes before B in the alphabet lottery. A computer program takes all such pairwise comparisons obtained from various counties' Statement of Votes, and generates a partial ordering of the alphabet lottery. Because we are only able to generate a partial ordering of the alphabet, for a small number of races we are unable to determine the exact ordering of candidate names on the ballot. If the ordering of any two candidates in a race is undetermined, the entire race is dropped from the dataset.

previous paragraph. As a result, we can infer the ballot positioning of candidates in each precinct from the ordering of precincts in the Statement of Votes.[10]

V. Results: Outcomes of Elections and Position Dependence

We first focus our attention on testing whether ballot position affects the results of elections. This allows us to test whether voters' choices are order-dependent and whether their evaluation process is position-dependent. Table 2 presents the number of election winners by ballot position for California city council and school board elections between the years of 1996 - 2005. Three interesting patterns emerge in this table. First, in every type of election (where election type refers to the total number of candidates and winners), candidates listed first won more elections than would be expected if election winners were distributed equally across all ballot positions. Second, even though all of the elections in Table 2 are in multi-member districts, there is no obvious advantage for candidates listed second on the ballot. Third, the benefits of being listed first on the ballot appear to be increasing as the number of candidates increases.

To formally test these observed patterns, we derive the expected distribution of winners by ballot position under the null hypothesis of no order-effects. Let $Y_{\sigma(i),j}$ be a Bernoulli random variable that is equal to one if candidate i, who is listed in ballot position $\sigma(i)$ in election j wins office, and zero otherwise. Assume that K_j of the N_j candidates win office, so that under the null hypothesis of no ballot order effects, the probability of any given candidate winning office in election j is $\pi_j = K_j / N_j$. Suppose that we observe T of these elections. The statistic $\hat{\theta}_p$ defined in equation (3) measures the difference in the probability of winning office in ballot position p relative to the expected probability absent any order-effects.

$$(3)\quad \hat{\theta}_p = \ln(\sum_{j=1}^{T} Y_{p,j} / T) - \ln(\sum_{j=1}^{T} \pi_j / T)$$

[10] The one exception is the Statement of Votes for Montgomery County in 2005, in which the ordering of precincts in the Statement of Votes does not match the ordering of precincts.

Applying a Taylor Series approximation, equation (4) gives the variance of $\hat{\theta}_p$ under the null hypothesis that ballot positions have no effect on the outcome of elections.

$$(4)\ \operatorname{var}(\hat{\theta}_p) = \frac{1}{T^2}\operatorname{var}\left(\sum_{j=1}^{T} Y_{p,j}\right) * \frac{1}{\left(\frac{1}{T}\sum_{j=1}^{T}\pi_j\right)^2} = \frac{\sum_{j=1}^{T}\pi_j(1-\pi_j)}{\left(\sum_{j=1}^{T}\pi_j\right)^2}$$

Applying the Central Limit Theorem gives us a straightforward statistical test of whether election outcomes are unaffected by the order in which candidates are listed on the ballot. We can reject the null hypothesis that election outcomes are independent of being listed in ballot position p at the α percent level of significance if equation (5) holds.

$$(5)\ \hat{\theta}_p \notin \left(-\sqrt{\operatorname{var}(\hat{\theta}_p)} * z_{1-\alpha/2}, \sqrt{\operatorname{var}(\hat{\theta}_p)} * z_{1-\alpha/2}\right)$$

The results in Table 3 apply equation (5) to test whether the outcomes of California city council and school board election significantly vary with respect to ballot position. Column (1) looks at the effect of ballot position on the outcomes of all elections summarized in Table 2. The results in Column (1) reject the hypothesis that voters' choices are order-independent. Candidates listed first are 9.8 percent more likely to win office than would be expected absent any effect of ballot position.[11] Put another way, in 5.6 percent of the elections in our sample the candidate listed first won office as a result of her ballot position. This benefit for the candidate listed first comes at the expense of candidates listed in the middle of the ballot. Candidates listed in the median ballot position[12] are 5.0 percent less likely than expected to win office. Candidates listed second won significantly fewer races than the first listed candidate, even though voting for the first candidate does not exhaust the voter's available votes. We therefore can also reject the hypothesis that voters' evaluations are position-independent.

[11] Similar patterns are found in single-member district elections. Candidates listed first were 6.0 percent ($p = 3.97$) more likely to win office than expected. Even in elections with only two candidates, the candidate listed first was 3.3 percent ($p = 1.92$) more likely to win office than expected.
[12] In election with an even number (N) of candidates, the median ballot position is defined as $N/2 + 1$.

Table 3 also shows that the benefit from being listed first is positively related with the number of candidates in the race. Column (2) indicates that in races with three or four candidates, being listed first increases the probability of winning office by 5.1 percent. Columns (3) and (4) show that the excess number of winners from the first ballot position increases to 13 percent in those races with five or six candidates, and 24.9 percent in those races with seven, eight, or nine candidates. This later number implies that in about 10 percent of those elections with seven or more candidates, the first candidate won office as a function of their ballot position.

To reinforce the results in Table 3, we also look at the effect of ballot order on city council and school board elections in Ohio. Because Ohio rotates the order of candidates' names on the ballot across precincts, we cannot replicate the exact same analysis we did for California. Instead, we treat each precinct as a separate election, and count the number of times a candidate "won" their precinct (i.e. would have won office if the election only occurred in that single precinct). Because each candidate appears approximately an equal number of times in each precinct, an advantage of such an analysis is that it ensures that the composition of candidates assigned to each ballot position is almost identical.

Table 4 demonstrates similar patterns of ballot order-effects in Ohio city council and school board elections as in California. Column (1) indicates that candidates listed in the first ballot position in Ohio were 6.4 percent more likely to win their precinct than would be expected if outcomes were independent of ballot order. Again this comes primarily at the expense of candidate listed in the middle of the ballot, with the candidate in the median ballot position being 3.1 percent less likely to win a precinct. Individuals listed second were also marginally significantly less likely to win than would be expected by random chance. Columns (2), (3), and (4) also indicate that, like in California, order-effects increase as the number of candidates in the race increases. In races with three or four candidates, being listed first only increases the probability of winning a precinct by a marginally significant 1.6 percent. This increases to a statistically significant 8.6 and 11.9 percent in races with five or six and seven or more candidate respectively.[13]

[13] These point estimates suggest that being listed first has a smaller effect on winning precincts in Ohio than it does on winning office in California. One explanation for this result is that voters' preferences tend to be more homogenous within precincts than across entire cities or school districts. As a result, a smaller percentage of precincts may be marginal with respect to ballot ordering.

Table 4 does present one result that differs from Table 3. While being listed last in California did not significantly affect the probability of winning office, candidates listed last were more likely than expected to win precincts in Ohio. One potential explanation for this difference is that incumbent candidates, who are more likely to win office, were underrepresented in the last ballot position in California. To investigate the possibility, we use a regression specification that controls for candidates' incumbency status. Let $X_{\sigma(i),j}$ be the observable characteristics of candidate i in ballot position $\sigma(i)$ in race j. In particular, we observe whether the candidate i in race j is an incumbent. Also let $1(\sigma(i)=k)$ be an indicator function equal to one if $\sigma(i)$ = k, and zero otherwise. Equation (6) defines $y_{\sigma(i),j}^{*}$ as the latent measure of preference for a candidate, where $E[Y_{\sigma(i),j}] = K_j / N_j$ under the null hypothesis of no order-effects, $\Phi^{-1}()$ is the inverse normal CDF, and $\varepsilon_{\sigma(i),j}$ is a standard normal random variable. The coefficient θ_k captures the effect of being listed kth on the ballot on the likelihood of winning office. We can estimate the coefficients in $y_{\sigma(i),j}^{*}$ by running a standard Probit regression , clustering standard errors by race to account for the within race correlation in the disturbance terms.

$$(6)\quad y_{\sigma(i),j}^{*} = \alpha + BX_{\sigma(i),j} + 1(\sigma(i)=k)\theta_k - \Phi^{-1}(1-E[Y_{i,j}]) + \varepsilon_{i,j}$$

We find no substantive difference between the results reported in Table 3 and the results obtained using equation (6).[14] The coefficient on the indicator for incumbency is significant and suggests that incumbents are about 37 percentage points more likely to win office. Including the incumbency indicator, however, has no effect on the point estimates for the effects of various ballot positions. We are thus unable to make any definitive conclusions about whether candidates listed last on the ballot perform significantly better than expected.

VI. Results: History-Dependent Evaluation

The results in the previous section demonstrate both that voters' choices are order-dependent and that their evaluation process is position-dependent. In this section, we extend

[14] Full results available from authors upon request.

these results to test whether the evaluation process is also history-dependent. Motivated by experimental evidence that individuals often compare the current alternative to the preceding one (see Houston, Sherman, and Baker 1989; Houston and Sherman 1995; Bruine De Bruin and Keren 2003), we are particularly interested in Markovian history-dependence; that is, how the quality of the immediately preceding candidate affects the likelihood of choosing the next listed candidate. We hypothesize that a candidate's performance is inversely related to the quality of the previous candidate on the ballot.

To estimate the effect of the previous candidates' quality on the next candidate, we ideally could look at how candidate performance differs when listed after candidates of varying quality. Unfortunately, we are aware of no state which uses a ballot rotation system such that this occurs. All rotation systems currently implemented result in candidates always being listed behind the same candidate (when not listed first). As a result, we only can use variation across candidates in the quality of the previous candidate.

One difficulty when testing for history-dependence is empirically differentiating between history-dependent evaluations and running out of available votes. Because voters are more likely to be out of votes, candidates are likely to perform worse when listed after high quality candidates. Because we are using multi-member district elections, however, we know regardless of the quality of the first candidate, voters still have votes remaining when they consider the second candidate. As a result, we can identify history-dependence by looking at changes in candidate's vote shares when listed first and second on the ballot.

Using within race variation in ballot ordering in Ohio allows us to observe candidates' performance in multiple ballot positions. Define $\text{Vote Share}_{i,j,\sigma(i)}$ as the vote share that candidate i receives in race j when listed in ballot position $\sigma(i)$. We test how the difference between $\text{Vote Share}_{i,j,1}$ and $\text{Vote Share}_{i,j,2}$ relates to the quality of the candidate listed first when candidate i is listed second.

A second difficulty when testing for history-dependence is measuring candidate quality. We define two measures of quality. The first is whether a candidate wins office. For each candidate, we define a dummy variable ($\text{PrevWinner}_{i,j}$) equal to one if the candidate listed first when candidate i is listed second in race j won office. The second quality measure, $\sigma(\text{Q - Prev.})_{i,j}$ is a measure of the vote share of the candidate listed first when candidate i is listed second in race j. To construct $\sigma(\text{Q - Prev.})_{i,j}$, we first calculate the vote share of the candidate listed first when candidate i is listed second in those precincts where candidate i is not listed either first or second.[15] To make observed vote shares comparable across election types, we then standardize this vote share with respect to the mean and standard deviation of this vote share across all candidates in this election type.[16] A $\sigma(\text{Q - Prev.})_{i,j}$ value of one implies that the candidate listed first when candidate i is listed second received a vote share that is one standard deviation above average for that election type. Similarly, we also construct $\sigma(\text{Q - Own})_i$, which is a measure of candidate i's vote share when they are not listed first or second. Again, this vote share is standardized with respect to the mean and standard deviation for this election type. We then estimate equations (7) and (8) including race specific fixed effects (α_j), with robust errors clustered by race.

$$(7)\ \ \Delta\,\text{Vote Share}_{\text{i,j}} = \alpha_j + \beta(\text{PrevWinner}_{i,j}) + \delta\,\sigma(\text{Q - Own})_i + \varepsilon_{i,j}$$

$$(8)\ \ \Delta\,\text{Vote Share}_{\text{i,j}} = \alpha_j + \beta\sigma(\text{Q - Prev})_i + \delta\sigma(\text{Q - Own.})_i + \varepsilon_{i,j}$$

Where $\Delta\,\text{Vote Share}_{\text{i,j}}$ is defined as either $\ln(\text{Vote Share}_{\text{i,j,2}}) - \ln(\text{Vote Share}_{\text{i,j,1}})$ or $\text{Vote Share}_{\text{i,j,2}} - \text{Vote Share}_{\text{i,j,1}}$.

Table 5 presents coefficient estimates for equations (7) and (8) using the Ohio data. Using either measure of quality, Table 5 indicates that being listed behind a high quality candidate significantly reduces the next candidate's vote share. Column (1) indicates candidates' vote shares are 3.9 percent lower when they are second on the ballot relative to when they are listed first. Column (2) indicates that this translates into approximately a 0.59 percentage point decrease in vote share. Columns (1) and (2) also indicate that being listed behind a candidate that wins office reduces the second listed candidate's vote share by an additional 1.9 percent, or 0.35 percentage points. Similar results are found in columns (3) and (4) when quality is measured by vote share rather than an indicator for winning office.

[15] Opponents' vote share is therefore calculated when candidate is listed in positions second to second-to-last on the ballot. This is done because realizations of our dependent variable are mechanically related to the previous candidate's vote share when they are listed either first or last on the ballot

[16] Where election type again refers to the total number of winners and candidates.

Columns (2) and (4) in Table 5 also show that the percentage point change in vote share is approximately constant with respect to own candidate quality. This implies that the elasticity of vote share with respect to ballot position is greater for lower quality candidates.

Table 6 decomposes the results in Table 5 based on the number of candidates competing for office. As seen in the previous section, the benefits to being listed first increase as the number of candidates in the race increase. The estimated effects of being listed behind a winning candidate, however, only trend upwards slightly as the number of candidates increase.

To test the form of history-dependent evaluation, we run another series of regressions that test how candidates' vote shares differ when they are listed third relative to when they are listed first. Because two different candidates appear before the third listed candidate, we want to see which, if either, of the two previously listed candidates affects the third listed candidate. If the first candidate on the list becomes a reference point by which decision makers compare subsequent candidates, then it may be that the quality of the first candidate has a large effect on the third candidate. On the other hand, if decision makers are making relative comparisons with the previous alternative, then the quality of the second listed candidate will be the primary influence on the evaluation of the third candidate.

The results in Table 7 demonstrate that only the immediately preceding alternative has a significant effect on candidate performance. This finding supports the hypothesis of candidate evaluations being Markovian. Column (1) in Table 7 replicates Column (1) in Table 5 using the difference in vote shares from when a candidate is listed first and third, rather than first and second. The point estimate for the effect of being listed behind a winning candidate is almost identical to that seen in Table 5. Column (2) shows this estimate is robust to including an indicator for whether the first candidate in the list won office. In addition, the point estimate for the effect of the first candidate winning office is positive and insignificant. In Column (3), we restrict the sample to those races with at least three winners, so that capacity constraints cannot bind when decision makers consider the third candidate. The results are nearly identical to those obtained in the full sample.

As another extension, we also examine how candidates listed later on the ballot affect candidate evaluations. While our model is based on preceding alternatives affecting the evaluation of subsequent alternatives, it is also possible that subsequent alternatives could influence preceding alternatives. This may be particularly likely at the end of lists when, for example, voters may be deciding which of the last two candidates should receive their remaining vote. To test this, we look at how candidates' vote shares differ when they are listed second to last and last on the ballot with respect to the quality of the candidate listed after them when they are positioned second to last on the ballot. The results are presented in Table 8. In races with six or fewer candidates there is no effect of being listed before a winning candidate. In races with seven or more candidates, however, we find that candidates followed by a winning candidate do gain significantly more votes when they are listed last than voters not followed by a winning candidate.

As a final test for history-dependence, we return to the California data to test how the previous candidates' performance affects the probability that a candidate wins office. We use a regression framework similar to equation (6) to test how the outcome of $Y_{\sigma(i)-1,j}$ affects the realizations of $Y_{\sigma(i),j}$. Mechanically $Y_{\sigma(i)-1,j}$ and $Y_{\sigma(i),j}$ are related because the number of winners in each race is fixed. Under the null hypothesis that the previous candidate does not disproportionately affect the next listed candidate $E[Y_{\sigma(i),j} \mid Y_{\sigma(i)-1,j} = 1] = (K_j - 1)/(N_j - 1)$ and $E[Y_{\sigma(i),j} \mid Y_{\sigma(i)-1,j} = 0] = K_j/(N_j - 1)$. We would like to test if the realized observations of $Y_{\sigma(i),j}$ conditional on $Y_{\sigma(i)-1,j}$ differ from these expectations. Equation (9) defines a latent measure of candidate preference $y_{\sigma(i),j}^{*}$ that is depends of the realization of $Y_{\sigma(i)-1,j}$. We are interested in the estimate of λ, which captures the effect of a previous winner on the likelihood that the next candidate is a winner. Again we can estimate the coefficients in $y_{\sigma(i),j}^{*}$ by running a Probit regression, clustering standard errors by race to account for the within race correlation in the disturbances.[17]

$$(9)\quad y_{\sigma(i),j}^{*} = \lambda Y_{\sigma(i)-1,j} + BX_{\sigma(i),j} + \sum_{k=2}^{N} 1(\sigma(i)=k)\theta_k - \Phi^{-1}(1 - E[Y_{\sigma(i),j} \mid Y_{\sigma(i)-1,j}] + \varepsilon_{\sigma(i),j}$$

The results in Table 9 demonstrate that candidates perform significantly worse than expected when listed behind a winning candidate. While the degree of statistical significance

[17] Because candidates listed in first have no candidate listed in front of them, they are dropped from the analysis.

is somewhat sensitive to specification, the point estimates in columns (1) – (4) consistently imply that a candidate who is listed behind a winning candidate is about two percentage points less likely to win election.[18] Given that about 42 percent of the candidates in the sample win office, this translates to between a four and five percent decrease in the likelihood of winning election if a candidate is listed behind another winning candidate. To put the magnitude of this effect in perspective, the point estimate is about 40 percent as large as the point estimate of the increased probability of winning from being listed first on the ballot obtained from estimating equation (6). As a robustness check, we also estimate equation (9) replacing $Y_{\sigma(i)-1,j}$ with $Y_{\sigma(i)-2,j}$.[19] Columns (5) and (6) show no significant effects of the candidate listed two spots ahead. Because only the immediately preceding candidate influences subsequent candidates, this again support the hypothesis that history dependence takes a Markovian form.

VII. The Effect of Partisan Cues

One caveat to the results presented in the previous two sections is that almost all the elections in the California and Ohio datasets are non-partisan. Past studies have found that ballot-order effects are significantly greater in non-partisan and primary elections (Ho and Imai 2006; Miller and Krosnick 1998). Thus, one may wonder to what extent our results apply to partisan elections. Fortunately, city council elections in Ohio can either be partisan or non-partisan. By comparing the magnitude of order-effects in the partisan versus non-partisan city council elections, we are able to get some traction? about how the presence of partisan cues would affect our results.

We observe 27 partisan city council elections and 50 non-partisan city council elections with more than five candidates in our dataset. For each of these elections, we aggregate the number of votes awarded to the candidate listed first in each precinct. We also calculate the number of votes we would expect to be allocated to the first candidate if votes were assigned independent of order. We define a dummy variable $Partisan_j$ equal to one if city council j is partisan, and zero otherwise. We then estimate equation (10), which tests if the number of

[18] Note, this coefficient can only be interpreted as the casual relationship of being listed behind a previous winner if it is assumed that there is no effect of the next listed candidate on the ballot. If candidates are more likely to win if listed ahead of losing candidates, then this coefficient will measure the sum of these two effects.
[19] Only those candidates listed third – last are included in this regression.

excess votes awarded to candidates listed the first ballot position are significantly different in those cities with partisan elections.

$$(10) \quad \ln(\text{Votes for 1st Candidate}_j) - \ln(\text{Expected Votes}_j) = \alpha + \beta(Partisan_j) + \varepsilon_j$$

Table 10 indicates that there is almost no difference in the percentage of excess votes award to candidates in the first ballot position in partisan and non-partisan city council elections. On average, candidates listed first received about four percent more votes than expected in both partisan and non-partisan elections. This result is robust to the inclusion of election type fixed effects. We believe the results in Table 10 support the notion that substantial order-effects can persist even if partisan cues are available, and therefore that the results of the previous two sections are not unique to non-partisan elections.

The results in Table 10 also challenge the conventional wisdom that party cues have a large impact on the magnitude of order-effects. One problem with existing evidence supporting this conventional wisdom is that races are not randomly assigned to receive party cues. Non-partisan offices tend to be for low salience offices. There are other significant differences between primary and general elections besides the presence of partisan cues.[20] A better test of the effect of partisan cues holds the office and type of election constant, while varying the availability of partisan cues. We do not interpret the results in Table 10 to say that partisan cues have no effect on the magnitude of order-effects. We only have 77 data points, which gives us little power to distinguish small differences in the magnitude of ballot order-effects in partisan and non-partisan election. We do believe, however, that Table 10 indicates that more evidence is needed before the conventional wisdom is taken as truth.

IX. Conclusion

This paper contributes to the study of ballot-order effects and more generally order-dependent choice in a number of important ways. From a policy perspective, we agree with the sentiment of Alverez, Sinclair, and Hasen (2006) that costly randomization and rotation procedures should only be undertaken if ballot order alters the results of elections. Our

[20] Sinclair (2006) notes that ballot order-effects could be larger in primary election because voters' have less formed opinions about candidates.

results demonstrate that in local city council and school board elections this is indeed the case. The impact of ballot order on the outcome of elections is not only statistically significant, but also economically and politically significant. In about 10 percent of the elections we study in California with seven or more candidates, the candidate listed first won office as a result of their ballot position. Given the large number of city council and school board elections nationwide which do not use rotated or randomized ballots, a good deal of local governmental policies are likely being set by individuals elected only because of their ballot position.[21] In particular, the current use of alphabetical ordering for local elections in many states not only provides the same candidates with the advantage of ballot position in election after election, but also gives the beneficiaries of ballot positioning the subsequent advantage of incumbency.

Our results also suggest that efforts currently used by states to mitigate ballot order-effects are not sufficient to eliminate them. The presence of history-dependent evaluation implies that ballot rotation schemes that always list a candidates behind the same other candidate will not be unbiased with respect to list orderings. Our results from California show that while the effects of history-dependent evaluation are not as large as positional-effects, they still can significantly affect the results of elections. The apparent Markovian nature of the history dependence, however, suggests that simple improvements can be made to rotation schemes. In particular, rotation schemes that result in each candidate being listed in each ballot position and behind every other candidate an equal number of times, are likely to eliminate most of the order-effects. Table 11 gives examples of ballot rotation procedures for three, four, and five candidate races that satisfy these properties. Implementing such schemes would add little cost to current practices, while improving the efficacy of elections.

Finally, our results have implications for the study of choice and decision making in other real world settings. They suggest that a decision maker evaluating an alternative is affected not only by its position but also by the alternative listed immediately before. This finding has important strategic and economic implications. For example, consider a firm auctioning positions for web advertisements (e.g. Google, Microsoft, Yahoo). Our findings suggest that advertisers' payoffs from a given position may depend on the characteristics of the preceding advertisement. As a result, mechanisms for selling web advertisements may

[21] Nationwide it is estimated that about 96 percent of the approximately 15,000 school boards have elected members (Hess 2001).

generate higher profits if locations are auctioned sequentially (allowing participants to observe the advertisements to be listed before them) than if locations are auctioned simultaneously. Similar considerations may arise in other ordered choice settings, suggesting that understanding the exact nature of order-effects deserved further investigation.

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Table 1: Number of Ohio Elections in Dataset By County and Year

County	1999	2001	2003	2005
Ashtabula				9
Brown				1
Butler	8	6	6	
Clark				3
Crawford			2	0
Cuyahoga		30	29	24
Defiance				3
Fairfield				3
Franklin		13	13	18
Greene				7
Hamilton		16	12	16
Jefferson				3
Lorain		6	4	8
Lucas			9	10
Montgomery				13
Muskingum				1
Stark	13	14	13	17
Summit	13	15	12	21
Wood				3
Total	34	100	100	160

Table 2: Election Winners By Ballot Position

California City Council and School Board Elections 1996-2005

Election Type	Expected	1	2	3	4	5	6	7	8	9
2 of 3	514.0	552	498	492						
2 of 4	278.3	289	282	269	273					
3 of 4	408.3	422	430	391	390					
2 of 5	144.0	164	149	138	125	144				
3 of 5	256.8	285	253	246	254	246				
2 of 6	64.7	70	61	66	57	62	72			
3 of 6	165.2	199	157	161	146	159	169			
4 of 6	12.0	14	15	12	11	10	10			
2 of 7	31.7	37	29	39	25	29	31	32		
3 of 7	79.3	100	73	87	67	70	69	89		
4 of 7	6.6	8	6	5	7	5	6	9		
2 of 8 & 3 of 8	59.7	80	63	54	56	63	54	55	52	
4 of 8	4.5	6	3	7	5	4	3	3	5	
2 of 9, 3 of 9, & 4 of 9	35.1	47	43	31	35	37	29	29	31	34

Note: X of Y indicates that the election is selecting X winners out of Y candidates.

Table 3: Excess Number of Election Winners by Ballot Position
California City Council and School Board Elections 1996 - 2005

	(1)		(2)	(3)	(4)
# Elections	3808		1872	1330	606
Number of Candidates in Election	All		3 or 4	5 or 6	7, 8, or 9
ln(Winners From 1st Ballot Position) - ln(Expected Winners)	0.098**		0.051**	0.130**	0.249**
	(0.014)		(0.017)	(0.028)	(0.054)
ln(Winners From 2nd Ballot Position) - ln(Expected Winners)	0.001		0.008	-0.012	0.001
	(0.014)		(0.017)	(0.028)	(0.054)
ln(Winners From Median Ballot Position) – ln(Expected Winners)	-0.050**		-0.036*	-0.072**	-0.068
	(0.014)		(0.017)	(0.028)	(0.054)
ln(Winners From Last Ballot Position) - ln(Expected Winners)	-0.021		-0.039*	-0.003	0.019
	(0.014)		(0.017)	(0.028)	(0.054)
(Winners From 1st Ballot Position – Winners From 2nd Ballot Position) / # Elections	0.055**		0.028	0.073**	0.101**
	(0.013)		(0.018)	(0.022)	(0.030)

Standard Errors in parenthesis. ****- $p < .01$, * - $p < .05$**

Table 4: Excess Number of Precinct Winners by Ballot Position
Ohio Cit Council and School Board Elections 1999, 2001, 2003, 2005

	(1)	(2)	(3)	(4)
# Precincts	19928	7104	8130	4694
Number of Candidates in Election	All	3 or 4	5 or 6	7, 8, or 9
ln(Winners From 1st Ballot Position) - ln(Expected Winners)	0.064**	0.016	0.086**	0.119**
	(0.006)	(0.009)	(0.010)	(0.016)
ln(Winners From 2^{nd} Ballot Position) - ln(Expected Winners)	-0.015*	-0.013	-0.022*	-0.004
	(0.006)	(0.009)	(0.010)	(0.016)
ln(Winners From Median Ballot Position) – ln(Expected Winners)	-0.031**	-0.008	-0.044**	-0.058**
	(0.006)	(0.009)	(0.010)	(0.016)
ln(Winners From Last Ballot Position) - ln(Expected Winners)	0.036**	0.000	0.052**	0.082**
	(0.006)	(0.009)	(0.010)	(0.016)
(Winners From 1st Ballot Position – Winners From 2nd Ballot Position) / # Precincts	0.044**	0.019*	0.058**	0.058**
	(0.006)	(0.009)	(0.009)	(0.011)

Standard Errors in parenthesis. ****- $p < .01$, * - $p < .05$**

Table 5: Within Candidate Differences in Vote Share When Listed 1st vs. 2nd

Ohio City Council and School Board Candidates 1999, 2001, 2003, 2005

	(1)	(2)	(3)	(4)
Dependent Variable	Difference in Log Vote Share	Difference in Vote Share	Difference in Log Vote Share	Difference in Vote Share
Listed after Winning Candidate	-0.019**	-0.345**		
(1 = Yes, 0 = No)	(0.007)	(0.109)		
Normalized Vote Share of Previously Listed Candidate			-0.013**	-0.205**
			(0.003)	(0.051)
Normalized Own Vote Share	0.020**	0.031	0.018**	0.016
	(0.004)	(0.045)	(0.004)	(0.046)
Average Fixed Effect	-0.039**	-0.592**	-0.052**	-0.748**
	(0.003)	(0.065)	(0.004)	(0.054)

"Listed after Winning Candidate" is a dummy variable equal to one if the candidate listed first when a candidate is listed second won office, zero otherwise

N = 707 winning candidates, 795 losing candidates; Mean vote share = 17.51.

Robust standard errors clustered by race in parenthesis. * - $p < .05$, ** - $p < .01$

Table 6: Effect of Previously Listed Candidate by List Length
Ohio City Council and School Board Candidates 1999, 2001, 2003, 2005
Dependent Variable: Vote Share when Listed 2nd – Vote Share when Listed 1st

	(1)	(2)	(3)	(4)	(5)
Number of Candidates	184	395	438	287	198
Percent Winning Candidates	0.50	0.55	0.45	0.43	0.40
Average Vote Share	25	20	16.66	14.29	12.12
Number of Candidates in Election	4	5	6	7	8 or 9
Listed after Winning Candidate	-0.225	-0.336	-0.408**	-0.517**	-0.186
(1 = Yes, 0 = No)	(0.473)	(0.192)	(0.174)	(0.193)	(0.208)
Average Fixed Effect	-0.400	-0.481**	-0.647**	-0.563**	-0.826**
	(0.273)	(0.106)	(0.078)	(0.083)	(0.084)

"Listed after Winning Candidate" is a dummy variable equal to one if the candidate listed first when a candidate is listed second won office, zero otherwise
Robust standard errors clustered by race in parenthesis. * - $p < .05$, ** - $p < .01$

Table 7: Within Candidate Differences in Vote Share When Listed 1st vs. 3rd
Ohio City Council and School Board Candidates 1999, 2001, 2003, 2005
Dependent Variable: Vote Share when Listed 3rd – Vote Share when Listed 1st

	(1)	(2)	(3)
Number of Observations	1502	1502	1078
Number of Candidates Winning Office	4 - 9	4 - 9	5 – 9
Number of Candidates in Election	2+	2+	3+
Candidate Listed Second Won Office	-0.373*	-0.327*	-0.360**
(1 = Yes, 0 = No)	(0.150)	(0.135)	(0.125)
Candidate Listed First Won Office		0.192	0.151
(1 = Yes, 0 = No)		(0.126)	(0.110)
Average Fixed Effect	-0.695**	-0.807**	-0.798**
	(0.071)	(0.068)	(0.086)

"Candidate Listed First (Second) Won Office" is a dummy variable equal to one if the candidate listed first (second) when a candidate is listed third won office, zero otherwise. **Robust standard errors clustered by race in parenthesis. * - $p < .05$, ** - $p < .01$**

Table 8: Effect of Next Listed Candidate by List Length

Ohio City Council and School Board Candidates 1999, 2001, 2003, 2005

Dependent Variable: Vote Share when Listed Last – Vote Share when Listed 2^{nd} to Last

	(1)	(2)	(3)	(4)	(5)	(6)
Number of Candidates	1502	184	395	438	287	198
Percent Winning Candidates	0.47	0.50	0.55	0.45	0.43	0.40
Average Vote Share	17.51	25	20	16.66	14.29	12.12
Number of Candidates in Election	All	4	5	6	7	8 or 9
Listed Before Winning Candidate	0.216	0.592	-0.080	-0.023	0.447*	0.650*
(1 = Yes, 0 = No)	(0.110)	(0.548)	(0.191)	(0.161)	(0.173)	(0.302)
Average Fixed Effect	0.454**	-0.403	0.822**	0.621**	0.324**	0.402**
	(0.052)	(0.274)	(0.105)	(0.072)	(0.074)	(0.122)

"Listed Before Winning Candidate" is a dummy variable equal to one if the candidate listed last when a candidate is listed second to last won office, zero otherwise

Robust standard errors clustered by race in parenthesis. * - $p < .05$, ** - $p < .01$

Table 9: Change in Probability of Winning if Listed Behind a Winning Candidate
California City Council and School Board Candidates 1996-2005 (N = 11590)
Dependent Variable: Indicator For Whether Candidate Won Election

	(1)	(2)	(3)	(4)	(5)	(6)
Number of Observations	11590	11590	11590	9094	9094	9094
Ballot Positions Included	2^{nd} – Last	2^{nd} - Last	2^{nd} - Last	3^{rd} – Last	3^{rd} – Last	3^{rd} – Last
Election Type X Ballot Position Fixed Effects	No	No	Yes	Yes	No	Yes
Listed after Winning Candidate	-0.021*	-0.026**	-0.019	-0.022*		
(1 = Yes, 0 = No)	(0.009)	(0.010)	(0.011)	(0.011)		
Listed Two Positions after Winning Candidate					0.002	0.013
(1 = Yes, 0 = No)					(0.012)	(0.013)
Incumbent		0.374**	0.380**	0.378**	0.369**	0.377**
(1 = Yes, 0 = No)		(0.012)	(0.012)	(0.013)	(0.013)	(0.013)

Calculated using Probit Regressions Coefficients,
Holding Other Variables at their Sample Means
Robust standard errors clustered by race in parenthesis. * - $p < .05$, ** - $p < .01$

Table 10: 1st Position Advantage in Partisan vs. Non-Partisan Elections
Ohio City Council Elections 1999, 2001, 2003, 2005 (N = 27 partisan, 50 non-partisan)
Dependent Variable: ln(% Total Votes First Listed Candidate) – ln(% Expected Votes)

	(1)	(2)
Election Type Fixed Effect	No	Yes
Partisan Election Indicator	-0.003	-0.001
(1 = Partisan, 0 = Non-partisan)	(0.010)	(0.008)
Constant	0.040**	0.038**
	(0.006)	(0.006)

Standard errors in parenthesis. * - $p < .05$, ** - $p < .01$

Table 11: Proposed Ballot Rotations

	Number of Candidates		
Precinct	Three	Four	Five
1	{1,2,3}	{1,2,3,4}	{1,2,3,4,5}
2	{2,3,1}	{2,4,1,3}	{2,5,4,1,3}
3	{3,1,2}	{3,1,4,2}	{3,1,5,2,4}
4	{1,3,2}	{4,3,2,1}	{4,3,2,5,1}
5	{3,2,1}	Repeat 1	{5,4,1,3,2}
6	{2,1,3}	Repeat 2	{1,4,2,3,5}
7	Repeat 1	Repeat 3	{4,5,3,1,2}
8	Repeat 2	Repeat 4	{2,1,5,4,3}
9	Repeat 3	Repeat 1	{3,2,4,5,1}
10	Repeat 4	Repeat 2	{5,3,1,2,4}
11	Repeat 5	Repeat 3	{1,3,4,2,5}
12	Repeat 6	Repeat 4	{3,5,2,1,4}
13	Repeat 1	Repeat 1	{4,1,5,3,2}
14	Repeat 2	Repeat 2	{2,4,3,5,1}
15	Repeat 3	Repeat 3	{5,2,1,4,3}
16	Repeat 4	Repeat 4	Repeat 1