

NOMINATE and American Political History: A Primer

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The NOMINATE algorithm holds great potential for enriching the analysis of American political history. This simple and brief primer provides a rigorous but accessible introduction to NOMINATE (for Nominal Three-Step Estimation) and to its uses -- without requiring advanced mathematical training.¹

Why have a short primer? Because NOMINATE ought to be widely used. Devised by Keith Poole (UC-San Diego) and Howard Rosenthal (Princeton and NYU), the results of NOMINATE illuminate a great deal of American political history – in particular, the relationships over time among roll-calls, congressional parties, public policies, and issues in national American politics.²

NOMINATE's great strength is that it allows one to compare legislative behavior across time and also within a given chamber of any particular Congress. NOMINATE reliably scales legislators by their ideological location in so-called issue space within each and every Congress. Indeed it offers a standard scaling for *all* members of Congress over two periods – before and after the Civil War, facilitating cross-time comparison of congressional party activity and policy-making during these two long periods.

One advantage of such cross-time comparison has already become quite clear. NOMINATE scores show that congressional parties are today more polarized than they have been for a century. The New York Times often publishes op-eds and news stories that use NOMINATE scores. Taking NOMINATE's stark portrayal of congressional party division seriously, two prominent political scientists filed a friend-of-the-court

brief in the Supreme Court's redistricting case, *Vieth v. Jubilerer*, urging the Court to take notice of such polarization as it deliberated whether House districting is justiciable.³

The party polarization story is certainly the "big" story to come out of NOMINATE.⁴ But there is also a "NOMINATE project" – work undertaken by a "second generation" of scholars inspired and challenged by NOMINATE.⁵ The "NOMINATE project" thrives on repeated forays into a vast dataset that remains relatively unexplored.

Imagine that groups like the AFL-CIO, the American Conservative Union, and Americans for Democratic Action had all been issuing "report cards" on all members of Congress since 1789. The resulting dataset would approximate what is on offer from NOMINATE's results. But the NOMINATE results are actually better. Group-compiled scores classify only divisive votes of interest to the group, and exclude less divisive votes. Using small and unrepresentative samples of roll-calls they therefore artificially polarize congressional behavior. In contrast, NOMINATE uses almost all of the roll calls ever recorded. It excludes only those roll calls where the minority is smaller than 2.5%.

Not only are NOMINATE scores more accurate than what would be available if there had been group-compiled scores from the first Congress. NOMINATE scores also continue to survive technical challenge. There has been something of a debate about whether to use NOMINATE at all. The resistance has been related in part to the very striking finding of "low-dimensionality." NOMINATE shows that congressional politics has contained at most *two* cross-cutting "issue spaces" and usually only one. Some have found that result simply implausible, and respond that there are actually

many issue spaces in congressional decision-making, given the variety of issues and policy domains which engage the attention of members of Congress, from defense appropriations to climate policy to whether to intervene to keep Terri Schiavo on life support to the “defense of marriage.” Also, and more technically, the growing interest in using Bayesian statistics (parameters are randomly distributed, data distributions are fixed), instead of a frequentist approach (parameters are fixed, but the unknown data are assumed to be randomly distributed) has generated scores that rival NOMINATE – and that can be argued to have a firmer conceptual basis. Nonetheless, the debate seems to have dissolved. NOMINATE scores correlate closely with the rival scores. This suggests that low-dimensionality cannot be dismissed, nor the utility of the scores.⁶

The mathematics of the scores, are, however, forbidding. Consider a statement by Poole and Rosenthal of how they specify their spatial model:

“Let s denote the number of policy dimensions, which are indexed by $k = 1, \dots, s$; let p denote the number of legislators ($i = 1, \dots, p$); and q denote the number of roll call votes ($j = 1, \dots, q$). Let legislator i ’s ideal point be \mathbf{x}_i , a vector of length s .”

Although this notation is not difficult, the ensuing discussion gets rapidly more difficult, proceeding for 16 pages or so. Within short order, we have this equation

$$L = \prod_{t=1}^{\tau} \prod_{i=1}^{p_t} \prod_{j=1}^{q^t} \prod_{l=1}^2 P_{ijl}^{C_{ijl}},$$

where P_{ijl} is the probability that the i th legislator votes yea ($l=1$) or nay ($l=2$) on the j th roll call in Congress t . Indeed, there are many passages in the description of the algorithm that are as (or more) challenging than this expression.

In this article we provide an intuitive and extended tutorial on NOMINATE – something that is, rather surprisingly, nowhere currently available (although there are brief intuitive treatments to be found in various places.) Below, using recent newspaper stories, we first very informally treat the spatial model of politics. The mathematical foundations of NOMINATE, broadly speaking, are then treated with a minimum of mathematical difficulty.

Following the mathematical exposition, we illustrate the uses of two particularly helpful NOMINATE tools, (1) DW-NOMINATE, one of the more widely used scores produced by the algorithm, and (2) Voteview, which displays two-dimensional plots of roll-calls. (There are other tools – but a complete treatment of the entire NOMINATE toolkit is beyond our scope.) As with our treatment of the spatial model and the mathematics, our primary purpose is instruction – and to thereby broaden the number of participants in the “NOMINATE project.”

We end with a substantive sketch of how using NOMINATE invites appreciation of a spatial approach to American political history. Poole and Rosenthal are political historians in their own right. Had they not thought *historically* about the spatial model of politics, and had they not understood that the spatial model could powerfully illuminate U.S. political history, they might never have developed the tools which they have made available to us.

We dub their political-historical analysis “low-dimensional political development” (or LDPD). In doing so, we mean to draw attention to their focus on the oscillation over time between a politics organized around one axis versus two broad axes of political

conflict. As one works with NOMINATE, it is hard to avoid such inherently developmental questions as: why have there never been more than two dimensions of conflict? why two axes at one time but not another? What difference does it make to policy-making one way or another – that is, why care at all about the relative dimensionality of American national politics?

A primer about NOMINATE inevitably pulls one into the spatial-theoretical preoccupations within which the NOMINATE scores are embedded. Our outline of the central spatial themes behind NOMINATE further contributes to our aim of lowering the entry costs to the “NOMINATE project.”

The Spatial Model and Its Substantive Developmental Importance

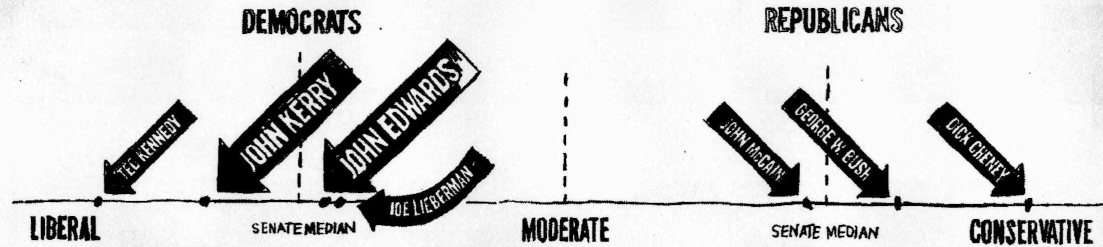
To begin, let us treat the spatial model as it applies to legislative roll-calls. Consider the use of NOMINATE scores that can be found in a Summer, 2004 op-ed in the New York Times – reproduced as Figure 1. In it, two Brookings Institution political scientists, Sarah Binder and Thomas Mann, discussed the graphic accompanying their piece that showed where today’s major politicians can be located on a left-right continuum.

As one can see, it features a straight line diagram with labelled arrows for Ted Kennedy, John Kerry, John Edwards, Joe Lieberman, John McCain, George W. Bush, and Dick Cheney. Each arrow tilts downward to indicate points on a horizontal line

Op-Chart

SARAH BINDER, THOMAS MANN, ALAN MURPHY AND PAUL SAHRE

Where Do They Stand?



Source: Ideological positions calculated by Keith Poole and Howard Rosenthal. See "Common Space Data," <http://voteview.ohio.edu/readmeb.htm>.

Most campaigns feature efforts by the candidates to characterize their opponent as being out of the mainstream — as an extreme liberal or as part of the far right. The current presidential campaign is no exception.

Thus far, most of the ideological fire has been directed at the Kerry-Edwards ticket. The Bush campaign has gotten particularly good mileage out of a National Journal analysis of roll call voting in 2003 that ranked John Kerry of Massachusetts as the No. 1 liberal in the Senate and John Edwards of North Carolina as the fourth-most-liberal senator.

Yet the senators' ratings are misleading because of the large number

of votes each man missed. Mr. Kerry, for example, attended so few votes on social and foreign policy that his composite score in 2003 was based only on economic policy. Even then he was not the single most liberal senator on economic issues; it was a distinction he shared with six other senators, including Bob Graham of Florida.

So where do the Democratic nominees really fit along the left-right spectrum? Well, you get a different answer if your calculations are based on nearly all votes cast by the candidates in their Senate careers. Using this measure, we have arrayed Mr. Kerry and Mr. Edwards from left to right in the above figure based on their voting history in the Senate. For comparison's sake, we also have included Ted Kennedy of

Massachusetts, Joe Lieberman of Connecticut, John McCain of Arizona, and the parties' median senators. We even have scores for President Bush (from his announced positions on roll call votes while president) and Vice President Dick Cheney (based on the votes he cast when he represented Wyoming in the House of Representatives from 1979 through 1988).

Assertions that the Democrats' presumptive nominees are extreme liberals fall flat. True, Mr. Kerry's voting history places him to the left of today's median Senate Democrat (Tom Daschle of South Dakota). But he is closer to the center of the Democratic Party than he is to the most liberal senators, including Mr. Kennedy. John Edwards falls just to the right of the median Democrat. In

fact, he is nearly indistinguishable from Mr. Lieberman, the Democrats' vice presidential candidate in 2000.

On the other side of the partisan divide, Mr. Bush — like Mr. Kerry — is more extreme than his party's median senator (Richard Shelby of Alabama). He is also noticeably more conservative than his primary challenger in 2000, John McCain. So any assertion that the Democratic candidates are out of the mainstream might easily be applied to the Republicans as well. In fact, if any of the four candidates on the national party tickets this year is out of the mainstream, it is Mr. Cheney, who in his last full term in the House was on the right flank of roughly 90 percent of his Republican colleagues. □

Sarah Binder and Thomas Mann are senior fellows at the Brookings Institution. Alan Murphy is a senior research assistant there. Paul Sahre is a graphic designer.

Figure One

running from "liberal" to "conservative." A perpendicular labelled "Moderate" bisects the line. The phrase "Senate median" is located at both the left and the right of this line. John Kerry is shown as being liberal. President George W. Bush is conservative. John

Edwards is shown as more moderate than the ideologically extreme Vice President Dick Cheney.⁷

The basic concept that self-evidently informs the plot – namely, that politics organizes itself on a one-dimensional, left-right ideological space -- is, by convention, dubbed *issue space*. Notice that Binder and Mann also regard legislators as arrayed within issue space. Thus, the horizontal axis depicting issue space implicitly is broken into identical intervals correlating to degrees of conservatism or liberalism that carry actual numerical values. Finally, people in issue space evidently occupy fixed locations within it.

Having pointed out these four (now obvious) elements of the figure – again, the assumption of *left-right issue space*, that the issue space has a *single dimension*, its underlying disaggregation into *intervals*, and the *locational fixity* of the scored politicians -- we can now introduce a vital complication that takes us an essential step forward. With a little thought one can quickly grasp that the idea of one-dimensionality is far from obvious. One-dimensionality is very likely an artifact of something political or of some political process. (As for the fixity of a legislator's location we return to that later in the article.)

Consider the case of the Southern New Deal Democrat, a legislator who voted for liberal economic positions but voted against anti-lynching legislation. This was a legislator who operated on *two dimensions regularly*. On one dimension he was a liberal; on the other he was the opposite of a liberal: he was a conservative. In other words, legislators can and do operate within two issue spaces.

But just when is American politics largely one-dimensional (as the plot in the Times op-ed implied), and when is it two-dimensional (as the example of the Dixiecrat implies)? Why is American politics one or the other at these times and not others? How many different dimensions have there been at different times in American history? Finally, *so what* if politics is either one-dimensional, two-dimensional, or more than two dimensional? That is, if dimensions really can be detected, what does the number of dimensions matter?

Dimensionality matters because it influences political choice and strategy. Take the example of the Southern Democrat. This case underscores that there were two separate issue-spaces in American politics during the New Deal, one dominant and one latent -- but potentially very salient. Franklin D. Roosevelt worked with a congressional Democratic party that had a hidden fault line which gradually became an open crack in the party's unity. Roosevelt was thus required, or so he thought, to *choose* the issue space in which he would more productively innovate. Either issue space had its own agenda. On the dominant New Deal agenda, the question was, shall we have more of an activist approach to economic or social policy or more of another? *Mutatis mutandis*, the same was true for the other issue space, the racial dimension. FDR's need for legislative majorities, coupled with the disenfranchisement of most black American voters, forced him (he thought) to accept patterns of policy design and implementation - in federal work relief and crop production control - that, while innovative on the "first dimension," would not cause overt conflict and debate, let alone cause any deliberate

legislative innovation, on the “second dimension,” that is, on the dimension of racial politics.

To repeat: whether there are one or two dimensions, and what the content of those dimensions is, influences both what kinds of policies politicians can choose and who gets what from government. If so, then there is a corollary issue: whether there can be *more* than two issue dimensions in politics. With two dimensions, there is obviously room for strategy -- although, as the New Deal example suggests, policy choices are probabilistic and thus will impose gains and losses for dominant coalitions and weaker political actors. But what happens when there are more than two dimensions? Surprisingly, the answer is that there is *too much* room for strategy.

Consider another example -- again drawn from the New York Times. A few years ago, the Brennan Center at New York University issued a report criticizing the New York state legislature as deeply dysfunctional and highly oligarchical, stating that its governance “systematically limits the roles played by rank-and-file legislators and members of the public in the legislative process.” The report cited a pronounced dearth of public hearings, near unanimous passage of most laws, and a lopsided ratio of 16,892 bills introduced to 693, or 4%, enacted in 2002 -- suggesting a combination of an active but small agenda and an ignored but large agenda. Not surprisingly, this portrait of a do-nothing, oligarchic legislature enraged the New York Senate majority leader, Joseph L. Bruno. Bruno called the report “pure nonsense,” and added: “Talk to the C.E.O. of any company. If you want to act on something, and the company has 212 employees, what are you going to do, have a discussion and let 212 employees do whatever the

agenda is? Is that what you do? So you have 212 different agendas. And that is just chaotic, doesn't work. That is Third-World-country stuff."⁸

Bruno's statement is of course ambiguous, and could be read to mean that 212 different priorities line up on one dimension, and he simply is too busy to handle them sequentially. Nonetheless, to a spatial analyst Bruno's seeming self-importance reveals less about his temperament and more about legislatures. That is, it can be read differently to mean that he, Bruno, could imagine that there really could be all of 212 "different agendas" in his legislature, one for each legislator who, presumably, would try to organize all of the legislature's issues around his or her unique set of concerns. (Although we cannot provide instruction here, the reason why spatial analysts would find Bruno's speculation about 212 agendas to be so satisfying has to do with the so-called "impossibility results," such as the McKelvey Chaos Theorem or the Condorcet Paradox, that fundamentally motivate spatial analysis.)⁹ Bruno clearly did not use the word "agenda" in the technical sense that spatial analysts have for the word, i.e. a question-for-action that organizes such legislative decision-making as amendment and roll-call voting. But he was intriguingly close to the vocabulary of spatial analysis. Perhaps for him 212 different "issue spaces" were a distinct possibility that *he*, Bruno, in his capacity as a legislative leader (or CEO of the New York Senate), had to forestall.

Otherwise, Bruno said, there would be "chaos." Again, the resonance with spatial terminology is striking. In the spatial analytical vocabulary, "chaos" has a meaning that is close to what Bruno evidently had in mind: it refers to the politics that ensues when a group of politicians operate simultaneously, in real time, on more than two dimensions.

When *that* happens politicians can have a very hard time working with each other at all, creating strong incentives for them either to defect from the rules of the game or to combine into a faction that will impose new rules unilaterally. A country can indeed become ungovernable, spatial theorists hold, when the actual condition of “chaos” -- in the spatial sense -- emerges. And if by a “Third World country” we mean an ungovernable country, then Bruno was clearly associating “chaos” (more than 2, indeed 212, issue-spaces) with ungovernability.

Interestingly, an expansion in legislative dimensionality in fact happened once in congressional development, in the pre- Civil War era. This underscores the tremendous political and developmental importance that “chaos” – and its aftermath -- can actually have. Poole and Rosenthal found so much dimensionality in Congress just before the Civil War that they called the American Congress “chaotic” – unmanageable in just the way that Joseph Bruno fears the New York legislature might be were it not for his autocratic leadership.

To return, then, to the question of dimensionality: is politics ever more than two-dimensional? *It could be.* Seasoned legislative leaders can certainly imagine that prospect. How many dimensions could there be? *Any number.* What is politics like with $n > 2$ dimensions? *Fairly unworkable, probably impossible.* The run-up to the American Civil War is a clear instance.

This brings us to a central finding of the “NOMINATE project:” that American politics has, except for a very brief period, been a politics of $n \leq 2$ dimensions. It is a great accomplishment of Poole and Rosenthal that their longitudinal NOMINATE

scores frame American political development in such terms. Before we return to that finding, however, there is quite a bit of further instruction. We turn, therefore, to the micro-foundations of NOMINATE.

So Where Do the Scores Come From?

What are the micro-foundations of NOMINATE? Poole and Rosenthal have armed themselves with a theory of individual legislative behavior that they consider *good* (or at least good enough) *for all legislators at all times*. That theory allows them, second, to extract rather precise information about ideological position from the entire, continuous record of national legislative behavior, namely, all congressional roll-call votes.

At first blush, such a theory would seem not only unlikely, but also wildly a-historical. But the question is not the theory's realism so much as its capacity to order an enormous amount of information without doing undue damage to the way politicians actually behave. So let us turn to the theory.

Utility-Maximizing Legislators

One basic idea in the spatial theory of legislative behavior is that legislators, being professional politicians, know rather precisely what they want -- and by the same token what they do *not* want out of the legislative process.¹⁰

The great function of democratic legislatures is raising and spending money. These tasks are measured and reported to everyone according to the national currency's metric, which means that democratic legislators routinely operate in easily comprehensible and metricized ways with respect to policy choices.

For instance, if a legislator prefers one level of appropriation for defense -- say a moderate hawk really likes appropriating \$300 billion for the current fiscal year -- s/he probably would not be happy with a \$250 billion appropriation, and s/he would be even *less* happy with a \$200 billion appropriation, and so forth. Likewise, this legislator might think that a \$400 billion appropriation is foolish, and that \$500 billion is even *more* foolish than \$400 billion. This legislator has a most preferred level, in other words, and then “around” that most preferred level are increasingly less desirable alternatives *in either direction*, up or down, more or less.

It is not hard to see that this prosaic account is inherently spatial. A legislator derives greater utility for a legislative outcome the closer it is to his or her most preferred outcome or “ideal point.” Correlatively, the greater the distance of an outcome away from the ideal point, then the smaller the utility. Furthermore, it is not hard to see that for defense spending, at least, the legislator’s preferences -- if graphed in two dimensional space, with “utils” (utility received) on the y axis and spending levels on the x axis -- would execute something like a bell curve from left to right along the abscissa.

Of course, fairly close to a legislator’s “ideal point” there is some indifference between alternatives. Given a choice between a \$301 billion and \$299 billion appropriation, with no chance of moving the outcome to \$300 billion, the legislator might feel indifferent between the two choices. Depending on his mood, s/he might vote for \$299 or s/he might vote for \$301. The probability of either gaining his or her

vote is identical, about 50%, which is not the case for a choice between a \$300 billion appropriation and \$200 billion appropriation.

Absent such a choice between very close outcomes in issue space, the odds that the legislator would vote for the lower appropriation instead of the ideal point are much smaller. But, critically, they are not zero. Perhaps his or her niece -- who is a dove -- promised to take him or her out to dinner to his or her favorite restaurant and then to the opera if s/he voted for the lower appropriation, and s/he happened to know that his or her preferred appropriation would win no matter what s/he did -- so s/he voted for the lower appropriation even though that was, for him or her, ordinarily an improbable choice. Such votes do occur in a legislator's career. Legislators answer several hundred roll calls in every congressional session, and over many sessions the probability of some level of seemingly inexplicable voting probably grows -- if only up to a certain level and no more. Every legislator has an "error function," so to speak. There is, of course, an explanation for each of the incidents of roll-call behavior that give rises to the head-scratching. That is, the legislator did not really make "errors." But his/her "error function" roll call choices are not captured by the utility-maximizing spatial logic we have just laid out -- hence the label "error function," which refers to some residual of observations that cannot be modelled precisely. Roughly speaking, the error function allows for the possibility that a legislator will sometimes vote for an outcome that is further from his or her ideal point ("ideal" with respect to those issues that are included in the model) than its alternative. The spatial model is thus meant to explain only a certain amount of the variation in roll-call behavior. Correlatively, the

spatial model *needs* some error in order to capture and explain important variations in behavior.

Now what comes next may be somewhat challenging for the uninitiated. How would one know what any legislator's "ideal point" in some issue space is? Obviously, the legislator's roll call choices, the yeas and the nays, provide some guide to a legislator's ideal point. They communicate legislators' revealed preferences. But how would one take all of a legislator's yeas and nays and derive some precise measure of her ideal point? And do the same for all the other legislators? And what metric would one use?

To specify this problem, consider the following matrix, in Figure 2:

	Legislator A	Legislator B	Legislator C
Vote 1	Y	Y	N
Vote 2	Y	N	N

Figure 2

This is a very simple version of the general problem that we have just posed. This is a 3 person legislature, and it has taken two roll-calls, with the yea/nay outcomes noted in the column for each of the 3 legislators. Could one estimate one-dimensional spatial "ideal points" from such a small amount of information? If so, how?

One way would be trial and error-- that is, to try different configurations of legislator and roll call locations until one got something that made a certain amount of sense.

Figure 3 offers one arrangement:

	Legislator A	Legislator B	Legislator C
Vote 1	Y	Y	N
Vote 2	Y	N	N

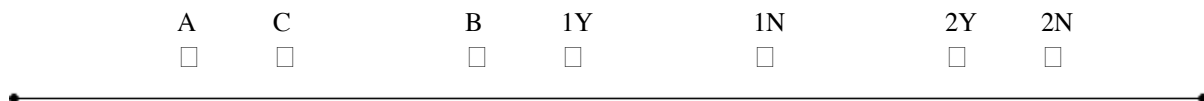


Figure 3

If you look closely at Figure 3, and check what you see before you against what we have just said about ideal points and utility maximization, you will notice that A is “placed” rather far away spatially from A’s *actual* votes, and C is also far away. Of the three, B is “placed” closest to B’s actual roll-calls -- but not particularly close. In fact, if one measured the distance between each legislator’s “placement” by this first trial-and-error effort, on the one hand, and each legislator’s actual roll call locations, and added the distances, then the total “distance” generated by this first “trial-and-error” effort is 16 and 1/2 inches.

Is there a better configuration? Yes, one could guess the following, which involves shifting C from C’s previous location on the left over toward the right and also flipping the locations of 2Y and 2N:

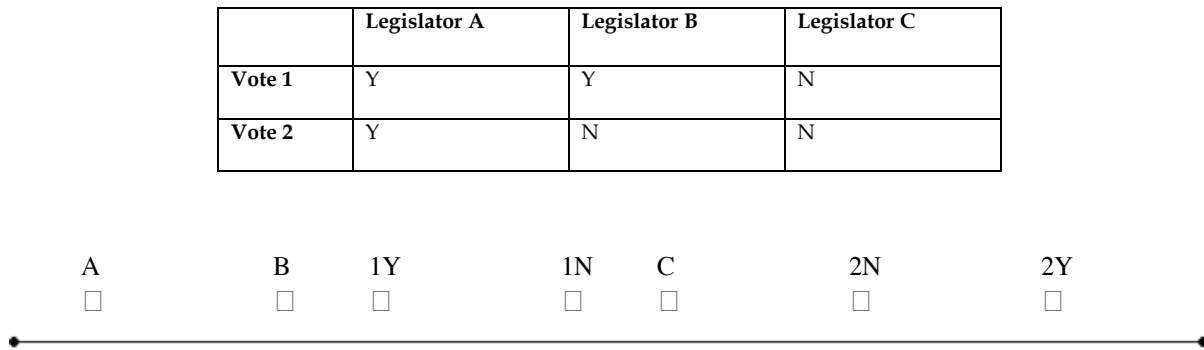


Figure 4

Notice that this arrangement, Figure 4, represents an improvement over the previous figure: both Legislators B and C are fairly close in space to their actual votes. But notice also that A is *still pretty far away* from A's second vote. The total "distance" is less than it was before – but it is nonetheless about 11 ½ inches.

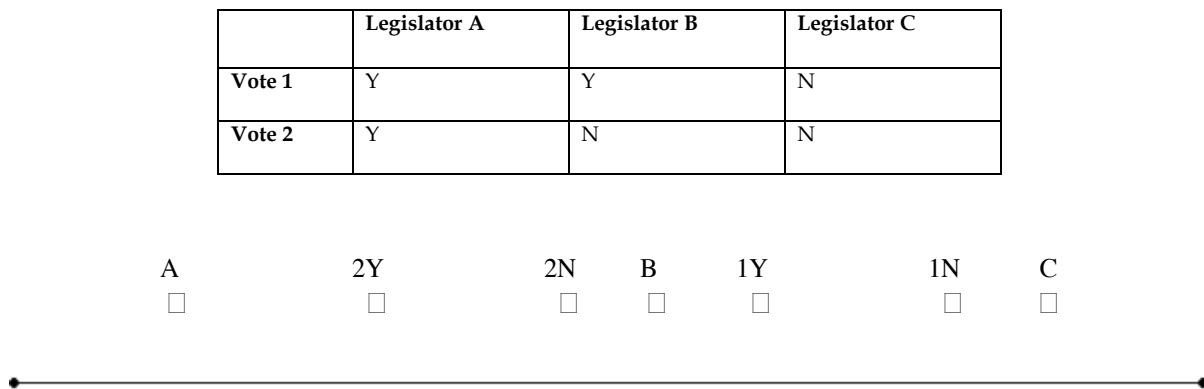


Figure 5

One further possibility is shown in Figure 5. C is moved all the way to the right, 2Y and 2N are re-flipped and moved left, B is located in the middle, and finally 1Y and 1N are put on the right. This does the most to “minimize” the distance between legislators and their actual roll call choices, namely, down to 8 inches.

By this point one gets the idea. Using the information which you have before you, in Figure 2, concerning legislators and their roll-call votes, you could “map,” after a certain amount of moving votes and legislators around on one line, where legislators’ ideal points probably are within this imaginary legislature.

In short, one can take roll call vote information and estimate whether legislators are “to the right” on the whole or “to the left” on the whole. Thus A is “to the left” in issue space above, B is “in the middle,” and C is “to the right.” Or, to put it in the language of Figure 1 (recall that this is the clipping from the New York Times) C is a “conservative,” B is a “moderate,” and A is a “liberal.”

Furthermore, if you wanted to develop ideological scores for these legislators, you could split the line in the figure into 201 intervals and come up with some sort of score for how “liberal” or how “conservative” each of the three legislators, A, B, and C, is. If the scale ran from -1 (most liberal) to +1 (most conservative), B would be about “0,” A would be close to -1, and C would be close to +1.

Now we get to a harder part. If you have lots of legislators, and lots of roll calls, trying first this and then that obviously cannot be the way to estimate legislator’s ideal points and to generate scores. It would in fact be impossible, even if you assumed that there is only one issue space. The House of Representatives has 435 members; each one

runs up about 600 roll calls in a congressional session. If there were two dimensions -- as during the New Deal -- your head would instantly spin even thinking about the prospect of a trial-and-error effort. (Interestingly, Poole and Rosenthal actually considered making a supercomputer conduct a kind of trial-and-error iteration, but concluded that any set of instructions to the computer would cause it to produce gibberish in a short period of time, what is called "blowing up.") In short, there has to be an efficient way to do what we did above with the actual, real world data concerning each chamber of the U.S. Congress over more than 200 years.

There is such a way, and it is called maximum likelihood estimation, or MLE. This is the mathematical core of the software program that Poole and Rosenthal devised for manipulating the data which they collected. MLE differs completely from the kind of trial-and-error which we just sketched -- it does *not* involve minimizing distances per the previous exercise. So it is vital to acquire some sense of MLE in a simple version of the procedure before extrapolating to what Poole and Rosenthal did with actual roll-call data in a complicated version of MLE. Our hope here -- by tapping the reader's memory (or grasp) of calculus, probability, and the nature of frequency distribution -- is to give an intuitive sense of what Poole and Rosenthal did to "map" legislators in issue space for several thousand legislators and many thousands of roll calls. Though the exposition is informal, it pays to read it slowly, with stops for thinking it over.

Maximum Likelihood Estimation

Fitting the spatial model means choosing values for all of the *parameters* of the model. These consist of (1) *the issue space coordinates for each legislator's ideal point* and (2) *the issue space coordinates for the "yea" and "nay" locations corresponding to each vote*. There is also a parameter that indicates (3) *the typical size of the errors*. Given a complete set of these three parameter values, it is possible to compute the probability (again, based on the model) of observing any specific combination of vote outcomes.

The *Maximum Likelihood Estimate* (MLE) corresponds to the set of parameters that, in turn, maximizes the probability of the observed "yea" and "nay" votes. In other words, it -- the MLE -- is that *estimated* (i.e. the artificial or "as if") set of *legislator and vote* coordinates -- in issue space -- that make the real observed outcomes (i.e. the "yeas" and the "nays" that these legislators actually cast in history) *as likely as possible*.

To better understand the likelihood function, it is helpful to consider a problem that is much simpler than predicting the voting behavior of members of Congress. Consider a gambling device, such as a slot machine, which pays out money on any one play with some fixed probability p . To estimate p , you could play the machine 100 times and, then, after each trial record on a piece of paper whether or not money is paid out. If you assume that the probability of a success on each play equals p regardless of the outcomes of the other trials (i.e., you assume that the trials are *independent* of one another) then the probability of any particular combination of successes and failures is:

$$(1) \quad \text{Prob}(\text{observed success-failure sequence} \mid p) = p^x (1-p)^{100-x},$$

where x is the number of times out of 100 that you win money (possible values of x are $0, 1, 2, \dots, 100$). The two terms being multiplied in (1) correspond to the probability of getting x successes (each happening with probability p) and of getting $100-x$ failures (each with probability $1-p$). Changing the order in which the successes and failures occur does not change the overall probability, as long as there are still x successes and $100 - x$ failures.

The probability statement in equation (1) treats p as a fixed number and is a function of x , the count of successes in 100 independent plays. After your experiment of playing the machine and recording your successes and failures, you will have valuable information. You will know the value of x . But you will not actually know p . To estimate it, you will need to compute a likelihood function for it.

The Likelihood Function $L(p)$ is identical to (1), except it treats x as fixed at the observed value *and is a function* of the unknown parameter p . The maximum likelihood estimate (MLE) for p is the value \hat{p} that maximizes $L(p)$. In other words, \hat{p} is the value of p that makes what happened (observing exactly x successes) as probable as possible. This does not mean that it is the correct value of p ; other values close to it are nearly as plausible, and there is no ruling out the possibility that something incredibly improbable (e.g. a run of good or bad luck) happened on your sequence of trials. However, MLE's are optimal estimators in many ways, and much is known about their behavior, particularly when the number of trials is large.

As an example, suppose you win 10 times out of 100 plays. The probability of any particular sequence that includes 10 successes and 90 failures is $L(p; x=10) = p^{10} (1-p)^{90}$,

which is plotted in the top half of Figure 6, “Visualizing MLE.” This likelihood function is maximized for $p = 0.1$, with the result that $\hat{p} = 0.1$ is the MLE. The maximization can be seen visually in the simple example plotted in the top half of Figure 6 for 100 trials. In the second graph, at the bottom of Figure 6, the MLE is also $\hat{p} = 0.1$ but the number of trials depicted is 1000, 10 times the number for the graph in the top half. In general, *with x successes in n independent trials, the MLE is $\hat{p} = x / n$, the observed proportion of successes.* But with the larger number of trials the range of plausible values that might be the true probability is narrower. (The differences between the rectangles underneath the curves emphasize that.) The relative accuracy of the estimates thus increases as the number of trials increases. The analogue for NOMINATE would be to have the results of a larger number of votes.

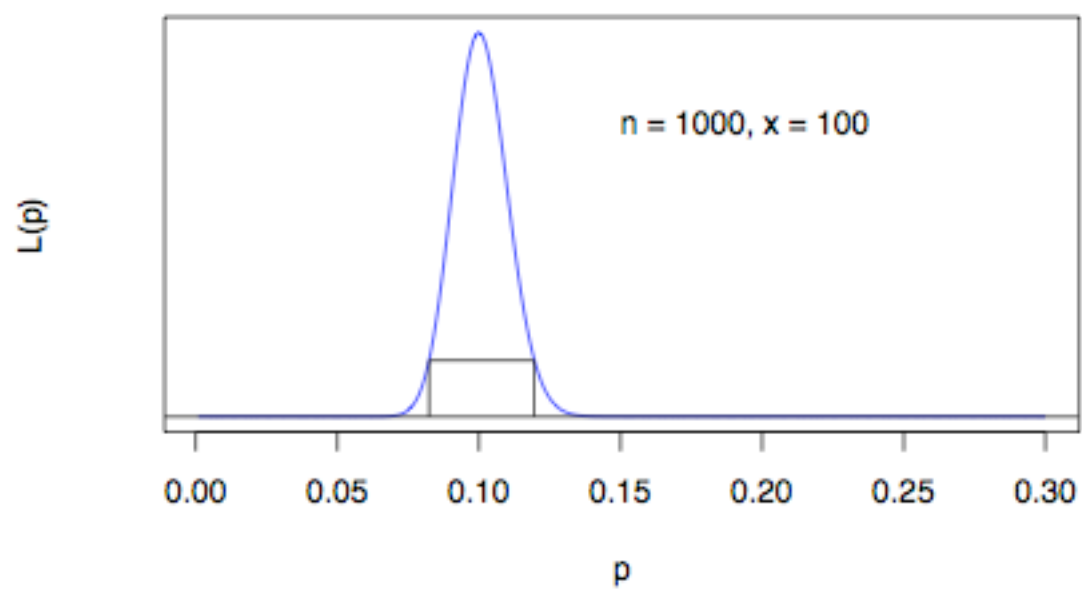
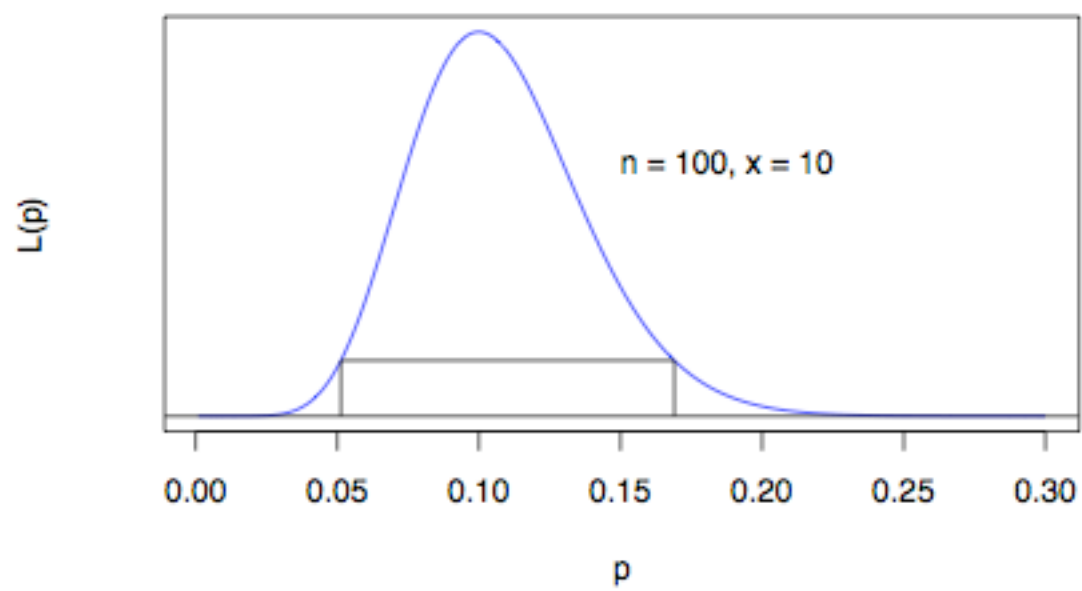


Figure 6: Visualizing MLE

In other words, with more information we narrow the range of plausible estimates – which is what we want. The rectangles in Figure 6 show 90% confidence intervals for p corresponding to $n=100$ and to $n=1000$ with $\hat{p} = 0.1$ in each case. The first interval is larger by a factor of roughly $\sqrt{1000/100}$, or about 3, meaning that around three times as many values of p must be considered "plausible" when using 100 trials compared to 1000 trials. But using a larger sample size will reduce the number of values of p that can be considered plausible – which means, in turn, greater accuracy and precision.

All of this brings us to a strength of NOMINATE. The above examples have only *one* parameter and 100 or 1000 outcomes. But NOMINATE routinely fits models with many 1000's of parameters *and* outcomes.

Each person who has voted in the time period considered has one or several associated parameter values (coordinates in issue space) -- as does each *question that was voted on*. How might we analogize these legislative facts? Imagine that there are six hundred different gambling machines (our analogue for roll calls) and, further, imagine that the machines may have different characteristics (e.g., different p 's). Now suppose there are 435 different people playing each machine, and that the players differ from each other at the business of winning money. In other words, the probability of a player winning on a particular play depends on *both* the player and the machine being played.

The different players in this example obviously represent different members of the U.S. House, and the different machines could – pursuing the analogy -- represent different questions being voted on in a Congress. Voting “yea” on a question, in turn,

could correspond to “winning money” on a play, and its opposite, voting “nay,” would correspond to “losses.”

Given values for all of the voter and question parameters, Poole and Rosenthal can write down a function for the probability of votes being cast in a particular way. This defines the likelihood function L for the set of parameters, and the MLE is the combination of voter and question coordinates that result in the largest possible value of L .

Now, there are important complications that require notice. Complications arise due to the large number of parameters involved in the Poole-Rosenthal likelihood function (i.e. NOMINATE, with – to recall -- the T and E standing for Three-step Estimation). While there is an explicit formula for the MLE in the simple example with the slot machine, much, much more computationally intensive methods were used by Poole and Rosenthal. What then did they do?

They used a computer algorithm (for those who are interested, it is the BHHH gradient algorithm) to handle the massive amount of information with which they worked. What did that involve? Here is another analogy: think of a very, very large and “bumpy” field with lots of little hillocks of varying height. There are, very roughly, three dimensions in this large terrain, length, width, and height. Your job is to find the *highest* location in this hilly field. This is like finding the MLE for a two-parameter model. The third dimension, this height, represents the value of the likelihood function for any particular two-dimensional location in the field.

Now, for the *one*-dimensional NOMINATE model, the highest “hill” would be located over a space of dimension equal to the number of legislators plus two times the number of votes – which is the total number of parameters in the model. A *two*-dimensional NOMINATE model would, of course, have twice as many parameters as the one-dimensional model.

(An aside is in order. You might be wondering why the terms “one-dimensional” and “two-dimensional” suddenly appeared. Recall, however, our earlier contrast between the one-dimensionality of the plot in Figure 1 and our discussion of the two-dimensionality of politics during the New Deal era.)

Back to our “hilly field” metaphor. To find the highest point in the field, you could check the height of every possible location with an altimeter and identify the maximum. However, this procedure could take a very long time if the field is large – which given the number of Congresses and roll calls it obviously is. A faster method would be to start *in some location*, and then take a step *in the direction that increased your height the most*. From this new position, you could take another step in the direction that again gave you the largest increase. After many steps you would eventually arrive at a location from which you could not go any higher. You would then conclude you were at local maximum. Repeating this “gradient method” from various starting locations, you could be reasonably confident of identifying the overall highest point in the field. This would, in fact, be a very tiny bit like the trial-and-error example above – although in fact you would be using mathematics called “hilltopping in higher dimensions.”

To use this procedure with the NOMINATE model, one would first choose a starting set of parameter values θ (the coordinates in issue space for the legislator ideal points and all of the yea and nay locations) and (get ready here for a mathematical term of art) evaluate the likelihood function $L(\theta)$. Then one would move to a slightly different set of values, θ' , and evaluate $L(\theta')$. If $L(\theta') > L(\theta)$, you accept θ' as the new θ . In this way you keep moving in the direction of the gradient vector. Repeating this procedure many times allows you to “climb the hill” until you arrive at the value that maximizes the function L , at least locally.

It might be helpful here to summarize by reconsidering the simple case displayed earlier:

	Legislator A	Legislator B	Legislator C
Vote 1	Y	Y	N
Vote 2	Y	N	N

Recall that we tried fiddling around with getting the appropriate relative distances between possible ideal points and the yea and nay points, even with only three legislators. We thus did very, very roughly (and without the mathematics of probability) what NOMINATE does systematically with much, much more information, *and*, quite crucially, using *probability* (not distance minimization.)

To recapitulate, in NOMINATE any given set of estimated coordinates for legislators in 1 or 2 issue spaces yields a certain probability of the observed votes. The MLE is the set of coordinates for all legislators in a Congress or in an historical period that makes this probability the largest. We tried to get the likely issue space locations of 3

legislators by fiddling with their observed yea and nay votes in a trial and error fashion, but NOMINATE does this for thousands and thousands of legislators and their roll-call votes through “hill-climbing.” Once a solution is obtained, that is, once NOMINATE thinks it has found the highest point in the hilly field, the legislator and roll-call parameters which are associated with that decision – which are the *estimated* coordinates – are dropped into a metric of some sort that can be easily interpreted, e.g. a scale between minus 100 and 100. *The resulting scores are the NOMINATE scores available on the voteview.com website for each member of Congress since the first Congress.*

It was a slight variation on *these* scores that Binder and Mann (go back to Figure 1) were using in order to make the claim that together Kerry and Edwards were less extreme than Bush and Cheney.¹¹ They got most likely Bush’s NOMINATE score by treating his legislative messages -- up or down on policy questions -- as one more set of “yeas” and “nays” in the legislative process. These were simply added into the database on which the algorithm worked. Cheney’s scores did not equate with Bush’s but instead the authors probably used his roll calls from his time as a member of the House.

It cannot be stressed enough that all of the very closely correlated versions of NOMINATE scores are *not* “true values” of anything real. They are merely estimates of (legislators’) parameter values that govern a probability model used to *approximate* non-random, real-life outcomes. Legislators and roll-calls have specified locations in a postulated “issue space,” and they -- and the postulated issue-space -- can be

mathematically recovered given roll-call votes for each legislators and through a data-reduction algorithm. The fitted parameters of the model form the basis of the scores.

But, as Figure 1 suggested, these scores tell us something politically substantive about real people – in that case, how far apart they were ideologically. They also allow one to “zoom in” on a particular politician, or on cohorts, and get a clear sense of their conservatism or liberalism on the two dimensions.¹²

Such properties of the scores, as we see next, permit one to investigate debates about American political history in useful ways.

The Scores, Voteview, and the “Redlined New Deal” Debate

To illustrate how NOMINATE can be incorporated into existing work, let us consider an issue in American political history, whether and just how Southern Democrats weakened, or aided, the New Deal’s social policies. Since the late 1970s and early 1980s, many scholars have asked whether and how the division in Congress between Northern and Southern Democrats affected New Deal policy design in ways that hurt the interests of African-American citizens.¹³

Two major issues have been at stake in addressing those questions: did New Deal social policy deepen black disadvantage, and if so, by how much and for how long? If New Deal social policy was meant for whites, first, and blacks only secondarily, then did that racialized allocation of social rights prime the racial tensions over “welfare” that erupted once African-American welfare protest made black disadvantage an issue?

Through comparison of key roll-call votes on the Social Security Act and the Fair Labor Standards Act, we can suggest how NOMINATE tools can be used to explore the

Figure 7

1. Congress Number
2. ICPSR ID Number: 5 digit code assigned by the ICPSR as
corrected by Howard Rosenthal and Keith Poole.
3. State Code: 2 digit ICPSR State Code.
4. Congressional District Number (0 if Senate)
5. State Name
6. Party Code: 100 = Dem., 200 = Repub.
7. Name
8. 1st Dimension Coordinate
9. 2nd Dimension Coordinate
10. 1st Dimension Conditional Standard Error
11. 2nd Dimension Conditional Standard Error
12. Log-Likelihood
13. Number of Votes
14. Number of Classification Errors
15. Geometric Mean Probability

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74 9460 3 1 MASSACH 200 TREADWAY A 0.418 -0.553 0.104 0.349 -29.45173 155 15 0.827
74 3746 3 2 MASSACH 100 GRANFIELD -0.263 -0.714 0.154 0.512 -62.64456 182 25 0.709
74 1574 3 3 MASSACH 100 CASEY J.E. -0.431 -0.812 0.181 0.522 -55.42553 129 27 0.651
74 4538 3 4 MASSACH 200 HOLMES P.G. 0.352 -0.579 0.099 0.469 -59.68023 198 22 0.740
74 8024 3 5 MASSACH 200 ROGERS E.N. 0.260 -0.751 0.063 0.271 -52.21115 206 20 0.776
74 189 3 6 MASSACH 200 ANDREW A.P. 0.370 -0.699 0.146 0.567 -45.61223 152 20 0.741
74 1996 3 7 MASSACH 100 CONNERY W. -0.215 -0.764 0.148 0.579 -73.85738 159 38 0.628
74 4261 3 8 MASSACH 100 HEALEY A.D. -0.322 -0.715 0.189 0.650 -42.90784 172 15 0.779
74 8139 3 9 MASSACH 100 RUSSELL R. -0.135 -0.365 0.203 0.748 -87.81804 171 42 0.598
74 9395 3 10 MASSACH 200 TINKHAM G. 0.632 -0.741 0.141 0.451 -39.84407 180 16 0.801
74 4399 3 11 MASSACH 100 HIGGINS J. -0.285 -0.824 0.231 0.894 -59.65034 175 20 0.711
74 6177 3 12 MASSACH 100 MCCORMACK -0.275 -0.419 0.086 0.269 -50.99101 191 20 0.766
74 10095 3 13 MASSACH 200 WIGGLESWORTH 0.361 -0.906 0.105 0.448 -30.82851 179 11 0.842
74 6033 3 14 MASSACH 200 MARTIN J.W. 0.318 -0.822 0.089 0.327 -33.24687 193 12 0.842
74 3569 3 15 MASSACH 200 GIFFORD C. 0.358 -0.375 0.077 0.253 -44.05878 155 22 0.753

74 7731 46 1 MISSISS 100 RANKIN J.E. -0.032 1.001 0.055 0.188 -66.48225 193 28 0.709
74 2712 46 2 MISSISS 100 DOXEY W. -0.163 0.987 0.133 0.444 -52.01234 194 24 0.765
74 10077 46 3 MISSISS 100 WHITTINGTON -0.043 0.957 0.068 0.203 -77.45348 201 36 0.680
74 3266 46 4 MISSISS 100 FORD A.L. -0.022 1.000 0.091 0.493 -81.78208 204 37 0.670
74 2770 46 5 MISSISS 100 DUNN A.C. -0.068 0.998 0.385 1.527 -21.85498 91 9 0.786
74 1952 46 6 MISSISS 100 COLMER W.M. -0.040 1.047 0.065 0.301 -60.96704 196 22 0.733
74 6250 46 7 MISSISS 100 MCGEHEE D. -0.181 0.843 0.157 0.675 -49.99617 181 19 0.759

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long-standing debate about correlation between New Deal policy design and the internal structure of the congressional Democratic parties of that era.

To begin with, there are 4 kinds of NOMINATE scores. Among the more useful for historical analysis are DW-NOMINATE (which are re-estimates of an earlier version with a different procedure for estimating the error, hence the letters DW, which stand for “Dynamic Weighting.”) They can currently be found, among other places, at <http://voteview.com/dwnomin.htm>.

Figure 7 – above -- displays the relevant DW-NOMINATE text from that website for the Massachusetts and the Mississippi delegations in the U.S. House for the 74th Congress. Looking at Congressman McCormack from the 12th Massachusetts district (later Speaker of the House), one sees that he locates somewhat toward -1 on a scale of economic liberalism and conservatism running from -1 to +1. His Republican colleague from the 4th District is far more conservative than he is, as indicated by his score of 0.352.

Looking at the Mississippi Democrats, one sees that they are less economically liberal than their Massachusetts counterparts. Also, they are more conservative on the second dimension. Indeed, Congressman Rankin is maximally conservative on the second dimension, that is, with regard to policies that would change race relations in Mississippi, placing him at +1. ¹⁴

McCormack, for his part, is relatively liberal on the second dimension.

By now, of course, we are very close to the lively debate about whether the New Deal further entrenched black disadvantage through its broad social programs. Scholars

have increasingly depicted them as internally “redlined” due to Southern Democratic influence on their design.¹⁵

Consider the design of the 1935 Social Security Act: were agricultural workers deliberately left out of the original coverage of the Act in order to accommodate the preference of Southern Democrats that black landless workers not receive federal protection in the form of old age income security? At the time of the bill’s passage, the NAACP pointed out the gap in coverage. On the other hand, no Southern Democrat clearly and unmistakably voiced a desire that the Act’s coverage features not disturb Jim Crow. Also, the Secretary of the Treasury, Henry Morgenthau, underscored the enormous administrative difficulty of implementing the Act if it were written to cover agricultural and domestic workers – and tightly focused revisionist research has shown that this argument was by no means pretextual.¹⁶

NOMINATE has a desktop spin-off that throws interesting light on the issue – Voteview, which can be downloaded from the same sites that provide NOMINATE scores (such as the one listed earlier.)¹⁷

Voteview displays spatial plots of roll-call votes. Visual inspection of these Voteview plots yields useful information on whether Social Security was “redlined by design.” Why? Because NOMINATE is expressly set up to detect not one but two dimensions – and the second dimension is racial. In other words, one would expect a vote on Social Security to display the patterning that one would see in a vote which taps the “second dimension.” But it does not – which raises interesting questions of interpretation that, in turn, bear on the “redlined New Deal” debate. First, though, a

quick Voteview tutorial, (another version of which is available at <http://www.princeton.edu/~voteview/> -- it duplicates some of what we say below.)

A Brief Tutorial on Voteview

Each spatial display provided by Voteview has several useful features. It shows “clouds” of tokens, each of which represents a particular legislator. For all major party legislators, the tokens are labelled either R, D, or S for Southern Democrat, and they are color coded. Those legislators elected by a third party, e.g. the Farmer-Labor Party, have an obvious label, in this instance F. Additionally, the clouds are bunched or dispersed in a wide variety of ways. Such bunching or dispersion roughly indicates partisan or factional cohesion along one of the two NOMINATE dimensions – and the patterns of bunching or dispersion also reveal how dominant the first dimension is in any particular vote.

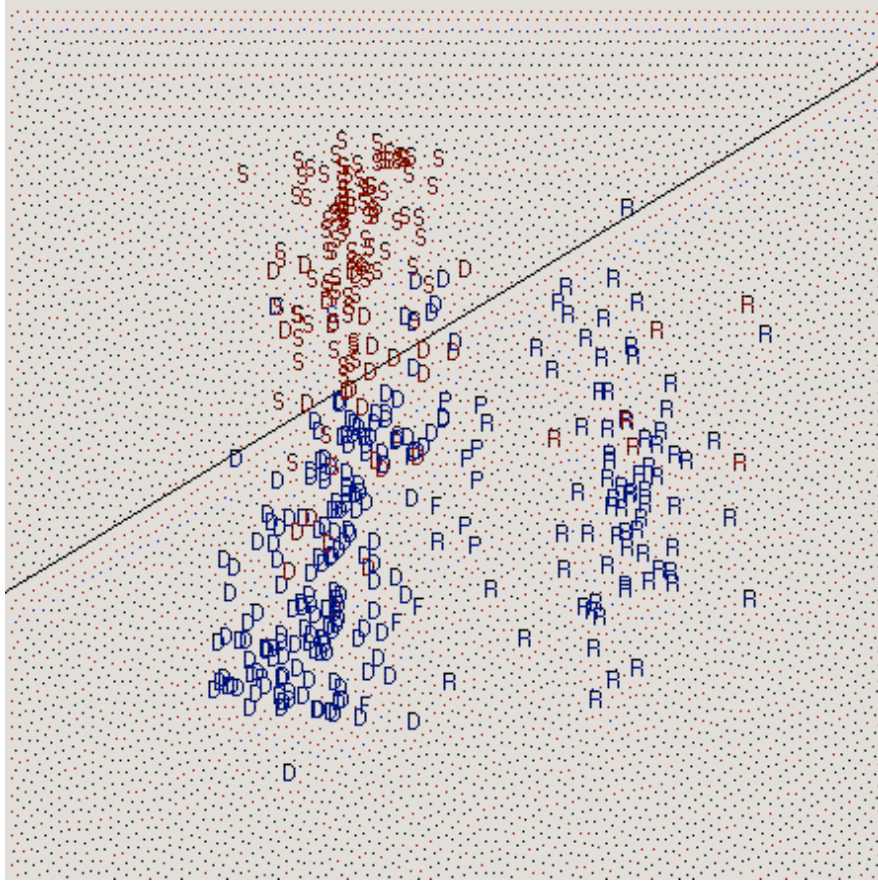


Figure 8

In this connection, consider Figure 8, which displays a House roll call on April 15, 1937, to amend a bill criminalizing lynching. Rep. Howard Smith of Virginia proposed an amendment to this bill: it proposed striking out the sections of the bill that imposed fines on counties in which lynchings occurred. As one can see looking at the figure, almost *all* of the S tokens (for Southern Democrats) are above the line (we say more about the “cut line” shortly), and many of the other party-label tokens (R, D, and F) lie underneath the line in two clouds.

The “cut line” thus shows that the vote on Smith’s amendment was a “second dimension” vote – but the small cloud to the right, underneath the “cut line,” of course

also indicates that the Republican and Democratic parties had a polarized relationship to each other on the ordinarily dominant first dimension.

Now to the “cut line.” NOMINATE assumes that the question voted upon has yea and nay positions in two-dimensional issue space. The yea and nay locations of the question are unknown parameters. The yea and nay coordinates of the legislators are also unknown parameters. All of the locations are found by maximizing the overall likelihood function for all of the unknown coordinates. The “cut line” is a line *perpendicular to the line joining the NOMINATE-estimated yea and nay points of the question voted on*. This (perpendicular) “cut line” furthermore bisects the other (joining) line at its halfway point. There are misclassifications – NOMINATE is after all likelihood estimation. But those legislators whose issue space positions make them likely to vote yea are typically on the yea side of the “cut line,” and vice-versa. Here the yeas are *blue*, the nays are *red*, and the misclassifications are either blue or red tokens that stand out visually because they are in the “wrong” place.

As an aside, when a legislator is “misclassified” by NOMINATE (and thus by its visual front-end, Voteview) the initial hypothesis is always that the legislator’s relative indifference to the outcome of the vote was higher than it was for his co-partisans or factional colleagues. But Voteview allows you to “inquire” about a misclassified legislator by toggling on the token to find out who it is – and the result can of course prompt further useful speculation beyond the standard initial hypothesis.

There is even more information to be had from the “cut line.” Looking at it in Figure 8, the anti-lynching roll-call, one notices that it tends toward the *horizontal*. This

particular angularity is in fact quite significant. The flatter a “cut line” the more the vote is a second dimension (“north-south”)¹⁸ vote. By the same logic, the more vertical the “cut line” is (as we will shortly see in considering the display of a vote on Social Security), the more the vote is a first dimension (“east-west”) vote – that is, much like the one-dimensional plot of the very first figure we presented, i.e. Figure 1.

Was Social Security Internally and Intentionally Redlined?

In keeping with the exercise of gleaning information from Voteview’s plots, now consider Figure 9. Recall that the NAACP criticized the proposed design of the Social Security Act of 1935 for its initial lack of coverage for farmers, farm laborers, and household workers and servants, on the ground that this feature of the Act’s design would leave about half of all African-American wage-earners unenrolled in the program. Several policy scholars have inferred racial intent in the Act’s design.

Ira Katznelson and Sean Farhang, in a recent article, point out that the number of cases of clear Southern Democratic racial animus in designing policy that would affect the income, education, and work conditions of black Southerners is large. Given the regularity of the pattern, they suggest that it makes sense to *also* code Social Security as belonging to this larger set of “redlined” policies. But, strictly speaking, this may or may not be the right inference, since there is no strong, *direct* evidence – actual “smoking gun” statements -- of racial animus on the part of Southern Democrats – whereas with the other policies there is. Social Security could be *sui generis* – in a set of 1, all by itself.

Indeed, Larry DeWitt, Gareth Davies and Martha Derthick have strongly argued that administrative necessity better explains the initial restriction of the Act's coverage formula to urban and industrial wage-earners. This point cannot, in our view, be dismissed. It reminds us, after all, that in 1935 the U.S. was an incomparably more agrarian nation than it is now. Huge regions of rural America were extremely remote. Furthermore, these areas were mired in a deep economic crisis with no certain outcome. To ask effectively bankrupt farmers to administer the Social Security system of contributory finance on behalf of their tenants – an organizational matter which today we rarely notice as we clock in at highly bureaucratized, modern workplaces – would have been, once one reflects on the matter, very hard and possibly politically suicidal for the Roosevelt Administration.

Can Voteview illuminate the difference between these rival scholarly views of Social Security? Considerations of space preclude a full application of Voteview to all of the relevant roll calls and to inspecting the angles of the cut lines and displaying information about them in, for instance, a plot or in histograms. But two more applications of Voteview do suggest that such a fuller exploration might well be informative.¹⁹

Figure 9, below, displays a House vote from April 11, 1935, on an open rule to permit 20 hours of debate on H.R. 7260, “a bill establishing a system of social security benefits.” The verticality of the “cut-line” suggests an almost perfect “first-dimension” roll call with little evidence of the hidden “racial dimension” criticized then by the NAACP and since then by many policy scholars.

Also consider Figure 10. Figure 10 displays the structure of a December 17, 1937 House vote on a motion by a conservative Republican, Fred Hartley of New Jersey, to “recommit S. 2475, an act providing for the establishment of fair labor standards in employments connected with interstate commerce.” The Fair Labor Standards Act was generally understood to exempt agricultural labor, an exemption that Northern and Southern Democrats in both chambers collaborated on. Several Southern Democrats openly expressed concern about the impact on race relations in the South if Congress followed FDR’s original proposal to have FLSA cover both agricultural and industrial labor. Nonetheless, the Senate failed to specifically expand the agricultural exemption for tobacco, cotton, and seasonal activity, though it did so for dairy and the packing of perishable goods, and for packing and preparation in the “area of production.” In other words, the bill, while internally “redlined,” was not *maximally* “redlined” when it came to the House. It is interesting (see Figure 10, below) that the vote on Hartley’s successful motion to recommit has a noticeable “second-dimension”/“north-south” structure to it of the kind that one sees in Figure 8. (That the cut line tips to the left, rather than to the right, is irrelevant, incidentally.)

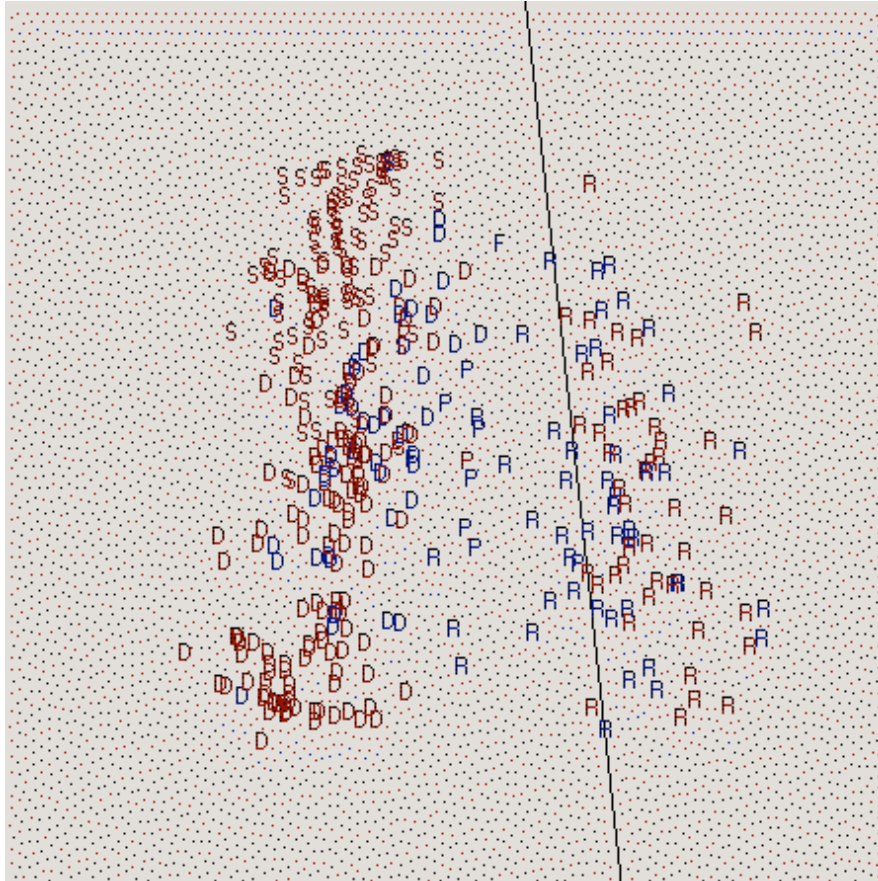


Figure 9

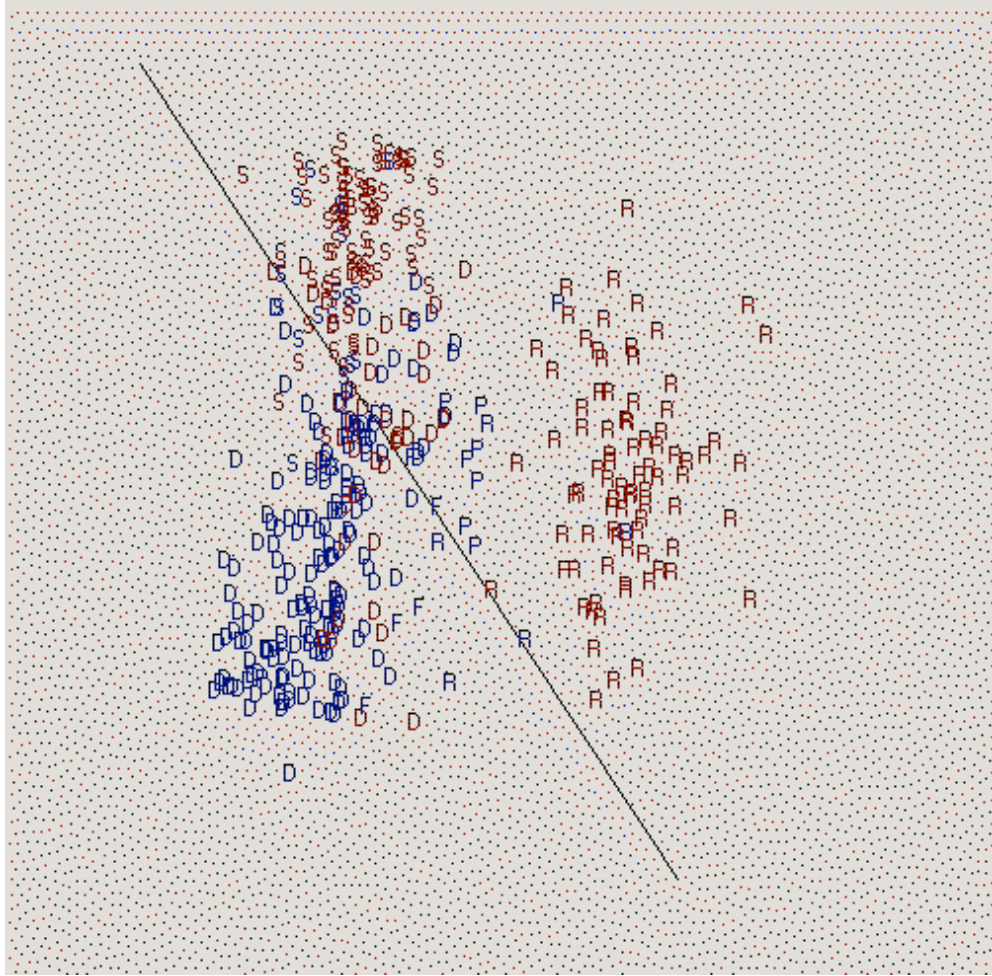


Figure 10

In short, using one of NOMINATE's tools – Voteview – raises the intriguing possibility that those scholars who want to “code” Social Security as deliberately “redlined,” in the same way that they code the FLSA as intentionally “redlined,” may have to review their conclusions. If the differences in the cut-lines persist in a fuller treatment of the entire set of relevant cases, then the apparent exception for Social Security may well be there *because it fundamentally differed*. Social Security may never have threatened the Southern political economy in the same way that the FLSA did.

Social Security would take many years in the future to pay out – or so it was widely thought at the time. Only later was the payout schedule accelerated. Second, everyone in the debate recognized that the program was geared for the *industrial* economy of the 1930s, not the entire American economy.

It is only today, after decades of experience with non-means tested, contributory finance programs which have a universal application, that as a country we are much more likely to aspire to *start* programs as close to their “universal” level as possible (i.e. 100% of the population). Indeed, that assumption was a major sticking point in the 1993-94 debate over health insurance, and it was interestingly never open to serious debate. But Social Security’s initial universalism was far from robust. It has become effectively universal only over the long run. Indeed, the program was instead designed to be a *targeted* program at its inception, and the target population was the adult male *wage* earner likely to have a stable, lifetime job with a career ladder. Very few Southern workforce participants, white or black, were in that initial conceptualization of the target population precisely because the South was rural. On this view, Social Security was, as Davies and Derthick suggest, never meant to apply to rural America – and the verticality of the cut line is consistent with that conceptualization of the program.

To summarize, we do not claim to have *settled* this APD debate. Our point, instead, is that using Voteview, and NOMINATE more generally, can be useful to those doing historical work – so helpful that they ought to become more integrated into developmental analysis.

Low-Dimensional APD

There is more to say about linking NOMINATE and APD – in particular, about the deep developmentalism which inspires the NOMINATE project.

Consider, first, some of the basic conceptions which we currently have of how American politics has evolved, very broadly speaking. They include:

Madisonian continuity, in other words, a public sphere that -- notwithstanding the development of national bureaucracy and a permanent military establishment -- is constantly churned by the public actions and public rhetoric of the officials occupying the institutions designed by the Founders in ways that make American politics readily comparable across time²⁰

institutional layering, for instance, the construction of a “modern” presidency that coexists with the “traditional” presidency, or the development and survival within the House and Senate of loosely coupled forms of internal structure²¹

regular cycles of conflict and consensus, mobilization and stability, inclusion and exclusion, such as Morone’s neo-Puritan cycles, Huntington’s creedal passive and creedal active periods and McFarland’s adaptation of this idea²²

democratization and de-democratization, for example, the two reconstructions of black voting rights, and the development of governmental and associational capacities to define and to protect political, civil, and social rights²³

institution-building (and institution-weakening) sequences over time that close off a range of institutional options, once political actors choose some options instead of others, for example, bureaucratic development,²⁴

de-localization within a federal system,²⁵

the recasting of party politics due to presidential entrepreneurship²⁶ or to the joint influence of presidential primaries and television broadcasting,²⁷

the weakening of once-common federated civic organizations during the 1960s and 1970s²⁸

the rise, development, and erosion of policy regimes or other resilient bundles of institutions, social and electoral coalitions, public philosophy, and policies as seen in immigration policy, for instance, or the kinds of regime dynamics sketched by Skowronek for understanding presidential politics, or the “racial orders” conceptualization of King and Smith²⁹

*policy feedback processes that recast the terms of participation and civic status, for instance, social policy interventions that allocate civic status differentially, or policy interventions that build civic capacities over the long-haul*³⁰

*the judicialization of politics, such as the rise of adversarial legalism and the construction by elected officials and judges of judicial review*³¹

*intercurrence, that is, the co-existence of relatively autonomous institutional and policy domains operating with different political dynamics and according to different “clocks” of “political time”*³²

These are some of the ideas developed by scholars in the political science subfield of American political development for characterizing and capturing historical processes, dynamics, and political mechanisms. But this catalogue is incomplete, we believe. At least one more distinctive way of thinking about American political development must be added to this inventory – namely, the issue-spatial perspective which informs and is substantiated by NOMINATE.

The concept of “low dimensionality” sits at the core of this additional developmental perspective. Perhaps the most basic finding of Poole and Rosenthal is that American politics has almost always exhibited “low dimensionality” -- by which they mean no more than two, mathematically-recoverable issue dimensions.

To recall, these dimensions are purely formal. This is exceptionally important because it means that *every possible substantive issue* “loads” (in the language of factor analysis) onto one or the other of the two dimensions. But that is of course very odd! There is a very wide range of seemingly disparate issues in contemporary American politics – from gay marriage to environmentalism to “intelligent design” in secondary science education to land use to gasoline prices to foreign policy to immigration, and so

on. Undoubtedly, the same was true in the past. Furthermore, such results as the Condorcet Paradox and the McKelvey Chaos Theorem dramatize both agenda instability and the potentially large dimensionality of majority rule.

How can it be that there are only two, truly basic issue dimensions in U.S. politics? The Poole and Rosenthal answer is, in effect, “surprising, but altogether true.” They fit a model with one dimension, to see how successfully that captured legislative behavior. Then they fit two dimensions, to see how much that improved the model's performance, then three dimensions, and so on.³³

They found that the one-dimensional model was about 83% accurate overall, meaning that in 83% of all the individual votes, the legislator voted for the outcome whose position in issue space (as estimated by NOMINATE) was closer to the legislator's ideal point (again as estimated by NOMINATE), while the two-dimensional model was about 85% accurate. Three or more dimensions offered virtually no improvement over two, which implied that Congress's issue space has nearly always been no more than two-dimensional, at least to the extent that a spatial model can approximate ideal points in congressional roll-call voting over time. As for the other 15%, it is non-dimensional voting lacking any underlying structure – pork-barrel voting and “error” (as in the discussion early in this article).

Poole and Rosenthal did not, it should be noted, directly estimate the number of dimensions. Instead, what they did was *assume* that issue space has been one-dimensional and then see fit the model to the data. Then they assumed a *second* dimension. Ex ante, the improvement in fit (what they call average proportional

reduction of error, or APRE) *had to grow*. What they did was a bit like throwing another independent variable into an OLS regression -- R-squared will always go up, even if only a bit, no matter what plausible variable you add. Assuming a second dimension doubles the amount of information you are working with. Rather than running a "climb the hill" algorithm in an "east-west" space, or "north-south" space, one runs it in a space that has both an "east-west" plane and a "north-south" plane, so there are now twice as many local maxima to climb, which, in turn, can do only one thing to your estimated parameter values for your legislators, for you now have two more coordinates for each -- namely, kick these estimated values closer to the real values.

Their cleverness, though, lay in trying to gauge how much change one got from this trick. That it was only 2% was remarkable. Then they did the trick again and nothing changed, really. The main exception is the period immediately before the Civil War, when the U.S. became increasingly ungovernable.

What is -- and was -- the content of these dimensions? This part of their analysis was interpretive. Poole and Rosenthal concluded that, over time, the first dimension was always socio-economic -- state banks vs. a national bank, at one time, currency expansion vs. currency restriction, at another, high tariffs vs. low tariffs at a third, social spending vs. spending restraint in a fourth, and so on. From reading their political history and looking at the specific content of the roll calls associated with the second dimension, they concluded that it was a "racial" dimension, or more precisely, a race-relations (often sectional) dimension.

In short, the American regime is an “ $n \leq 2$ dimensions polity” (so to speak.) It always has been, in all likelihood. To be sure, Poole and Rosenthal emphasize the rupture preceding the Civil War. But it is remarkable that the “chaotic” dimensionality which they find in the early-to-mid 1850s rapidly subsided. The previous basic dimensionality re-asserted itself – the difference being that a previously subordinated second dimension became, and for quite some time stayed, highly salient. Hence our larger point: the “ $n \leq 2$ dimensions” nature of the regime does not shift.

To put it another way, it appears that over the course of American political history low-dimensionality *co-exists* with, and is little disturbed by, other kinds of developmental patterns, including those catalogued above – i.e. Madisonian continuity, institutional layering, cycles, sequences that generate “trajectories,” democratization and de-democratization, and the constitutionalization of politics. This fact of co-existence is consistent, in truth, with a basic property of American political evolution that has been identified by Skowronek and Orren. As they note, American political development is strikingly *intercurrent*: “the normal condition of the polity will be that of multiple, incongruous authorities operating simultaneously,” that is, there are “multiple-orders-in-action” over the course of American history.³⁴ A very similar concept is Schickler’s notion of “disjointed pluralism” with which he characterizes congressional evolution. “Intercurrence” might be thought of as “disjointed pluralism” writ large. What we point out here is simply that low-dimensionality *also* forms part of intercurrency.

Undoubtedly, we think, much of the explanation for the persistence of low-dimensionality is the party system.³⁵ The United States was the first early modern polity to develop a mass (though by no means fully inclusive) party system. Party competition might therefore be counted a centripetal, self-stabilizing “order-in-action” (to use the language of Orren and Skowronek.) To be sure, elections generate the mass discussion and speech that would seem to give politicians opportunities for disrupting the coalitions of their opponents -- what William Riker memorably called “heresthetics.”³⁶ A mass, competitive party system is so encompassing, however, and it operates on such a large scale, that no one has -- nor could have -- a structurally decisive capacity to abruptly “flip” everyone, during campaigns, to a new dimension of conflict beyond those that already exist, and also to keep them there on that new dimension.

A party system’s inclusiveness and mass character muffle, in other words. That is, they muffle the impact of any agenda-setting agitation and politicking. To put the matter a bit more micro-economically, in any modern electorate, agenda-setters would have to find some way of achieving the requisite marginal impact on the cognitive attention that every attentive or potentially attentive voter gives to the existing dimension(s) of party conflict. Purposive, directed attention-focusing activity would have to be calibrated to match all the marginal variations in attention that exist among the public in order to shunt party conflict onto another latent, underlying dimension or agenda. That seems nearly impossible.

Even if that were possible, furthermore, it is hard to see how the new focus of attention could be sustained. As agitation, framing, and other attention-focusing

activities generate new symbols and arguments, citizens are faced with a cognitive choice: are these symbols and arguments really genuinely new and previously unheard of? The question, for many, answers itself -- no. More plausibly, many individuals will decide that the supposedly new symbols and arguments can be related to existing symbols and arguments. They thus "fold them into" existing symbols and arguments. The pre-existing dimension(s) of conflict thus stay(s) unaltered. The existing dimensions are, cognitively, Procrustean beds.

Consequently, across American political history one would expect to find politicians "mapping" new and initially unfamiliar issues onto the existing dimensions. There is strong, indirect confirmation of this possibility, it turns out, in the fact that legislators' NOMINATE "scores" are fairly *fixed*. Once a liberal, always a liberal. Once a conservative, always a conservative. Once a moderate, always a moderate.

Some legislators do, of course change what they stand for. Think, for instance, of Strom Thurmond. NOMINATE thus mathematically allows for the possibility that a legislator's ideal point on a dimension may move over time. What Poole and Rosenthal found, though, is that most legislators hardly move at all, and any movement is basically slow and steady, without sudden erratic jumps.

More precisely, they ran estimates of error reduction with the assumption that legislators never move, and compared the results to what they got when they allowed linear changes, then more complicated quadratic changes, and so on. They found that allowing linear changes over time increased NOMINATE's accuracy somewhat, but quadratic and higher-order movement models offered essentially no improvement.

Furthermore, what movement there was tended to be small. In other words, the movement of a legislator's ideal point is essentially a very slow drift in a straight line (on one dimension, from more liberal to more conservative or vice versa).³⁷

This makes sense. As long as House districts – and states -- stay the same over the legislator career, the accountability relationship demands considerable fixity. Thus there is congruence between the district median and legislator preferences, generating the ideal point that we have discussed. Thurmond is, in fact, the exception who proves the rule: the South Carolina electorate changed composition sharply during his career.

It would seem, then, that if politicians have careers, and if their careers matter to them, then they are likely to be “issue mappers” not “issue innovators.” But what about Riker’s demonstration that politicians engage in “heresthetics?” Riker was impressed by the potency of heresthetics, and saw it as a possible source of political instability and disruption. On reflection, though, it seems evident that “heresthetics” is not *dimensional* innovation. When politicians engage in Riker’s “heresthetics” they are not actually pushing American politics toward a system of $n > 2$ dimensions. Instead, they are exploiting an unstable *relationship between* dimensions.

To summarize, politicians manage the dimensionality of American politics, and, in those periods when there are two dimensions, they contest the relative salience of the basic dimensions. This can, of course, be a high stakes game that is highly entrepreneurial, as illustrated by the long run-up to the Civil War. Inspired by Riker, Barry Weingast has recently suggested that the stage for the Civil War was set by an ultimately failed effort to manage the existing two-dimensionality. The rise of Martin

Van Buren's "national" party system was the initial, basic device for dimensional management in the ante-bellum period and until the break-up of the Whig Party it did work to blunt the party-systemic impact of the second, racialized dimension. But clearly the second dimension was ever present – as shown by the politics of the gag rule for blocking congressional reception of abolitionist petitions for outlawing slavery in the District of Columbia.³⁸

By the time of the Lincoln-Douglas Debates, mainstream, ambitious politicians, not just politically marginal abolitionist orators, were openly arguing about which dimension should be salient in party competition – socio-economic or racial – not least because there was new, successful party dedicated to changing the agenda of American politics, the Republican party. Lincoln argued that saving the soul of America *required* sustained party conflict on the second dimension. Obviously he did not use the term "second dimension." But re-reading the Debates one will see that he clearly refers to something like a "second dimension," over and over. For his part, Douglas pleaded with his audiences for the importance of staying on the "first dimension," the agenda of socio-economic conflict, and repeatedly warned his audiences that Lincoln's plan to rearrange the relationships between the existing issue dimensions was both dangerous and unnecessary.

Besides managing dimensions, and contesting their relationship with each other, if there is more than one, the other exceptionally significant thing that American politicians have historically done is generate – or mute --*polarization* on one (or both) of the basic dimensions. For instance, Andrew Johnson used his presidency to rapidly

and very sharply polarize American party politics on the newly salient racial-sectional dimension – in all likelihood in order to win the 1868 presidential election. But that was a choice which he had, which is why congressional Republicans were initially startled by his behavior. Johnson's entrepreneurship was exceptional, however. Polarization happens more gradually, it seems, when it happens -- as illustrated by the past several decades of American national party politics. Just as there are strong incentives for politicians to "map," so there are strong incentives, usually, to maintain, not widen, the distance between party medians, left and right.

What does the foregoing sketch suggest in terms of research questions, broadly speaking? First, there are the hypotheses we have put forth – that some institutions (such as the ante-bellum "national parties" and the gag rule) have historically functioned as devices for managing dimensional salience, that politicians are issue mappers, that heresthetics is rarer than mapping, that heresthetics always involves the exploitation of an unstable relationship between two dimensions, and that entrepreneurial polarization, perhaps more than heresthetics, has periodically and decisively influenced political development. These all require substantiation.

Related tasks include documenting and explaining the relative salience of the two dimensions across time, and of explaining the near disappearance, in the last quarter of the 20th century, of a second dimension. That certainly is related to the great re-incorporation of African-American citizens through voting rights and civil rights policies. But why has the Christian political mobilization of the past generation *not* re-

activated the second dimension? Are openly conflictual race relations and extreme sectional tension the only source of a second dimension?

Additionally, there is the problem of explaining the great polarization of the past 45 years – which has *not* been matched by a similar polarization, in national opinion survey results, among voters. Is that due to recruitment patterns for national office from state legislatures? To the development and impact of primary elections? What role, if any, do mid-term congressional elections play? Presidential agenda-setting? The development of internal governance mechanisms in the Senate and the House?

What impact has polarization had on the polity? McCarty, Poole and Rosenthal suggest that polarization has been associated with an increase in income inequality.³⁹ Does that relationship hold for previous polarizations? What other phenomena are associated with polarization? With partisan convergence?

This sketch of research issues is not meant to be exhaustive, only illustrative. But the sketch is full enough, we think, to substantiate the claim we made at the outset of the article – that the marriage of spatial theory and a thorough scaling of all congressional roll-calls has opened up new and vital developmental questions.

Conclusion

NOMINATE scores, and the desktop tools that have been produced as a by-product of NOMINATE's construction and application – a process that took Poole and Rosenthal decades – represent major breakthroughs in the development of political science. By now this is widely recognized within contemporary political science, most

notably among congressional scholars and among the somewhat (but not entirely) overlapping community of scholars who have been influenced by the formal-analytical applications pioneered by William Riker and others.

There are rich opportunities for the APD subfield to join and participate in this accomplishment. As Katznelson and Lapinski recently noted, APD's next "big step" could very well be in the area of congressional evolution *and* its role in driving American political development.⁴⁰ NOMINATE can help to do this because of the relative inter-temporal comparability of the scores it generates. It has yielded a full data series for the entire history of the Republic. Also, NOMINATE will very likely be used synergistically with another data series which are being generated by Katznelson, Lapinski, and Razaghian. The time for APD scholarship to adopt both NOMINATE and these other scaling results would seem to have arrived. We are hardly recommending that APD jettison all of its previous conceptual categories in favor of exclusively spatial-analytical categories. We only recommend that APD make room for them. Poole and Rosenthal – and those scholars who have found their work exciting -- are, after all, very much developmentalists in their own right.

ENDNOTES

¹ A good and oft-cited introduction so far has been Jordan Ellenberg, "Growing Apart: The Mathematical Evidence for Congress' Growing Polarization," Slate 26 December 2001.

² Technically, most uses of NOMINATE are actually uses of a particular version, DW-NOMINATE, i.e. Dynamic Weight Nominal Three-Step Estimation.

³ Robin Toner, "Good-Will Reserves Run Low for Social Security Talks," New York Times, 19 December 2004, p. 41, charting scores from 1901 to 2001 for House; Norman Ornstein and Barry McMillion, "One Nation, Divisible," New York Times, 24 June 2005, p. A-23; Brief of Political Scientists Bernard Grofman and Gary Jacobson as Amici Curiae In Support of Neither Party, No. 02-1580, In the Supreme Court of the United States, Richard Vieth, et al, v. Robert C. Jubilerer, et al, On Appeal From the United States District Court for the Middle District of Pennsylvania, August 2003, in authors' possession, courtesy of Bernard Grofman.

⁴ See, especially, Nolan McCarty, Keith T. Poole, and Howard Rosenthal, Polarized America: The Dance of Ideology and Unequal Riches (Cambridge, MA: MIT Press, 2006).

⁵ For instance, Ira Katznelson and John S. Lapinski, "At the Crossroads: Congress and American Political Development," Perspectives on Politics 4 (June 2006): 243-260.

⁶ The example of Bayesian approaches to recovering where legislators are in issue space suggests why the scores correlate so strong. Scores derived from Bayesian approaches depend on "vague priors:" that is, they assume very little about the actual location of legislators, thus approximating the frequentist premise that data are random. So they tend to converge on frequentist results, leading to the high correlations. An accessible introduction to these matters can be found in Joshua Clinton, Simon Jackman, and Douglas Rivers, "The Statistical Analysis of Roll Call Data," American Political Science Review 98 (May 2004): 355-370.

⁷ Sarah Binder, Thomas Mann, Alan Murphy and Paul Sahre, Op-Chart, "Where Do They Stand?" New York Times, 26 July 2004, p. A-17.

⁸ Michael Cooper, "So How Bad Is Albany? Well, Notorious," New York Times 22 July 2004, B1 and B5.

⁹ For an introductory discussion, see Charles Stewart III, Analyzing Congress (New York: W.W. Norton, 2001), ch. 1.

¹⁰ Note that what follows sounds more like a quadratic utility function, with the two sides of a bell-shaped function crossing the abscissa, when in fact the utility model used by Poole and Rosenthal is meant to take account of legislator awareness of precise ideological differences. Thus the function has two tails that never cross the abscissa. But to sketch the spatial model we have ignored this critical difference.

¹¹ Binder and Mann used a variant called “common space” scores; these are not available for the entire period of congressional history.

¹² See, for instance, Paul Krugman’s discussion of John McCain’s extreme NOMINATE rating in “The Right’s Man,” New York Times 13 March 2006, p. A 21.

¹³ Among others, Ira Katznelson, When Affirmative Action Was White: An Untold History of Racial Inequality in Twentieth-Century America (New York: W.W. Norton, 2005); Robert C. Lieberman, Shifting the Color Line: Race and the American Welfare State (Cambridge, MA: Harvard University Press, 1998), and Steve Valocchi, “The Racial Basis of Capitalism and the State, and the Impact of the New Deal on African-Americans,” Social Problems 41 (August 1994): 347-362.

¹⁴ The alert reader will notice that Rankin’s second dimension score is actually just over the upper bound. This might seem the result of truly fierce white supremacy. That is in fact the explanation. The technical reason for his score being above the upper limit is related to the estimates of whether his ideal points move in issue space across time. Poole and Rosenthal found that most legislators do move their location in issue space, and they do this somewhat over time. Their movement is best estimated as a “linear” movement. On the whole, though, movement is slight. See Keith T. Poole and Howard Rosenthal, Congress: A Political-Economic History of Roll-Call Voting (New York: Oxford University Press, 1997), pp. 25, 28, 70-77. If, therefore, someone has moved “over” the bounds on any dimension, the statistics indicates that there were political pressures that moved them a great deal, relative to other legislators. Thus, Rankin’s white supremacy caused him to move in issue space, over the course of his career,

a great deal, relative to all other legislators – which reflects his reaction to the destruction of Jim Crow between the New Deal and the Great Society.

¹⁵ “Redlining” refers to racial coding of maps used for allocation of housing credit. We use it here to refer, more broadly, to the racialization of public policy. It is worth noting that “redlining” as a word came from the discovery by historians, principally Kenneth Jackson, that the Home Owners’ Loan Corporation of the New Deal era rated neighborhoods to assess credit risk through the color coding of city maps. Green meant low risk; blue and yellow moderate risk; red high risk. Predominantly black neighborhoods were typically colored red, hence the term “redlining.” As a further aside, we note that federal maps, by themselves, did not generate redlining, as is sometimes thought. Federal maps reflected an ongoing – in other words, they did not create a new – practice in housing finance. See Amy Hillier, “Redlining in Philadelphia,” in Ann Kelly Knowles, ed., Past Time, Past Place: GIS for History (Redlands, CA: ESRI Press, 2002).

¹⁶ Larry DeWitt, “It Was Not About Race: The Decision to Exclude Agricultural and Domestic Workers from the U.S. Social Security Program,” unpublished mss., cited with permission of the author, “in-house” historian at the Social Security Administration.

¹⁷ Voteview works, however, only with PC desktops, not Apple machines.

¹⁸ Note that “north-south” is nothing more than a pun – in other words, *any* second dimension vote – on abortion, for instance, if the House ever voted a national policy proposal – would be “north-south.”

¹⁹ We plan to do this in a separate article, we should note.

²⁰ David R. Mayhew, America’s Congress: Actions in the Public Sphere, James Madison through Newt Gingrich (New Haven: Yale University Press, 2000); Samuel P. Huntington, Political Order in Changing Societies (New Haven: Yale University Press, 1968), ch. 2.

²¹ Jeffrey K. Tulis, The Rhetorical Presidency (Princeton: Princeton University Press, 1987); Eric Schickler, Disjointed Pluralism: Institutional Innovation and the Development of the U.S. Congress (Princeton: Princeton University Press, 2001).

²² James A. Morone, Hellfire Nation: The Politics of Sin in American History (New Haven: Yale University Press, 2003); Samuel P. Huntington, American Politics: The Promise of Disharmony (Cambridge, MA: Belknap Press, 1981); Andrew S. McFarland, Neopluralism: The Evolution of Political Process Theory (Lawrence: University Press of Kansas, 2004), esp.ch. 6. More generally see David Resnick and Norman C. Thomas, "Cycling Through American Politics," Polity 23 (Fall 1990): 1-21.

²³ Richard M. Valelly, The Two Reconstructions: The Struggle for Black Enfranchisement (Chicago: University of Chicago Press, 2004); Kevin J. McMahon, Reconsidering Roosevelt on Race: How the Presidency Paved the Road to Brown (Chicago: University of Chicago Press, 2004); Francisco E. Gonzalez and Desmond King, "The State and Democratization: The United States in Comparative Perspective," British Journal of Political Science 34 (April 2004): 193-210.

²⁴ Daniel P. Carpenter, The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862-1928 (Princeton: Princeton University Press, 2001); Scott C. James, Presidents, Parties, and the State: A Party System Perspective on Democratic Regulatory Choice, 1884-1936 (New York: Cambridge University Press, 2000).

²⁵ Martha Derthick, Keeping the Compound Republic: Essays on American Federalism (Washington, DC: Brookings Institution Press, 2001), esp. ch. 1.

²⁶ Sidney M. Milkis, The President and the Parties: The Transformation of the American Party System Since the New Deal (New York: Oxford University Press, 1993)

²⁷ John H. Aldrich, Why Parties? The Origin and Transformation of Political Parties in America (Chicago: University of Chicago Press, 1995).

²⁸ Theda Skocpol, Diminished Democracy: From Membership to Management in American Civic Life (Norman: University of Oklahoma Press, 2003).

²⁹ Fred Block, "The Roles of the State in the Economy," in Neil Smelser and Richard Swedberg, eds., Handbook of Economic Sociology (Princeton: Princeton University Press, 1994); John L. Campbell and Michael Patrick Allen, "Identifying Shifts in Policy Regimes: Cluster and Interrupted Time-Series Analyses of U.S. Income Taxes," Social Science History 25 (Summer 2001): 187-216; Andrew J. Polsky, "Why Regimes? Ideas, Incentives, and Policies in American Political Orders," Polity 29 (1997): 625-40; "Dialogue on 'Institutional Complementarity and Political Economy,'" Socio-Economic Review 3 (May 2005): 359-82; Wolfgang Streeck and Kathleen Thelen, "Institutional Change in Advanced Political Economies," in Wolfgang Streeck and Kathleen Thelen, eds., Beyond Continuity: Institutional Change in Advanced Capitalist Societies (New York: Oxford University Press, 2005); Daniel J. Tichenor, Dividing Lines: The Politics of Immigration Control in America (Princeton: Princeton University Press, 2002); Aristide R. Zolberg, A Nation By Design: Immigration Policy in the Fashioning of America (New York: Russell Sage Foundation; Cambridge, MA: Harvard University Press, 2006); Stephen Skowronek, The Politics Presidents Make: Leadership from John Adams to Bill Clinton (Cambridge, MA: The Belknap Press of Harvard University Press, 1997); Desmond King and Rogers M. Smith, "Racial Orders in American Political Development," American Political Science Review 99 (February 2005): 75-92

³⁰ For example: Suzanne Mettler, Dividing Citizens: Gender and Federalism in New Deal Public Policy (Ithaca: Cornell University Press, 1998); *idem*, Soldiers to Citizens: The G.I. Bill and the Making of the Greatest Generation (New York: Oxford University Press, 2005); Lester Salomon, "The Time Dimension in Policy Evaluation: The Case of the New Deal Land-Reform Experiments," Public Policy 27 (1979): 129-183.

³¹ Richard H. Pildes, "The Constitutionalization of Democratic Politics," Foreword, The Supreme Court, 2003 Term, Harvard Law Review 118 (November 2004): 28-154; Robert A. Kagan, "Adversarial Legalism and American

Government,” in Marc K. Landy and Martin A. Levin, The New Politics of Public Policy (Baltimore: Johns Hopkins University Press, 1995); and, among many others, Mark A. Graber, “The Non-Majoritarian Difficulty: Legislative Deference to the Judiciary,” Studies in American Political Development 7 (1993): 35-73; Keith Whittington, Constitutional Construction: Divided Powers and Constitutional Meaning (Cambridge, MA: Harvard University Press, 1999), Ken I. Kersch, Constructing Civil Liberties: Discontinuities in the Development of American Constitutional Law (New York: Cambridge University Press, 2004).

³² Karen Orren and Stephen Skowronek, The Search for American Political Development (Cambridge: Cambridge University Press, 2004).

³³ Poole and Rosenthal, Congress: A Political-Economic History of Roll-Call Voting, Table 3.1 p. 28.

³⁴ Orren and Skowronek, In Search of American Political Development, at pp. 108 and 113, respectively; Schickler, Disjointed Pluralism.

³⁵ As do Poole and Rosenthal – see Congress, p. 35: “Parties...help to map complex issues...into a low-dimensional space.”

³⁶ William H. Riker, The Art of Political Manipulation (New Haven: Yale University Press, 1986).

³⁷ Poole and Rosenthal, Congress, pp. 25, 28, 70-77.

³⁸ Charles Stewart III and Jeffery Jenkins, “The Gag Rule, Congressional Politics, and the Growth of Anti-Slavery Popular Politics,” unpublished mss., <http://web.mit.edu/cstewart/www/papers.html>

³⁹ McCarty, Poole, and Rosenthal, Polarized America.

⁴⁰ Katznelson and Lapinski, "At the Crossroads."