

**BEYOND CONTROL: A MODEL OF PARTIES AS COMPLEX ADAPTIVE SYSTEMS**

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## ABSTRACT

Since Downs (1957), spatial models of political parties have typically depicted parties as unitary, rational actors, motivated by vote-maximizing goals. In this paper I present a spatial model of party behavior that depicts parties as diffuse collectivities of citizens lacking a coordinating authority. I then explore several implications of the model, focusing on how factors such as the number of parties and the nature of the issue space affect the degree and speed with which parties diverge on issues. After describing some general results, I show how variations of the model, such as including multiple electoral districts, can be incorporated into the model's framework. Finally, the paper concludes with suggestions for further applications, such as multi-member districts and strategic voting behavior.

**Key words:** Political parties, realignment, Tiebout model, issue evolution, k-medoids.

## 1. Introduction

Since Downs (1957), spatial models of political parties have depicted parties as unitary, rational actors, usually motivated by vote-maximizing goals. In the real world, of course, parties are anything but unitary. Party members often have real, nontrivial differences over issue preferences, goals, strategies, and even perceptions. Some may perceive the party to be near the middle, while others see the party as extreme. Some partisans may want to move the party toward the middle of an issue, while others wish to “lead” public opinion, steering the party away from the middle. Unitary actor models of parties typically miss these political differences inside a party and ignore the considerable collective action problems that must be overcome before a party can approximate strategic behavior.

In this paper I present a spatial model of party behavior that depicts parties as diffuse, voluntary collectivities of individuals. The model avoids many of the collective action problems that unitary actor models assume away while maintaining a semblance of order and predictability. The model is a derivative of the Tiebout model (1956), originally used by Charles Tiebout to describe the provision of local public goods. In Tiebout’s system, citizens choose where to reside from among a set of communities, basing their decision on the different bundles of public goods offered by each community. Citizens who care more about one type of good, say public schools, will move to a different community than citizens who care more about other goods, such as public beaches or a senior center. A community’s particular bundle of public goods is democratically determined by its citizens, producing a dynamic whereby the movement of citizens between communities produces change in the bundles of public goods, resulting in additional relocations by citizens, and so on, until an equilibrium is reached. Equilibria for

Tiebout models are usually, but not always, pareto optimal.<sup>1</sup> The model is well known in economic circles and some sociology circles but has been studied by only a few scholars in political science, most recently by Kollman, Miller, and Page (1997).

### 1.1. A Tiebout Model of Parties

The model presented here is similar to a standard Tiebout model with important exceptions. Instead of people choosing to reside in communities, voters choose to identify with parties, and rather than making decisions based upon bundles of public goods, citizens evaluate the parties on the parties' issue positions. In variations of the model presented later in section two, there are multiple districts in the political system, but voters do not move between the districts. One should therefore not equate "districts" in this model with "communities" in a standard Tiebout model. The parallel with the model here and a standard Tiebout model is between parties and communities.

The dynamics of the model are as follows: Voters' preferences over a set of issues,  $W = \{1, 2, \dots, S\}$ , are randomly distributed. Let  $v_{i,s} \in (0, 1)$  be the preferred policy outcome on issue  $s$  for voter  $i$ . The number of parties is fixed at  $k$ , and the initial platform position of each party  $p$  on issue  $s$ ,  $\Pi_{p,s}$ , is determined by a random draw from the distribution of voter preferences. Each voter identifies with the party whose platform is closest in Euclidean distance. In other words, each voter chooses the party that maximizes her utility according to the function:

$$u_i(\Pi_p) = \sum_{s=1}^S -\|v_{i,s} - \Pi_{p,s}\| \quad (1)$$

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<sup>1</sup> Tiebout's hypothesis that local public goods might be efficiently allocated via his model has been challenged by other scholars. Bewley (1981), for instance, demonstrates scenarios where equilibria in Tiebout models are not pareto optimal. More recently, however, scholars have found that by relaxing some of Bewley's

After voters choose their parties, each party platform becomes the median of the party's identifiers' positions on each issue. The process then iterates: voters identify with the nearest party based on the latest platforms, party platforms are updated to the new global median of their identifiers' preferences, and so on, until stability is reached. The process reaches stability when no voter can increase her utility by changing parties given the current constellation of party platforms and each party's platform is the global median of its identifiers' preferences.

A diagram of the process is shown in Figure 1, where  $S = 2$  uncorrelated issues,  $k = 2$  parties, and  $n = 440$  voters. For reasons explained in the next section, the issues in Figure 1 have slightly different distributions, with  $v_{11} \in (0, 1)$  and  $v_{12} \in (0, .8)$ . The first panel in the figure shows the initial random locations of the party platforms (represented by two black dots), the party identifications of the voters based on the initial platforms, and the new party platforms calculated from the global median of each party's identifiers (represented by the large white circles). Each successive panel depicts the next iteration, showing the party identification of voters based on the previous platform as well as the new global median for each party. After following a serpentine, nonlinear trajectory, the platforms eventually stabilize at  $t = 8$ , when the platforms reach the quartiles of preferences on  $s_1$  and the population median on  $s_2$ . Under this constellation, each platform is at the global median of its members' preferences, and no voter has an incentive to change parties.

<<< INSERT FIGURE 1 HERE >>>

If the party platforms were computed as the mean of the party identifiers' preferences rather than the median, the process would be identical to the k-means algorithm commonly used in statistics, computer science, and operations research. Used for non-hierarchical clustering, computer imaging, and facility location problems, the k-means algorithm offers a locally optimal solution to the problem where one wishes to locate  $k$  "centers" so that the average (or total) distance between an individual and the nearest center is minimized (Cox 1957; Fisher 1958; MacQueen 1967).<sup>2</sup> Alternatively stated, the algorithm is used to sort individual observations into a fixed number of maximally homogeneous groups. When the median rather than the mean is used to calculate the centers of the groups, the algorithm is known as the k-medoids algorithm (Kauffman and Rouseau 1990), and it too is used as a clustering technique to produce maximally homogenous groups.<sup>3</sup> The convergence and efficiency properties of both the k-means and k-medoids algorithms, as well as several related algorithms, are well documented in statistics and computer science journals (see for instance Garcia-Escudero and Gordaliza 1999). My purpose here is less concerned with the optimality properties of these algorithms than with how the algorithm can be used to explain the behavior of political parties that may otherwise appear aberrant under unitary rational actor models. Thus, rather than cataloging sources of sub-optimality, path-dependency, and small vs. large sample properties of the k-medoids algorithm, I devote the remainder of the paper to demonstrating how the Tiebout party model can be applied to the behavior of political parties, where the number of individuals is large and the properties of

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<sup>2</sup> This problem is commonly (and confusingly) referred to in the literature as the "k-median problem." The term *median* in this context has nothing to do with the fiftieth percentile; it is simply the generic term for the objects being located (e.g., manufacturing plants or, in this case, political platforms).

<sup>3</sup> Although the k-medoids algorithm is typically less sensitive to outliers than the k-means algorithm (Kaufman and Rousseeuw 1990), outliers, especially in small samples, can sometimes result in k-medoids solutions that are far from optimal (Garcia-Escudero and Gordaliza 1999).

the algorithm are more consistent (on central limit theorems for  $k$ -means, see Hartigan 1978; Pollard 1982).

## 1.2. Party dynamics in a single-issue environment

For many distributions of voter preferences it is possible to analytically derive constellations of party locations that are stable, but because of path dependency and the possibility of local optima, it is less clear whether the parties will consistently move to these locations. In addition, the paths of the party platforms are often as least as noteworthy as the end results. Consequently, a series of computational experiments were employed to test the reliability of stable outcomes across different initial conditions and to illustrate the dynamics of the parties under various scenarios. For a given distribution of voter preferences and a given number of parties, a population of 10,000 simulated voters was created, and a set of 100 experiments was performed by randomly drawing starting party platforms and allowing the Tiebout process to run for 40 rounds.

The most trivial application of the Tiebout party model pertains to the behavior of parties in a single-issue environment. Experiments were run for a host of different distributions over a  $(0, 1)$  issue space, as shown in Figure 2.<sup>4</sup> Although sets of experiments were run for  $k = 2, 3, 4,$  and 5 parties, for brevity Figure 2 shows only results for  $k = 3$ . Readers can infer patterns for other values of  $k$ . In general, the parties converged to stable locations fairly quickly, with the changes between rounds typically growing geometrically smaller over each iteration. Even for the uniform distribution, where convergence took the longest, the average movement between

the sixth and seventh rounds was less than .01 in the (0, 1) space. The party platforms did not always end up at the *exact* same locations from one experimental run to the next, but for any given distribution and value of  $k$ , the results rarely differed across experiments by more than .005 (see Hartigan 1978 for similar consistency results with the k-means algorithm). The exception is the symmetric bimodal distribution, shown as the first graph in Figure 2, where a second constellation of platforms, a reflection of that shown in the figure, occurred with equal frequency. As this example illustrates, the final platforms for some distributions may be sensitive to initial conditions, although path dependency is less of a concern for most cases, particularly when the number of voters is large and the distribution of preferences is continuous.

<<< INSERT FIGURE 2 HERE >>>

Figure 2 also demonstrates that any of the three parties – be they left, middle, or right – can end up as the largest, second largest, or smallest party, depending on the distribution of voter preferences. This result is clearly different from many unitary rational actor models of parties, where the middle party gets “squeezed” by the exterior parties and either ends up as the smallest party or ideologically “jumps” another party in a process lacking a stable equilibria. As such, the Tiebout party model may be more useful than unitary rational actor models to describe party behavior in political systems where  $k > 2$ .

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<sup>4</sup> So that  $v_i \in (0, 1)$  for all examples, variants of the beta distribution were used for the non-uniform distributions. Specifically, the following distributions were used for the examples in Figure 2: beta(4,4) for a symmetric unimodal distribution; beta(2,7) for a unimodal skewed distribution; beta(2,7) and  $1 - \text{beta}(2,7)$  were drawn in equal proportions for a symmetric bimodal distribution; and beta(2,7) and  $1 - \text{beta}(2,7)$  were drawn according to a 2:1 ratio for an asymmetric bimodal distribution.



An obvious result in Figure 2 is that the parties are widely dispersed, although how widely dispersed depends on the particular distribution of voters' preferences. The uniform distribution case results in equally spaced and equally sized parties, a result that holds for any value of  $k$ . For  $k = 2$  the parties converge to the quartiles of the uniform distribution; for  $k = 3$  the parties are at .166, .5, and .833; and for  $k = 4$ , the parties end up at .125, .375, .625, and .875. The results for the uniform distribution are identical to those of Eaton and Lipsey's (1975) unitary actor model, where each actor chooses a position to minimize the damage that another actor can inflict.<sup>5</sup> Of course, since voter preferences are not usually uniformly distributed, one would not expect to see parties of exactly the same size; in the real world, the size and locations of the parties would be more likely to resemble the patterns from the other distributions in the figure.<sup>6</sup>

### 1.3. *S*-dimensional results for $k$ parties

The Tiebout party model is more valuable to understanding party dynamics in a multi-dimensional setting. As demonstrated by the example in Figure 1, parties in the Tiebout model tend to diverge on some issues but not others. To give structure to the issue space and to make sense of what leads the parties to diverge on a particular issue but not others, voter preferences were modeled so that the variance of preferences differs from issue to issue. Specifically, preferences were uniformly and independently distributed as follows:  $v_{i1} \in (-1.0, 1.0)$ ,  $v_{i2} \in (-.8, .8)$ ,  $v_{i3} \in (-.6, .6)$ ,  $v_{i4} \in (-.5, .5)$ ,  $v_{i5} \in (-.4, .4)$ . Allowing different variances for the

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<sup>5</sup> This should not be surprising. Eaton and Lipsey were aware that the equilibrium locations of firms under their min-max strategy would be the social optimal in terms of minimizing transportation costs—exactly what the  $k$ -means algorithm is employed to solve in operations research.

preferences on the issues has a strong effect on which issues the parties diverge and on which issues the parties take similar positions. Table 1 gives the absolute distance from zero (zero being roughly the median preference for each issue) for the parties on each dimension after 20 rounds, averaged across 100 experiments for each scenario.

<<< INSERT TABLE 1 HERE >>>

Except in rare cases, the parties diverged on the issues where voters have the greatest variance in preferences and converged on all other issues. In the two-party case, for instance, the party platforms routinely moved to the quartiles on  $s_1$  and the median for all other issues. On occasion, the two parties' platforms would start near the quartiles on  $s_2$  and the median on all other issues (a local optimum for the k-median problem). In these instances, the platforms would eventually begin to move toward the quartiles on  $s_1$  and the median on the other issues (the global optimum), but the process took much longer to approach stability, a phenomenon explained in more detail in the next section. Normally, the platforms approached stable positions near the global optimum by approximately the fifth or sixth round, but in instances where the platforms were already near a local optimum, the path to the global optimum could sometimes take longer than 20 rounds, which is why in Table 1 the average distance from the median on  $s_1$  is not exactly 0.5 for  $k = 2$ .

The natural tendency for parties to diverge only on the issues with the widest variance is consistent with the empirical work by Page (1978), who finds the parties in the U.S. to be

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<sup>6</sup> An obvious and important difference between the real world and the model as presented thus far is that the model lacks any influences from a general election and that the number of parties is fixed. In other work (2000),

polarized only on the issues over which the public is most polarized. That the parties only diverge on one dimension when  $k = 2$  is also consistent with Poole and Rosenthal's (1991) findings that 85-95% of votes in Congress can be explained by a single dimension, often referred to as a party dimension. And although the process is different, the result conforms with Aldrich's (1995) suggestion that parties in the US system were originally created as a means of solving cycling problems endemic to a high-dimensional issue space. In the Tiebout party model the result is the same, but the process is not driven by any conscious actors trying to steer the parties. Rather, the two parties' divergence on only a single dimension is the emergent product of thousands of political individuals operating through a complex systems dynamic. Just as the self-interested, narrow-minded behavior of disparate individuals guides Adam Smith's invisible hand to coordinate markets, the self-interested, local behavior of voters drives the parties to distinguish themselves on only the issue or issues over which the voters are most polarized, despite the issue space being complex.

Results for  $k > 2$  are similarly of low dimensionality. When  $k = 3$  and  $k = 4$ , the party platforms are only differentiated by the first two issue dimensions. Only when  $k \geq 5$  do the parties consistently take non-central positions on more than two issues. If voter preferences are correlated across issues, the parties of course diverge on a greater number of issues, but the dimensionality of the party differences can be reduced to those found in Table 1 simply by "rotating" the issue space.

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variations of the model with a general election produce similar results to those with a general election, as long as voters cast their ballots non-strategically.

#### 1.4. Party Realignment

Issues need not enter into the political environment simultaneously, and allowing for non-simultaneous issues opens up the possibility for realignments. As the previous section suggests, realignments can only occur if the voters are more widely dispersed on a new issue. Otherwise, the parties do not diverge on the new issue and few voters have cause to change their party identification. To demonstrate the realignment process under the Tiebout party model, two sets of experiments were run for cases where  $k = 2$ . In the first set, the political environment initially consisted of just one issue,  $s_2$ , with the same distributional properties described in the previous section. The Tiebout process was allowed to run as before for 20 rounds, and the parties' platforms diverged to the quartiles in the normal fashion. After 20 rounds an additional issue,  $s_1$ , was introduced to the political environment, and the Tiebout process was allowed to continue until stability in the platforms was reached. The second set of experiments was like the first, except that the initial political environment consisted of two issues,  $s_2$  and  $s_3$ , rather than just  $s_2$ .

Figure 3 shows the parties' distance from the median voter on each issue over time, averaged over 100 experiments each. In the first set of experiments, shown in the top panel of the figure, the parties are immediately dispersed on  $s_2$ .<sup>7</sup> When the new issue,  $s_1$ , is introduced at the end of round 20, very little happens at first. The party platforms are initially similar to one another on  $s_1$  because preferences on  $s_1$  are uncorrelated with  $s_2$ . As long as the platforms are not exactly identical on the new issue though, the greater variance of preferences on  $s_1$  ensures that at least a handful of voters will change parties over the new issue. Specifically, voters who are equidistant from the parties (*i.e.*, at the center of the preference distribution) on  $s_2$  and hold

extreme preferences on  $s_1$  will move to the party closest to them on  $s_1$ . The change in party identification among this group of voters causes the small difference between the parties' platforms on  $s_1$  to grow a little wider. This in turn prompts additional voters who are moderate on  $s_2$  but extreme on  $s_1$  to change their party identification. As the process iterates, the gap between the parties on the new issue  $s_1$  grows larger and larger, and more and more voters change parties.

<<< INSERT FIGURE 3 HERE >>>

For a while, the gap between the parties on the original issue,  $s_2$ , is largely unaffected, because only moderates on  $s_2$  are changing parties. During this period, the parties are briefly polarized on both dimensions. Eventually, however, the gap between the parties grows so great on  $s_1$  that even voters who are less moderate on  $s_2$  change parties, diluting the homogeneity within the parties on  $s_2$  and causing the parties' positions on  $s_2$  to moderate. In the last stages of the process, the party platforms move to the quartiles on  $s_1$ , and then gradually all differences between the parties' positions on  $s_2$  disappear as the platforms converge to the center on the original issue.

The bottom panel in Figure 3 shows the realignment process when an additional issue is present in the political system. Note that even though the additional issue,  $s_3$ , never manifests itself as a partisan issue, its existence affects the dynamics of the realignment. The mere presence of  $s_3$  in the environment slows the realignment process by approximately five rounds.

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<sup>7</sup> The reason the average distance from the median for  $s_2$  in Figure 3 is immediately 0.4 is because the figure shows results averaged over 100 experiments. At  $t = 0$  a party's platform is *on average* 0.4 from the median,

With preferences on  $s_2$  entering into voters' utility functions, the initial effect of the new issue  $s_1$  is diluted, resulting in fewer voters being swayed by the small partisan differences on  $s_1$ . Consequently, it takes longer "to get the ball rolling," although once it gathers steam, the process unfolds in a similar fashion.

The process depicted in Figure 3 is notably different from the classic party realignment models where a party "searches" for an issue with cross-cutting cleavages in order to become the majority party or where the parties rapidly change their positions over a single critical election (Sundquist 1983). Here, the parties are much more passive, subject to external shocks in the issue environment. The changes in the parties' positions on the issues are also gradual, similar to Carmines and Stimson's (1989) "issue evolution" model of realignments. This sort of model is well suited to describing the partisan shifts on racial issues in the 1960s and 70s (Carmines and Stimson) and the more recent party shifts on abortion (Adams 1997), two issues in the U.S. where the parties diverged from the median voter, and where the changes took decades to unfold.

It is also worth noting that as long as preferences on the new issue are uncorrelated with those of the old issue, either party is equally likely to eventually take the conservative or liberal side of the new, realigning issue. The determining factor is the relative position of each party at the moment the new issue is introduced; the party that starts most conservative on the new issue ends most conservative. When preferences on the new issue are correlated with preferences on the old issue, the directions the parties take on the new issue are more predictable; for positive correlations, the most conservative party on  $s_2$  becomes the most conservative on  $s_1$ . Correlated preferences also mean that the parties never fully converge on the old issue. The more correlated preferences are on the new and old issues, the less the parties converge on the old issue.

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because  $E[|x - \mu|] = 0.4$  for random draws over the  $(-0.8, 0.8)$  issue space. Although Figure 3 does not show it, the

## 2. Variations of the Model: Multiple Districts

### 2.1. Robustness through Multiple Districts

The Tiebout model can easily be adapted to incorporate other features of the political system, such as multiple districts. Under the simplest multi-district configuration, the party platform is merely the median of the districts' party platforms. Voters still choose their party identifications based on the national platforms, but the voters' decisions only directly affect outcomes within their own district. If the districts all have identical distributions of preferences, multiple districts will not affect the eventual stable locations of the party platforms, although the number of districts can affect the paths taken by the platforms. Whereas a system consisting of a single district will have platforms whose paths (but not eventual locations) are sensitive to initial conditions, a system consisting of many districts will behave more predictably from beginning to end. With multiple districts, the platforms are based on the median of many sample medians, and by virtue of central limit properties, the initial conditions are less stochastic.

In a related way, multiple districts can produce more stable results in the presence of "errors" or "noise" that may occur at any time in the process. Thus far, the model has invoked the convenient assumption that party platforms instantly reflect the median preference of the party's members. With multiple districts, this assumption can be relaxed without losing the predictive power of the model. One can imagine, for instance, a system whereby candidates compete for election in the district primary and the primary winners for all the districts construct the party platform. If the candidates are sincere in their issue positions, or are not perfectly informed of their constituent preferences, or if more than two candidates compete in the primary, then the party outcome in any given district may be something other than the median of the

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party platforms in each experiment moved to the quartiles on  $s_2$  (also 0.4 from the median) within a few rounds.

partisans' preferences in that district. Multiple districts have the ability to minimize the consequences of these deviations on the national platform.

To demonstrate how multiple districts can make the platforms more robust to noise, a separate set of experiments was conducted in which three candidates, one incumbent and two randomly chosen challengers, competed in the party primaries. Voters voted for whichever candidate was closest within their party. For simplicity, the number of parties was kept at  $k = 2$ , and the issue space consisted of a single, uniformly distributed issue,  $v_{it} \in (0, 1)$ . In the one-district case the party platforms are obviously unstable. In experiments, the platforms undulated around each quartile but never reached equilibrium; the average between-round change in a party's platform after round twenty was .06, a figure that persisted with successive rounds. When voters were divided into five and ten districts, the same average platform movement dropped to .032 and .026, respectively. And when voters were divided into one hundred districts, the average single-round movement in the national platforms after round twenty was just .008, less than one percent of the total issue space. Even in the presence of "noise" or bounded rationality, then, the Tiebout model can produce stable, predictable results, as long as the number of districts is sufficiently large.

## 2.2. Suppressing Issues with Dissimilar Districts

Dividing a population into districts with dissimilar preference distributions can substantially change the alignments of parties, compared to the alignments under a single-district or identically distributed districts. Figure 4 shows the preference distributions and party alignment for three equally-populated districts. Preferences in District A are uniformly distributed on  $s_2$  but skewed on  $s_1$ . Preferences in Districts B & C are also uniform on  $s_2$  and skewed on  $s_1$ , except the skew on  $s_1$  is in the opposite direction from that in District A. Because



the preferences within each district are more polarized on  $s_2$  than on  $s_1$ , the parties within each district – and at the national level – polarize on  $s_2$  and converge on  $s_1$ . As a result, the districts have similar partisan patterns. Regardless of district, those on one side of the median on  $s_2$  are in one party, and those on the other side of the median on  $s_2$  are in the other party. Because preferences on  $s_2$  are symmetric in each district, the parties are also equally sized.

<<< INSERT FIGURE 4 HERE >>>>

If the three districts were combined into a single district, as shown by the right-most distribution in Figure 4, the partisan nature of the system would be quite different. As a combined district, voters' preferences are more widely dispersed on  $s_1$  than  $s_2$ , and so the parties polarize on  $s_1$ . Moreover, the parties in the combined district are no longer of equal size. Overall, the light-shaded party, representing most of the preferences in what used to be Districts B & C, dominates the dark-shaded party, which represents most of the preferences in the former District A.

This phenomenon may give a crude explanation for the 19<sup>th</sup> century party realignment surrounding the U.S. Civil War, as well as perhaps other realignments where the most polarizing issue of the time correlated with regional differences. For a time, the multi-district system can suppress the regional differences from being manifest as partisan differences, but prominent national elections can effectively bring the country into one large district and start a process where the parties realign on the more polarizing issue. This phenomenon may also foretell realignments in political systems where districts are combined into a larger system, such as the

European Union, or where districts are being separated into smaller political divisions, such as the former Soviet Union.

### **3. Conclusions and Paths for Future Research**

The goal of this paper is to introduce the Tiebout party model and to demonstrate how it can be used to explain party behavior in the context of several different political features, such as different numbers of parties, preference distributions, and characteristics of the districts. Certainly other features can be explored within the framework of the model as well. Kollman, Miller, and Page (1997), for instance, examine how different preference aggregating systems, favoring the mean, median, or modal preferences affect sorting in a Tiebout model. Their work may have application here in demonstrating how changes in the party rules influence platform creation. Similarly, changing the electoral rules to allow for multiple seats per district instead of single member plurality could affect the platform locations or at least the variance in the platforms (Adams 1996).

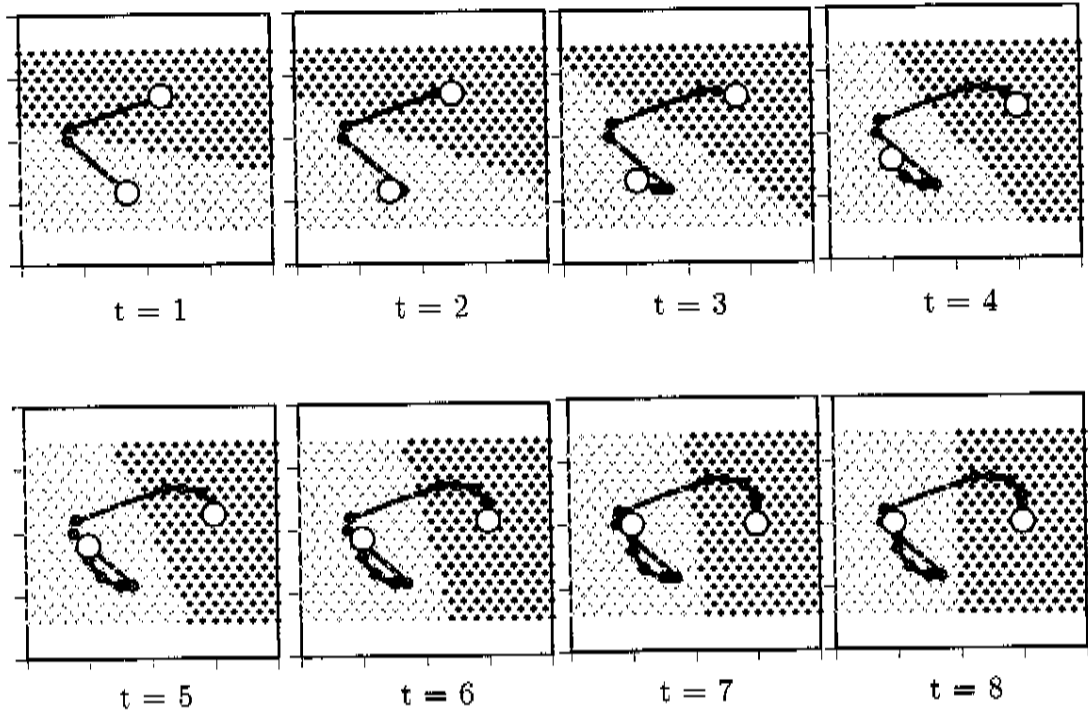
Finally, the opportunity for strategic behavior on the part of candidates and voters deserves greater exploration. As already shown, a system with imperfectly informed or non-strategic candidates can produce similar results to one with perfectly informed and strategic candidates, as long as the number of districts is sufficiently large. Left out of the model thus far, however, has been any consideration of the general election. In separate work, I show that the presence of a general election as a threshold for contributing to the platform does not significantly affect the locations of the platforms as long as candidates have lexicographic preferences for winning in the primary and voters are sincere. Still left to be explored is what happens when voters, or at least some portion of voters, behave strategically.

Political parties, particularly in the modern era, are complex, diverse organizations that cannot be easily maneuvered by a couple of strategists or a few cigar-smoking men in a back room. The Downsian characterization of a party as a team united by a common goal of winning denies the diversity and conflict within parties and ignores the considerable collective action problems that must be overcome to make such a large, heterogeneous group behave as a unitary actor. Our models can reflect the diversity of these organizations without resorting to simple story telling and without sacrificing falsifiable predictions from our theories. Complex systems models, such as the Tiebout party model, allow parties to appear purposive, perhaps even strategic, even when the organization and its members are not. Just as species do not willfully coordinate to develop the biological features that maximize their survival in certain environments, and just as no unitary actor controls Adam Smith's invisible hand to set the efficient prices and product-mix of goods in a market economy, so too are political parties and other political organizations not driven by unitary, strategic actors.

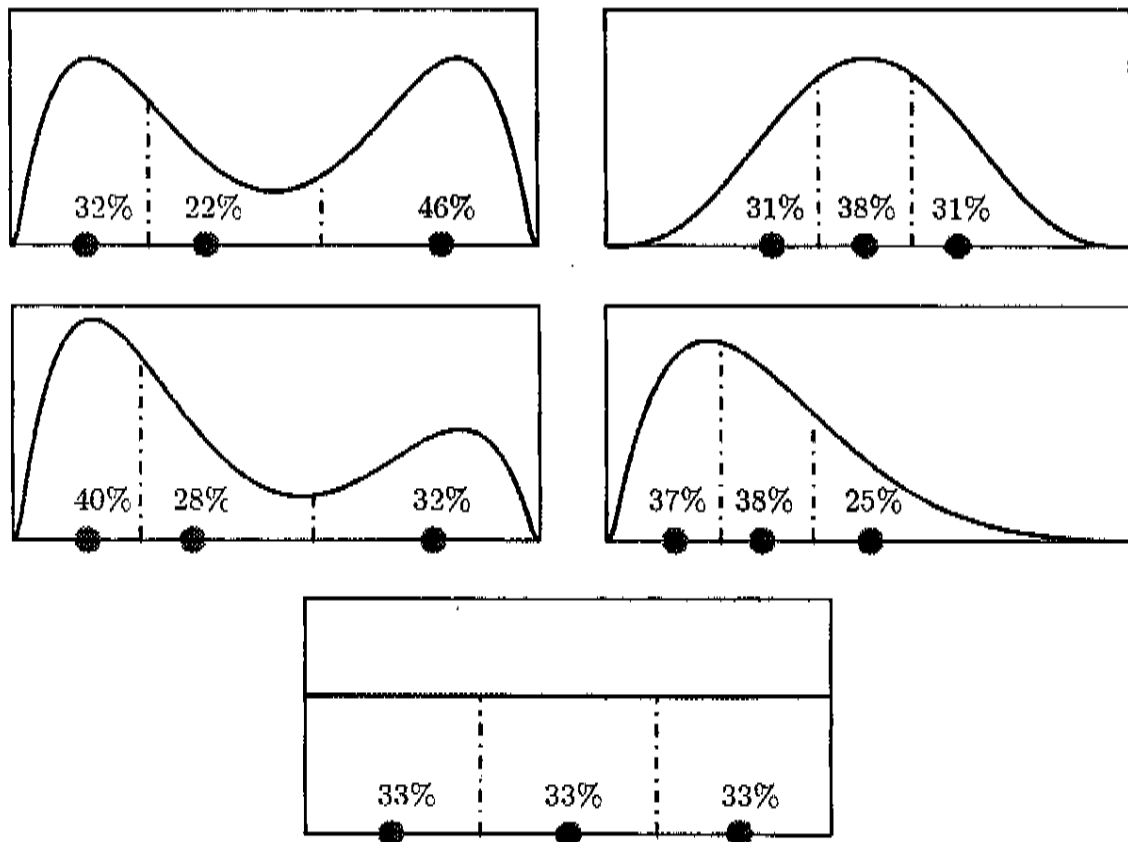
**Table 1. Mean Party Distance from Center, by Issue Dimension and  
Number of Parties.**

Issue:	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$
Range:	[-1.0, 1.0]	[-.8, .8]	[-.6, .6]	[-.5, .5]	[-.4, .4]
2 parties	.474 (.003)	.029 (.002)	.005 (.0001)	.003 (<.0001)	.001 (<.0001)
3 parties	.466 (.004)	.289 (.010)	.0002 (.007)	.005 (.0002)	.003 (.0001)
4 parties	.491 (.001)	.391 (.001)	.025 (.001)	.005 (.0001)	.003 (<.0001)
5 parties	.482 (.003)	.391 (.001)	.114 (.003)	.008 (.0002)	.004 (<.0001)
6 parties	.472 (.003)	.387 (.0009)	.186 (.002)	.012 (.0003)	.005 (<.0001)

Note: Means are averaged across 100 experiments. Standard errors are in parentheses.



**Figure 1. Platform Dynamics for Two Parties Over Two Issues.**



**Figure 2. Stable Party Platforms in a One-Dimensional Space for Three Parties.**

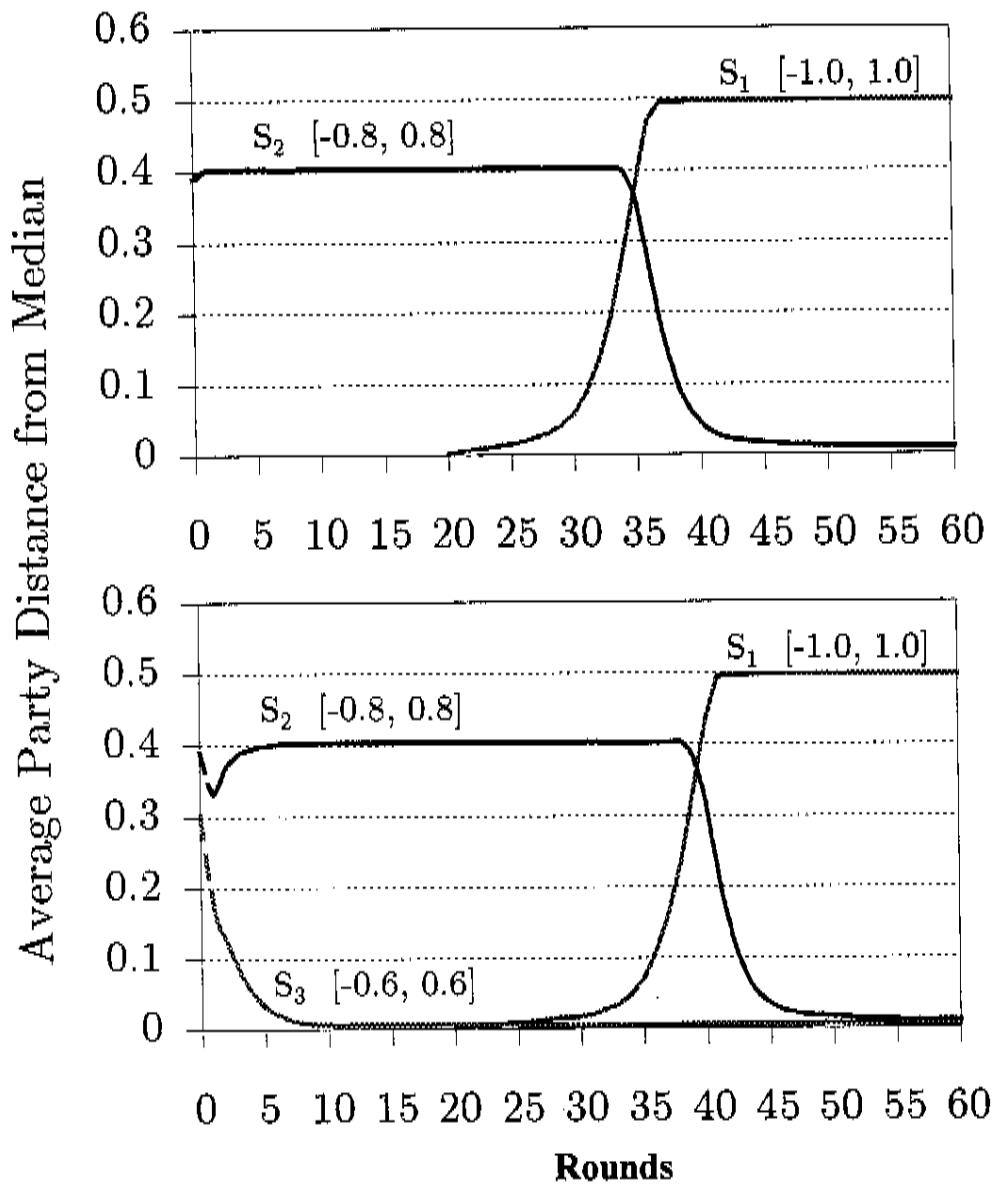
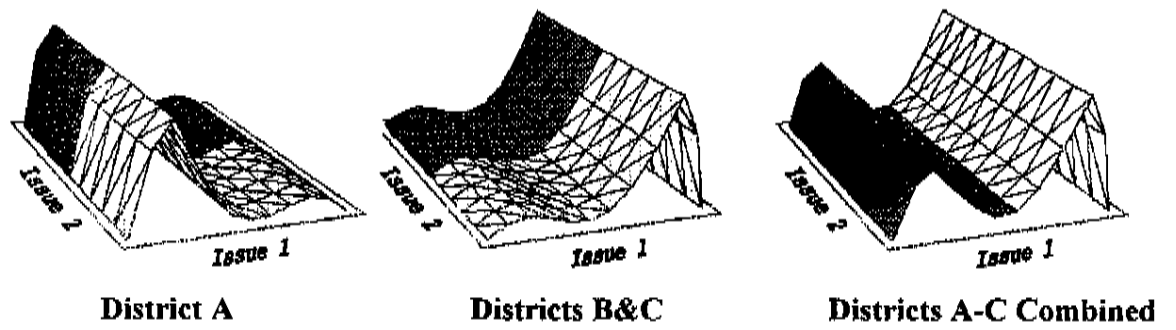


Figure 3. Dynamics of Party Realignments.



**Figure 4. Party Distributions Over Two Issues in Three Dissimilar Districts.**



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