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Alphabetically Ordered Ballots and the Composition of American Legislatures

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Abstract

Although research demonstrates that favorable ballot position can deliver candidates a small windfall of votes in local, nonpartisan, and primary elections, it is not clear whether ballot order laws have had any impact on the composition of U.S. legislatures. In this article, I estimate the substantive significance of ballot order rules by comparing the legislators of states that alphabetically order ballots to those elected by states that randomize or rotate ballot order. I also compare legislators elected by states that started or stopped alphabetically ordering ballots in recent decades. I find that states that alphabetically order ballots disproportionately elect candidates with early alphabet surnames. My research challenges the prevailing belief that ballot order affects only minor elections and suggests that seemingly innocuous rules have altered our political landscape. I conclude that arbitrary ballot ordering rules should be reformed to remedy their substantial impact on political representation.

Keywords

electoral systems, representation, elections, election rules, political behavior

In highly competitive endeavors, small advantages, particularly those enjoyed early in a career, can help some rise above the field and cause others to fall short. Malcolm Gladwell's (2008) popular book *Outliers: The Story of Success* highlighted how arbitrary eligibility cut-off dates in youth hockey leagues affect those who plays professional hockey many years later. January babies are not inherently better hockey players, but they do enjoy a relative age advantage in youth hockey leagues with

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January 1st eligibility cut-offs. Because they are bigger, faster, and more coordinated when they start playing hockey (they are nearly 20% older than December babies in a league for 5-year-olds), children born early in the year enjoy more opportunities to develop their skills and progress from one level to the next (Barnsley and Thompson 1988; Barnsley, Thompson, and Barnsley 1985). In this article, I consider whether arbitrary rules for organizing ballots play a similar role in legislative careers as eligibility cut-off dates do in the careers of professional athletes.[1] Methods of arranging names on ballots may seem innocuous, but policies that give some candidates a slight advantage over others in entry-level politics potentially affect who later serves in state legislatures or even the U.S. Congress.

Prior research indicates that how candidates are listed on ballots influences some percentage of votes cast when information about candidates is limited. For example, in primary and nonpartisan elections, voters cannot distinguish among candidates based on party labels. In these elections, some fraction of the electorate, perhaps 2% to 5% of voters, select the first-listed candidate, which occasionally provides that candidate the margin of victory. This can be understood as a consequence of low-information voting (Brockington 2003; Lupia and McCubbins 1998; Lupia, McCubbins, and Popkin 2000; Sniderman, Tetlock, and Brody 1993).

Existing research has helped estimate the magnitude of ballot order effects in particular elections, but the impact of ballot order laws on U.S. legislatures has not been studied. Do these relatively small vote shifts in relatively minor elections dissipate as candidates compete in elections for more prominent offices or do these slight advantages persist in the highest ranks of government? The answer to this question has important implications for democratic governments. Some ballots may be failing to accurately represent the will of the voters, resulting in the election of the wrong representatives to U.S. legislatures.

This analysis takes advantage of states adopting different election laws to test the impact of ballot order on representation. Although all static ballot arrangements may create advantages and disadvantages, alphabetic ordering rules benefit an identifiable group of candidates. I hypothesize that states that arrange candidates in alphabetic order are disproportionately represented by legislators with early-alphabet surnames compared with states that randomize or rotate ballot order. My research indicates that ballot order does significantly alter the composition of U.S. legislatures. My results challenge the prevailing belief that ballot order effects are confined to minor elections. I estimate that the distortion induced by alphabetically ordered ballots is roughly equivalent in magnitude to the effect that literacy tests and other discriminatory devices had on minority representation.

I begin with a brief discussion of political science research on voter behavior that explains why alphabetic ordering gives candidates with early alphabet names a slight advantage in particular elections. I then identify the data sources and statistical methods I use to test the hypothesis that alphabetically ordering ballots distorts legislative representation in favor of candidates with early alphabet names. After presenting my main findings, I discuss some potential limitations to this analysis. This research suggests that seemingly innocuous election laws play a larger role in politics than has

been previously acknowledged and that ballot ordering rules have significantly altered the American political landscape. Accordingly, I conclude that arbitrary ballot ordering rules should be reformed to remedy their substantial impact on political representation.

Ballot Order and Windfall Votes

Beginning with Wilson (1910), Brooks (1921), and Bain and Hecock (1957), political scientists have demonstrated enduring interest in whether the first candidate listed on a ballot has an advantage at the polls. In this section, I briefly review relevant political science research. Existing research strongly supports the premise that alphabetically ordered ballots give candidates with early alphabet names an advantage but does not address whether this advantage affects the composition of professional legislatures.

Classic theories of voter behavior present voters as rational actors who attempt to balance political preferences and civil duties against the costs of becoming politically informed (Downs 1957; Riker and Ordeshook 1968). Political knowledge is costly, so many voters enter ballot booths with very little information about candidates and issues (Lupia and McCubbins 1998; Lupia, McCubbins, and Popkin 2000; Sniderman, Tetlock, and Brody 1993). If voters cannot differentiate among candidates based on party labels or lose interest in voting, they may simply opt for the first candidate they have no reason to oppose (Brockington 2003; Krosnick, Miller, and Tichy 2004; Meredith and Salant 2013; Salant 2011). If candidates are listed alphabetically, this primacy effect benefits candidates with early alphabet surnames.[2]

Prior research consistently reports statistically significant ballot order effects in primary, local, and nonpartisan elections in the United States (Brockington 2003; Brook and Upton 1974; Ho and Imai 2008; Koppell and Steen 2004; Meredith and Salant 2013; Miller and Krosnick 1998; Mueller 1969; 1970; Volcansek 1981). Statistical analysis of election results in other countries also demonstrates that the first-listed candidate consistently receives a small windfall of votes (Lijphart and Pintor 1988; Lutz 2010; Mackerras 1968; Marcinkiewicz 2014; Webber et al. 2014). Controlled laboratory experiments further demonstrate that the first-listed candidate enjoys a windfall of votes when information is limited (Abakoumkin 2011; Bagley 1965; Johnson and Miles 2011; Taebel 1975).

At the same time, however, scholars have found little or no effect of ballot order in highly salient elections. Ballot order is not thought to affect voting in high-profile, partisan elections for state or nationwide offices (Alvarez, Sinclair, and Hasen 2006; Bagley 1965; Brook and Upton 1974; Darcy 1986; 1998; Ho and Imai 2006; 2008; Kelley and McAllister 1984; Miller and Krosnick 1998; Upton and Brook 1974). Voters typically prefer specific candidates in these elections and salient cues on ballots allow voters to decide in accordance with their preferences. Some studies have detected statistically significant ballot order effects in state and national general elections (Krosnick, Miller, and Tichy 2004; Lijphart and Pintor 1988; Robson and Walsh 1974), but these findings may result from periodicity in the data or analyzing aggregate data without proper controls (Alvarez, Sinclair, and Hasen 2006; Ho and Imai 2006; 2008).

Despite nearly a century of political science research, it is not clear whether ballot order is a substantively significant issue. Considering the number of published studies on ballot order effects, it is surprising that few studies have addressed their impact on political representation. Although the impact of ballot order on representation has not been carefully studied, conventional wisdom appears to be that ballot ordering rules impact elections for offices on the level of county coroner (Byrne and Pueschel 1974) but do not affect major political contests, such as partisan elections for Congress and state legislatures. Miller and Krosnick (1998, 291–92) speculate that ballot ordering rules "have probably done little to undermine the democratic process in contemporary America."

The question is whether favorable ballot order is an advantage that persists over time or just "luck" that runs out when candidates face stiffer competition in higher profile elections. I maintain that candidates who enjoy a slight advantage in "minor" elections, like children who enjoy a relative age advantage when they start playing sports or attending school, are more likely to win subsequent elections because of their early success.[3] Politicians typically win a number of relatively minor elections as they advance their political careers. Indeed, prior electoral success is thought to make a candidate more competitive in contests for higher offices (Jacobson 1989; Krebs 2001; Van Dunk 1997). A legislative career is comparable with a professional sports career in that both politicians and athletes face long odds in highly competitive arenas and, if they enjoy early success, make their way from humble beginnings to the tops of their fields. Occasionally, the candidates for "relatively low-level and unpublicized offices" ascend the political ranks and become significant national figures.[4] The majority of national legislators have held lower elected offices.[5] While the windfall from favorable ballot position can be slight, it may help a candidate survive a tight race. "The fact is," Mayhew (2004, 33) observed, "the typical Congressman at least occasionally has won a narrow victory."

Primary elections potentially connect the outcomes of elections subject to positional bias to general representation patterns. Because primary voters cannot distinguish among candidates using party labels, political scientists expect and have found significant ballot order effects in primary elections (Ho and Imai 2008; Koppell and Steen 2004). If alphabetic ordering favors candidates with early-alphabet names in primary elections, voters in subsequent general elections will select from slates of candidates that disproportionately represent the early alphabet. Ballot position may not directly affect voting in general elections for high-profile legislative positions, but it has an indirect effect on general elections through antecedent elections. This is an important point because it helps reconcile an apparent contradiction between the theory developed here and prior analyses, which found no statistically significant ballot order effects in partisan, general elections. Just as the link between birth month and playing professional hockey does not result from professional teams discriminating against players born late in the year, any disproportionate representation of early alphabet names by states that alphabetically order ballots may not be caused by bias in partisan, general elections but rather result from small biases in the processes that produced experienced candidates.

While the microlevel processes that potentially connect alphabetically ordered ballots to legislative composition are not fully tested in this research, which focuses on the upper strata of representation, the main implication of this bottom–up view of politics is that alphabetically ordering ballots will distort representation in favor of candidates with early alphabet names. In the next section, I outline my approach to evaluating this claim.

Data and Methods

The description of states as laboratories of experimentation is particularly apt with respect to election administration.[6] States have used an incredible array of ballot formats and designs.[7] Ideally, one wants to know who states would have elected under different ballot ordering laws and compare these potential outcomes to the representatives they actually elected. The ideal comparison cannot be made, of course, because the researcher cannot randomly assign election laws to states.[8] Instead, one must observe outcomes and attempt to control for alternative explanations.[9]

In this analysis, I make two comparisons to estimate the impact of alphabetically ordered ballots on legislative representation. First, I compare the representatives of states that alphabetically order ballots to those of states that randomize or rotate ballot order because one would not expect randomization or rotation to advantage candidates with early alphabet names.[10] Second, I examine states that started or stopped using alphabetically ordered ballots between 1967 and 2010, comparing the legislators they elected alphabetically ordering ballots to those they elected using other ordering methods. Other possible comparisons, such as comparing representatives from states with alphabetically ordered ballots to the general population or to states that do not alphabetize, randomize, or rotate ballots, are not featured in this analysis.[11]

My analysis of congressional representation is based on the 81st to 112th Congresses (1949–2012). Although a number of states have alphabetically ordered ballots for a longer period of time, I limit observations to the time period that states began rotating or randomizing ballots so that congressional elections are observed in similar time frames.[12] Also, if a state enacted its primary ballot ordering method after 1949, I limit observations to the time period it either alphabetized ballots or rotated/randomized ballot order. This process identified 3,349 U.S. Senators and Representatives elected by alphabetic ordering states and 4,093 elected by the comparison states.[13] To analyze state legislatures, I used an extensive dataset on state legislative elections conducted from 1967 to 2010 compiled by Klarner et al. (2013).[14] These data identify 39,991 successful candidates from alphabetic ordering states and 40,558 from states that rotate or randomize ballot order.

Using a variety of primary and secondary sources, I identified 16 states that have ordered primary election ballots alphabetically and 12 states that have ordered by random assignment or by rotating multiple versions of their ballots among precincts (Gillie 1989; Krosnick, Miller, and Tichy 2004; Miller 2010; Scott 1972).[15] A number of the states that order primary election ballots alphabetically also order general election ballots alphabetically.[16] Generally, states alphabetically order ballots because it *seems* fair and is relatively easy to implement.

Table 1. Primary Ballot Ordering Methods.

Alphabetically ordered ballots		Randomized/rotated ballots	
State	Year enacted	State	Year enacted
Alabama	1923	Alaska	1949
Delaware	1915	Arkansas	1969
Florida	1971	California	1975
Georgia	1933	Idaho	1970
Hawaii	1960	Indiana	1991
Indiana	1945–1991	Kansas	1967
Louisiana	1952	Minnesota	1981
Maine	1954	Montana	1971
Maryland	1957	North Dakota	1971
Massachusetts	1894	Nebraska	1960
Nevada	1891	New Hampshire	2006
New Hampshire	1979–2006	New Mexico	1970
Rhode Island	1947–1994	Ohio	1971
South Carolina	1996	Oklahoma	1974
Tennessee	1972	Oregon	1953
Vermont	1912	Texas	1971
		Washington	1966
		West Virginia	1991
		Wisconsin	1970
		Wyoming	1971

Note. Massachusetts candidates listed alphabetically after incumbents; New Hampshire listed state legislative candidates alphabetically from 1979 to 2006.

States have adopted alphabetic ordering laws at varying times during the late nineteenth and twentieth centuries rather than as a result of a common electoral reform movement.[17] While one must consider relevant differences between these two groups of states other than ballot order rules, the number and variety of states in both groups reduces potential confounders. It is also helpful that these sets of states elected their representatives at roughly the same times under similar conditions (i.e., under two-party systems with government-issued ballots).

As noted in Table 1, several states changed their ballot ordering methods during the study period. In 1991, Indiana modified its ballot ordering rule, Indiana Stat. 3-10-1-18, to determine the order of candidates by lottery in large counties. Rhode Island amended its ballot order provision, R.I. Gen. Laws § 17-15-8, in 1994 to list major party candidates first followed by other candidates in random order. In 2006, the Supreme Court of New Hampshire declared the state's alphabetic ordering scheme unconstitutional.[18]

This research requires a flexible method of comparing surname distributions. One cannot assess whether the early alphabet is disproportionally represented in certain

legislatures without a fair baseline of comparison. Nonparametric analysis is useful because the expected distribution of legislators' surnames does not have classic statistical properties.[19] Although the Kolmogorov–Smirnov two-sample test has been applied in other political science works (e.g., Childers and Skinner 1979; Garnham 1976), I discuss the technical details of this statistical test in the remainder of this section.

The Kolmogorov–Smirnov test is a flexible, nonparametric technique for assessing whether two samples are likely to be realizations of the same distribution (Conover 1999). The test utilizes an empirical distribution function, $F(x)$, which equals the proportion of sample observations that are less than or equal to the value x. $F(x)$ for an unknown distribution compares to a cumulative density function for a probability distribution. Given two samples of representatives, one from states that alphabetically order ballots (AO) and the other from states that rotate or randomize candidate order (RR), $F_{AO}(x)$ and $F_{RR}(x)$ equal the cumulative proportions of representatives with surnames at or before position "x" in alphabetic order. I order legislators alphabetically and measure $F_{AO}(x)$ and $F_{RR}(x)$ at 415 unique points.[20] Specifically, I calculate the proportion of legislators with names that start before "AB," "AC," "AD" . . . "ZY" in both groups.[21] If these samples of legislators have similar names, the difference between $F_{AO}(x)$ and $F_{RR}(x)$ will be relatively modest at all points of measurement.

To determine whether the difference between $F_{AO}(x)$ and $F_{RR}(x)$ is statistically significant or could result from random variation, one calculates the maximum distance between empirical distributions. If the maximum value of $F_{AO}(x) - F_{RR}(x)$, the test statistic, exceeds the critical value, one rejects the hypothesis that the two samples were drawn from the same distribution.[22] If alphabetically ordering ballots causes disproportionate representation of the early alphabet, one would find that $F_{AO}(x)$ is significantly greater than $F_{RR}(x)$ at relatively low values of x.[23] Plotting empirical distributions help us perceive both the magnitude and direction of differences in sample distributions.

$F_{AO}(x)$ may reflect alphabetically ordering ballots, but $F_{AO}(x)$ may also correlate to the prevalence of last names in the general population from which candidates emerge or other explanatory variables. The value of $F_{RR}(x)$ would have similar correlates, but the expected effect of alphabetically ordered ballots is zero because candidate names are either randomized or rotated in these states. Assuming that the composition of last names in the general population and other factors have the same effects on $F_{AO}(x)$ and $F_{RR}(x)$, the difference between $F_{AO}(x)$ and $F_{RR}(x)$ should reflect the effect of alphabetically ordering ballots. Although factors such as candidate quality, campaign strategy, and economic conditions help explain the outcomes of particular elections, these factors are probably not correlated with alphabetic order.[24] Even if factors other than ballot order and the composition of names in the general population are correlated with $F_{AO}(x)$ and $F_{RR}(x)$, we might expect these other factors to have similar effects in states that alphabetically order ballots and states that randomize or rotate ballot order.[25]

As noted above, nonparametric statistics allow us to make inferences about distributions with undefined properties. In the next section, I compare the representatives of states that alphabetically order ballots to those of states that randomize or rotate ballot

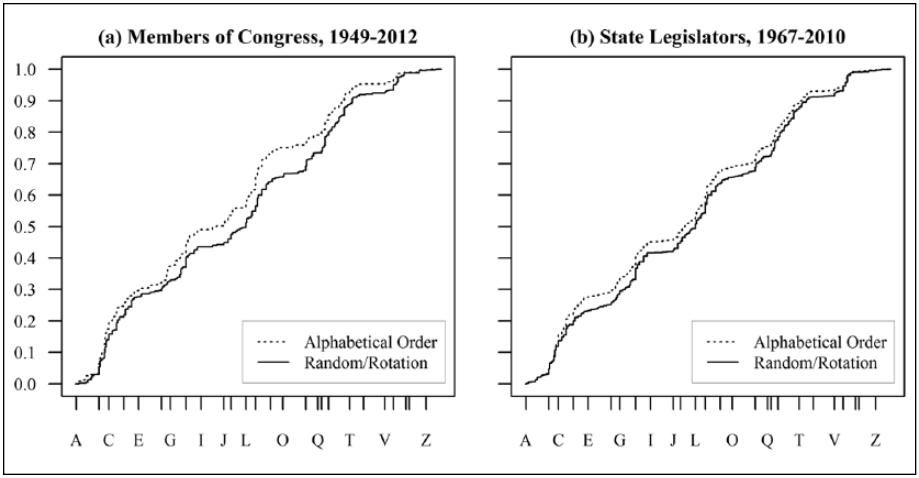

Figure 1. Empirical distributions of federal and state representatives' surnames by method of ballot ordering.

order. I also test whether representation varies significantly when a state starts or stops alphabetically ordering ballots. A disadvantage of using nonparametric statistics is not being able to directly incorporate control variables into the analysis; however, we can control for differences by mechanically separating samples. After presenting my main results, I control for some potential alternative explanations by separating samples of state legislators based on values of control variables and examining differences within key subpopulations.

Results

What does one find comparing legislators elected by alphabetic ordering states to those elected by states that randomize or rotate ballot order? Figure 1a compares the empirical distributions of their respective congressional delegations. $F_{AO}(x)$ exceeds $F_{RR}(x)$ for most of the range of possible x values. The gap between empirical distributions first appears in the early alphabet, widens considerably in the middle of the alphabet, and closes in the late alphabet. The maximum distance between these empirical distributions is .094 (which occurs at "Mi"). A total of 71.2% of representatives from alphabetic ordering states have surnames at or before "Mi" alphabetically compared with only 61.8% of representatives in comparison states. This difference greatly exceeds the critical value corresponding to 99% confidence (.035). The statistical test, therefore, confirms the visual evidence: The early alphabet is disproportionately represented by the congressional delegations of states that alphabetically order ballots.

Similar results are observed in state legislatures. Figure 1b plots the empirical distribution functions for state legislators elected using alphabetic ordering and randomization/rotation. The maximum distance between $F_{AO}(x)$ and $F_{RR}(x)$ on the state level

is .045. A total of 35.9% of state legislators elected in states that use alphabetically ordered ballots have surnames at or before "Go," while only 31.4% of the comparison group have names that fall this early in the alphabet. One rejects the hypothesis that these samples have the same distribution if the distance between their empirical distributions exceeds .011 (the sample sizes for state legislators are greater than they are for members of Congress). Therefore, one rejects the hypothesis that the surnames of state legislators from alphabetically ordering states have the same distribution as those from comparison states with more than 99% confidence.[26]

In addition to these between-state comparisons, one can compare how representation in individual states changed when they started or stopped alphabetically ordering ballots. As noted in Table 1, a number of states either started or stopped alphabetically ordering ballots between 1967 and 2010. Florida, for example, adopted its alphabetic ordering law in 1971; Indiana, however, stopped alphabetically ordering its ballots in 1991. If ballot ordering rules affect representation in these states, one would expect greater representation of early alphabet surnames in the Florida legislature after 1971 and in the Indiana legislature before 1991. Figure 2 assesses the impact of alphabetically ordering ballots on individual state legislatures.

Although the representation patterns in individual states are not as clear as those derived from pooled state data, one observes significant changes in Florida, Indiana, New Hampshire, and Rhode Island.[27] The maximum difference between the empirical distributions of Florida legislators before and after 1971 (.091) is unlikely if legislators had similar names before and after alphabetically ordering ballots (p value $< .01$). Likewise, in Indiana and Rhode Island, the relevant test statistics (.068 and .069) led one to reject the null hypotheses of no differences between distributions (p values $< .01$). The difference in New Hampshire (.0317) exceeds the critical value for 95% confidence but falls short of the 99% confidence critical value. These within-state comparisons are consistent with and reinforce the between-states comparisons reported above; alphabetically ordering ballots appears to significantly shift representation toward early alphabet names.

Assessing Alternative Explanations

To this point, I have shown that there is a statistically significant difference between legislators elected by states that alphabetically order ballots and those elected by states that randomize or rotate names on ballots. It is important to ask whether factors other than ballot order laws could explain these differences. Above, I assumed that factors other than ballot order, such as the prevalence of names in the general population, have the same effect on election outcomes in states that alphabetically order ballots and states that randomize or rotate ballot order, but in this section, I relax this assumption to consider alternative explanations.

Of particular concern, I believe, is the possibility that potential candidate pools in states that alphabetically order ballots differ from potential candidate pools in other states. It is reasonable to speculate that differences in representatives' surnames reflect demographic differences in state populations.[28] For example, states that alphabetically

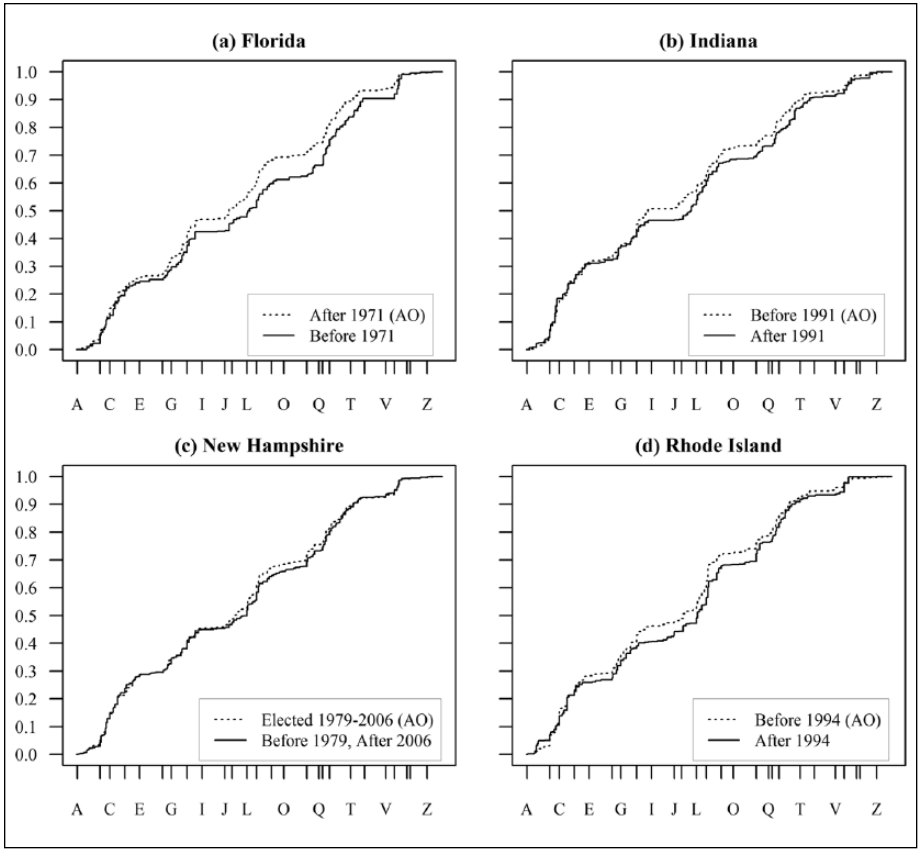

Figure 2. Empirical distributions of state legislators' surnames, before and after alphabetically ordering ballots.
Note. AO = alphabetical order.

order ballots have fewer Hispanic residents than do states that randomize or rotate candidate order.[29]

As noted above, one can control for variables other than ballot order laws, such as race or ethnicity, by separating observations into categories of the control variables and then applying the Kolmogorov–Smirnov test to subsets of observations. Controlling for the effect of state demographic variation on congressional representation (Figure 1a) is relatively simple. If the results reported about stem from more Hispanics residing in and representing states that randomize or rotate ballot order, the test statistic, $F_{AO}(x) - F_{RR}(x)$, should fall below the critical value once one accounts for Hispanic members of Congress.[30] If we exclude these observations and compare congressional delegations, the distance between empirical distributions (.113) still exceeds what one would expect from random variation (p value < .01).

Table 2. Comparing Subpopulations of State Legislators, 1967–2010.

Subpopulation	N_{AO}	N_{RR}	Max. $F_{AO}(x) > F_{RR}(x)$	p value
Caucasians	36,155	30,569	0.055 at "Go"	< .01
Hispanics	1,210	2,022	0.071 at "Ll"	< .01
African Americans	6,417	4,394	0.034 at "Fr"	< .01
Republicans	16,962	18,604	0.043 at "Gr"	< .01
Democrats	30,695	22,251	0.060 at "Dy"	< .01
Representatives	32,623	32,470	0.044 at "Fo"	< .01
Senators	7,368	8,088	0.056 at "Ja"	< .01
First Term Winners	15,227	13,217	0.049 at "Dy"	< .01
Primary Election Winners	7,122	2,487	0.072 at "Fu"	< .01

Note. AO = Alphabetical order; RR = rotate or randomize.

Controlling for the impact of state demographic differences on the composition of state legislatures is more challenging than it is for congressional representation because data on the race and ethnicity of state legislators elected from 1967 to 2010 are not readily available. Therefore, I use Census data to estimate the empirical distributions of Caucasian, Hispanic, and African American state legislators in our two sets of states. As part of the 2000 Census, the largest peacetime mobilization project in U.S. history (Hillygus et al. 2006, chap. 2), the Census Bureau published a report on the 151,671 surnames that occur more than 100 times in the population (Word et al. 2008). The data indicate the racial/ethnic composition of each name.[31] These data account for 89.8% of population and can be used to reliably estimate racial and ethnic characteristics of large samples (Abrahamse, Morrison, and Bolton 1994; Elliott et al. 2009; Grofman and Garcia 2014; Morgan, Wei, and Virnig 2004). Based on the racial and ethnic compositions of state legislators' names, I estimate empirical distributions for separate racial and ethnic groups.[32]

As summarized in Table 2, Caucasian state legislators from states that alphabetically order ballots tend to have surnames closer to the beginning of the alphabet than do Caucasian state legislators from states that randomize or rotate ballot order; the same is true for Hispanic state legislators and for African American state legislators. Despite smaller sample sizes, the distances between empirical distributions of the surnames of Caucasian, Hispanic, and African American legislators exceed the respective critical values for 99% confidence hypothesis testing. Although demographic differences explain why some states elect more minority legislators than do other states (Edwards 2013), they do not explain the difference between states that alphabetically order ballots and states that rotate or randomize ballots.[33]

This method of analyzing differences in subsamples can be repeated to control for other factors, such as incumbency advantage, partisanship, and legislative chamber differences. To test whether my main findings are a legacy of self-selection (i.e., legislators with early-alphabet names adopting these laws to help in their re-election), I compare the empirical distributions of candidates who won open seats in

state legislatures. The winners of open seat elections in states that alphabetically order ballots disproportionately favor the early alphabet. Incumbency advantages do not explain the differences in legislators' surnames observed in this research. Similarly, we observe significant differences controlling for partisanship and chamber differences. Significant alphabetic bias is observed among Democrats, Republicans, State Representatives, State Senators, and in primary elections.

Although I have attempted to test some prominent alternative explanations, there are many factors that influence elections that may contribute to the lingering suspicion that some key variable has been omitted. As noted above, states vary considerably in how they administer elections and how much information they put on their ballots. As a general method of assessing the probability that alphabetic bias in legislatures would be observed under alternative groupings of states (i.e., on a basis other than ballot order rule), I employ the randomization inference approach suggested by Keele, McConnaughy, and White (2012). This method can be used to estimate the probability that the distribution of representatives' surnames observed in states that alphabetically order ballots can be explained by the chance overlap between ballot order laws and the real (and unspecified) explanation for apparent differences in representation. To conduct this test, I rank states based on the distance between the empirical distribution of their state representatives' surnames and that of the general population.[34] I then estimate the probability that the sum of ranks of 16 randomly selected states would be less than or equal to the sum of ranks observed in states that alphabetically order ballots (the observed sum of ranks for these states equals 314).[35] The *p* value of this randomization inference test equals .004. Other groupings of states (based on unspecified variables) are extremely unlikely to produce the differences in representation observed here.[36] The results reported above are not driven by including states with exceptional political systems (like Nebraska's unicameral, nonpartisan legislature). The randomization inference analysis indicates that other, unspecified distinctions among states are unlikely to explain the differences observed here.

Estimating the Number of Seats Affected by Ballot Order

In this section, I attempt to put my results in context so others may judge whether ballot order laws have had a substantively significant effect on American politics. At the congressional level, it was determined that the percentage of members from alphabetic ordering states with surnames at or before "Mi" exceeds that of comparison states by 9.4%. Given the number of representatives elected from alphabetic ordering states during the time period of this study, this difference translates to 313 members of Congress or roughly 10 members per term. With respect to state legislatures, the difference reached 4.4%, which equates to 1,776 state legislators during the study period. Assuming the 16 alphabetic ordering states have 2-year legislative terms, this difference amounts to 4 legislators per state or 71 legislators per term nationally.

I estimate that alphabetically ordered ballots on average shift 10 seats in Congress and 71 seats in state legislatures in favor of politicians with early-alphabet surnames compared with name-neutral ballot ordering rules. This shift is equal to the legislative

representation of a medium-sized state. Although arbitrary ballot ordering rules do not intentionally discriminate against any protected class, they compare in magnitude to the effect of poll taxes and literacy tests used in a number of states until the 1960s to suppress African American representation.[37] States historically subject to heightened enforcement under the Voting Rights Act due to discriminatory histories elected 11African Americans to Congress in 2012.[38] If one assumes that other static ballot ordering methods affect elections in states not listed in Table 1 like alphabetic ordering affects representation in states studied here, the overall impact of ballot ordering rules on political representation may be double that of alphabetic ordering alone.

These results challenge the prevailing wisdom on ballot order effects. These results suggest that ballot ordering rules significantly affect the composition of state legislatures and the U.S. Congress. These findings contradict the view that ballot ordering effects are confined to bottom of the ballot contests. The decision to order candidates according to where their names fall in the alphabet has had a pronounced impact on the composition of American legislatures.

Conclusion

This article utilizes the decision of some states to alphabetically order ballots to examine the impact of ballot order on legislative representation. Although political scientists have carefully studied ballot order effects in particular elections, the aggregate impact of ballot ordering rules on representation has not been systematically examined. In this research, I consider whether the compositions of state legislatures and congressional delegations have been skewed by ballot order by comparing, first, the representatives of states that alphabetically order ballots to those of states that randomize or rotate ballot order, and second, who gets elected in states that started or stopped alphabetically ordering ballots during the time span of available data. I find that representation is noticeably skewed by alphabetically ordering ballots toward early-alphabet names. While this observational analysis has limitations, my principle finding is robust to varying research designs and controlling for a number of alternative explanations.

Ballot order appears to affect preliminary contests, which in turn affect general election outcomes and the composition of state and federal legislatures. Alphabetically ordered ballots may create a slight advantage for candidates with early-alphabet names at a formative time in their political careers in much the same way as a January 1st cut-off date for registering in youth hockey leagues gives rise to a relative age advantage for children born early in the calendar year (Barnsley and Thompson 1988; Barnsley, Thompson, and Barnsley 1985). This research is only suggestive as to internal causal mechanisms, but we do observe significant differences between states that alphabetically order ballots and those that randomize or rotate ballot order on at least three levels of elections: state primaries, state general elections, and congressional elections. Future research might explore alphabetic bias in lower levels of politics, including municipal elections, which are subject to an even more bewildering array of election rules than are elections to state and federal offices.

My results challenge the view that ballot ordering rules are innocuous administrative details. I estimate that the distortion resulting from alphabetic ordering in the United States is roughly equivalent to the representation of a medium-sized state or the effect of literacy tests and other historic barriers to voter registration on African American representation.

Election rules that eliminate positional advantages, such as randomizing or rotating ballot order, may be more complicated and costly to administer than simply listing candidates in alphabetic order, but the evidence presented here suggests that ballot order laws have had significant consequences for political representation.[39] This research suggests that alphabetically ordered ballots alter the composition of American legislatures; states that have enacted this practice may not be represented by legislators who enjoy the most support in the electorate. The practice may cause less deserving candidates to win office, leaving these states worse off. This research supports recent works that advocate ballot reforms to reduce positional bias in elections (Beazley 2013; Miller 2010). Given the magnitude and complexity of policy issues on both the state and federal levels, we should be wary of arbitrary rules for ordering ballots that interfere with the election of the best qualified candidates for public office.

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Notes

1. The relative age effect observed in professional hockey leagues has been observed in other fields, including professional baseball (Thompson et al. 1991), professional soccer (Barnsley, Thompson, and Legault 1992; Helsen, Van Winckel, and Williams 2005), high school leadership (Dhuey and Lipscomb 2008), and lifetime economic opportunities (Bedard and Dhuey 2006).
2. Recency biases would favor the candidate listed last on the ballot. As noted below, I do not find evidence of late-alphabet advantage though the method applied should detect it. Recency bias is more of a concern when options are presented verbally rather than in writing (Krosnick 1991).
3. For this reason, election rules may alter candidates' incentives to seek office. If candidates believe that ballot ordering rules increase their chances of success, they should be more inclined to seek office, all else equal. Parties may similarly recruit candidates with ballot position in mind.
4. See, for example, *Tsongas v. Secretary of Com.*, 291 N.E.2d 149 (Mass. 1972; Sen. Paul Tsongas' lawsuit challenging Massachusetts ballot ordering laws as candidate for the Middlesex County commission).
5. According to the biographical data by produced by McKibbin (1997), 18.4% of members of the 104th Congress previously held municipal offices; 12.2%, county-level offices; 51.3%, state-level offices; 10.1%, prior federal offices.

6. States developed uniform ballots in the 1880s to combat election fraud associated with party-generated ballots and to facilitate orderly administration of multiple elections on the same day.
7. Other ordering methods include lottery-style drawings, party-column ballots, ordering according to party performance in a past election, or leaving ballot order to the discretion of election officials.
8. As noted in the text, political scientists have conducted laboratory experiments and have capitalized on natural experiments produced by rotating or randomizing ballot order in particular elections to produce precise estimates of ballot order effects. While these designs are ideal for microlevel research, I am interested in whether the advantage identified in these studies dissipates or persists over a series of elections. This level of inquiry would require a field experiment, but a randomized field experiment is not possible.
9. I do not use matching methods despite their appeal for causal inference. There are relatively few states to match, and the dimensions on which one would match them are not clear. One could match a state legislative election in an alphabetic ordering state with one in a state that randomizes or rotates ballots, but this would result in inappropriate post-treatment matching because I contend that alphabetic ordering affects elections that precede general partisan elections.
10. When order is rotated across multiple versions of ballots, ordering advantages are evenly distributed among candidates. When order is determined by lottery, positional advantages are not expected or related to alphabetic order.
11. One might assume that representatives' surnames should be proportional to surnames in the corresponding electorate (in the absence of alphabetic ordering effects) and compare representatives from alphabetic ordering states to the general population. Some prior works have featured this comparison (e.g., Robson and Walsh 1974), but this approach makes an unnecessarily strong assumption. One might also compare representatives elected by states other than those listed in Table 1, but the influence of their ordering methods on the expected distribution of representatives' names is not entirely clear. These alternative designs yield comparable substantive results.
12. Excluding election results obtained in alphabetic ordering states at the time or soon after enacting alphabetic ordering has the additional virtue of limiting the possibility of results being caused by states that happened to have early-alphabet representatives selecting the ordering schemes in self-interest.
13. These data were obtained from the Congressional Biographical Directory (available at http://bioguide.congress.gov/biosearch/biosearch.asp).
14. The temporal domain of the observations of state legislators is limited to the time frame of the dataset, 1967–2010, as well as the enactment years reported in Table 1.
15. Alabama's enactment year was determined by consulting its legislative history. Section 535 of the 1907 Code did not require primary voters to prepare ballots at the voting place. The Alabama Code of 1923, Section 623, however, required the names of candidates for each office to be printed in alphabetical order by surnames.
16. Hawaii, Louisiana (except in presidential elections), Maine, Massachusetts (see note accompanying Table 1), Nevada, and Vermont alphabetically order all election ballots. The other states listed in the left-side column of Table 1 alphabetically order primary election ballots. The results of this analysis do not show that states that alphabetically order both general and primary election ballots display greater alphabetic bias than those that limit the practice to primary elections.

17. After I present my primary results, I test whether my findings are the product of differences other than election rules. Of particular interest is whether demographic differences among the states, rather than ballot ordering rules, explain differences in representation.
18. See *Akins v. Secretary of State*, 904 A.2d 702, 707 (N.H. 2006). Prior to 1972, Scott (1972, n. 37) reports Tennessee Code did not specify an ordering method. I did not attempt to categorize any state based on distinct ballot ordering rules for local elections, run-offs, odd-year elections, or special elections.
19. One does not expect, for example, a bell-curved distribution with many surnames beginning with M and N names and relatively few with A, B, Y, or Z. One also does not expect to observe legislatures with uniformly proportioned surnames (1/26th As, 1/26th Bs, and so forth).
20. I order representatives by the first two letters of their surnames and count representatives in each group. This ordering creates 676 potential measuring points (26 × 26), but only 415 two-letter combinations are actually observed in the data. I reach the same conclusions ordering representatives by the first letter of their last names only and measuring at 26 different values (because this creates a less detailed rendering of the same lines). With fewer measuring points, the corresponding figures are confusing on first impression because the empirical distribution functions tend to overlap.
21. One expects to find many observations to be tied at the same value because many different names start with the same first two letters, but this is not a serious issue. Ties make the statistical test conservative because they decrease the distance between empirical distributions (Conover 1999). One could break ties by ordering more than two letters, even using full names to exhaust possibilities, but there is little added benefit to such an approach. Additional details on the empirical distributions in Figures 1 and 2 are nearly imperceptible in print.
22. The critical value for hypothesis testing depends on sample sizes and desired confidence level; it represents the distance one would reasonably expect to observe between empirical distributions of two samples as a result of random variation. The critical value for a one-sided Kolmogorov–Smirnov test comparing large samples of different sizes at the 99% confidence level is calculated as $1.52\sqrt{\frac{m+n}{mn}}$ where m and n are sizes of the respective samples (Conover 1999, Table A21).
23. In contrast, if recency effects give late alphabet candidates an advantage, one would observe $F_{AO}(x) > F_{RR}(x)$ at relatively high values of x, and $F_{AO}(x) < F_{RR}(x)$ at intermediate values. The distributions considered here do not exhibit recency effects.
24. Very few variables of interest in elections correlate to alphabetic order. "[F]or alphabetic listings such as directories of names, values of most variables fluctuate randomly through the list" (Agresti and Finlay 2009, 22). For example, gender is thought to be an important factor in the emergence and success of legislative candidates, but men and women have similar last names.
25. For example, candidates with early-alphabet surnames may be more successful because they enjoyed certain advantages growing up, such as being assigned to the front row in school or topping alphabetized job application piles (*The Economist* 2001). But such general advantages would occur in all states and not explain differences among states.
26. It is not apparent from these data why the alphabetic advantage appears greater at the federal level than it does at the state level. If congressional elections do not suffer from ballot order effects but rather reflect ballot order effects in earlier elections, one might suspect

the gap to close in increasingly competitive elections. Prior work on relatively age advantage suggests the disparity between early and late birthdays may increase somewhat in increasingly competitive leagues (Barnsley and Thompson 1988; Barnsley, Thompson, and Barnsley 1985). In addition, there may be ballot order effects in congressional elections (Krosnick, Miller, and Tichy 2004) or in the multiple minor elections that may precede election to Congress. This curious result warrants further research.

27. The distributions of state legislators in South Carolina and Tennessee before and after those states alphabetically ordered ballots do not exhibit significant alphabetic bias.
28. Recent research, however, suggests that the racial and ethnic groups identified by the Census Bureau have similar surname distributions, except for Asian-Pacific Islanders who tend to have late-alphabet surnames (Edwards 2014).
29. Hispanics averaged 5.63% and 8.41% in the former group in 2000 and 2010, and 10.12% and 13.12% in the latter group in the same periods. These figures are low relative to national averages because averaging weights small states equally with large states with substantial Hispanic populations (e.g., California, Texas, and Florida). Averaging the states' percentage Hispanic populations makes sense in reference to the state legislative representation data; the comparison for congressional delegation data should be weighted by state population size. These figures do not span the duration of data on representation studied here because the Census Bureau did not systematically collect data on Hispanic populations until 1980.
30. Forty-nine Hispanics from 12 different states have been elected to Congress during the time span studied here (serving a total of 32 terms representing states that alphabetically order ballots).
31. For example, according to the Census data, 57.7% of people named Jones are Caucasian, 37.3% African American, and 1.44% Hispanic.
32. To estimate the empirical distribution for a particular race/ethnicity of state legislators, I multiply the number of legislators with a given name by that group's share of each name. For example, states that alphabetically order ballots elected 168 legislators named Jones. Multiplying this number by the racial/ethnic make-up of the name Jones, I estimate that 96.9 of these legislators were Caucasian; 62.7, African American; and 2.4 Hispanic. This method is sure to incorrectly identify the race/ethnicity of some legislators, but these errors are essentially random and the method should yield reasonable estimates in large samples. I compare my estimates to known benchmarks to validate my estimation strategy. Based on surnames, I estimate that 290 Hispanics serve in state legislators in 2010; the National Directory of Latino Elected Officials reports 251 Hispanic state legislators (available at http://www.naleo.org/directory.html). I assume that the extremely rare surnames excluded from Census Bureau data are evenly distributed among the known surnames. Extremely rare surnames account for approximately 10.2% of all surnames.
33. It is possible that the Hispanic population varies from one state to the next in a manner that is not reflected in the Census data on surnames. Some states have historic ties to particular nations of origins (e.g., the Cuban population in Florida). Accordingly, the difference between distributions of Hispanic legislators should be viewed with some caution.
34. I do not maintain that representatives' surnames should mirror those of the general population but rather am using the distribution of surnames in the general population as a common yardstick to compare states. This analysis yields the following ranking of alphabetic bias in state legislatures (from most to least favorable to early-alphabet names): LA, $TN_{BEFORE72}$, $RI_{BEFORE94}$, NC, $IN_{BEFORE91}$, AK, UT, $SC_{BEFORE96}$, AZ, CA, AL, NJ, MD, $IN_{AFTER91}$, NV, DE, MA, NE, $RI_{AFTER94}$, CT, $TN_{AFTER72}$, $FL_{AFTER71}$, TX, KY, ME, VA, $NH_{BEFORE06}$, MI, VT, ID,

GA, SD, WV, IA, MY, OR, HI, MS, $NH_{AFTER06}$, NY, $SC_{AFTER96}$, MN, NM, IL, OH, ND, OK, AR, WA, $FL_{BEFORE71}$, WY, MO, KS, CO, PA, and WI. I do not attempt this analysis on congressional delegations because the subsample sizes are too small.

35. According to Keele, McConnaughy, and White (2012, 489), test statistics for randomization inference testing based on sums of ranks are common. Because there are nearly five trillion different ways to draw 16 cases from a pool of 56 observations (six states alphabetically ordered ballots for only part of the sample period), I estimate the distribution of randomly drawn rank sums using 100,000 such draws.
36. Rather than conducting this randomization inference test as a draw of 16 states from a pool of 51, one could conduct the test as a random draw of 16 subjects from a pool of 36 (20 states have rotated or randomized ballot order). The *p* value resulting from this test is .0005.
37. Edwards (2014) maintains that alphabetically ordering ballots unintentionally disadvantage Asian American candidates and violate the fundamental right to vote.
38. The Supreme Court held that the historic coverage formula for heightened Voting Rights Acts enforcement unconstitutionally infringed upon state sovereignty in the 2013 case of *Shelby County, Alabama v. Holder*, 133 S.Ct. 2612 (U.S. 2013).
39. Some courts have held that rotating candidate names on ballots is costly, perhaps as high as 13% of the cost of producing ballots. See *Sonneman v. State of Alaska*, 969 P.2d 632 (Alaska 1998). But recent research suggests election costs are primarily a function of the number of elections, the size of the jurisdiction, and polling operations, rather than ballot design (Montjoy 2010). In addition, alphabetically ordering ballots may be "penny wise and pound foolish" given ongoing litigation over the practice (Beazley 2013).

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