

Neighborhood Effect Revised:
Spatial Statistical Analysis in Electoral Geography

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Abstract

The differentiation of space based on the electoral preferences of residents is what forms the electoral space – a special layer of the earth's surface that is the object of study of the discipline we call electoral geography. Geography of voting identifies the factors and patterns that underlie long-standing territorial differences in the political activity of voters and their voting habits by administrative and territorial unit, constituency and district, as well as the geographic favouritism and disproportionality of electoral systems – that is, the proclivity of electoral procedures to the territorial differentiation of election results. The key task of electoral research is thus to assess the degree to which voter intention is deformed by a system of interrelated filters including the effects of electoral geography.

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A number of factors influence the electoral behaviour of voters, some of which have a pronounced geographical nature. These are called the spatial effects of voting, which we will discuss in greater detail. *Scalar* spatial effects of voting include those in which electoral behaviour is determined by the properties of a given place (say, the fact that an election campaign was successful in one region, but unsuccessful in others). *Vector* spatial effects of voting are those where electoral behaviour is determined by the location of a given place (for example, the fact that the region is located close to the area where a given candidate can traditionally rely on support). We can thus say that scalar voting effects are based on the principle of vertical conditionality in geography, where the properties of an object are determined by the properties of the place in which it is located, and vector effects are based on the principle of horizontal conditionality in geography, where the properties of an object are determined by its location relative to other objects – that is, they arise as a result of its relations with the positions of other objects in space (Table 1).

Effect type	Geographic principle	Explanatory factor	Examples of effects
Scalar	Vertical conditioning	Properties of the place	Friends-and-neighbours effect, campaign effect, issue voting effect
Vector	Horizontal conditioning	Location of the place	Neighbourhood effect

Table 1. The scalar and vector spatial effects of voting

The most obvious scalar geographic factor in electoral behaviour is the *friends-and-neighbours* effect (sometimes called the localism effect), which describes the propensity of voters to vote for people from the same region. There are, in fact, dependencies of two different scales here.

At the local level, the friends-and-neighbours effect can be seen in a narrow sense: the closer voters live to the hometown (district, street, home) of a candidate, the more likely they are to vote for them.

At the regional level, the friends-and-neighbours effect is evident in the broad sense: when voting for a candidate to represent them in the authorities, the electorate is more inclined to support someone local, that is, a candidate who was born in or spent a significant part of his life in the same region (district, city, country) as his or her voters. Accordingly, candidates get more support in territories they have a personal connection with.

There are two key explanations for this dependency. First, candidates are traditionally more recognizable in their native regions and it thus is easier for them to rally support there, because proximity to the candidate (geographical, but also social) equals trust, since it is far more likely that interactions with this candidate will take place in the future than with a candidate who is not from the region. Second, voters will naturally expect a “hometown” boy or girl to pay more attention to local interests, which means that it is easier for these candidates to convince doubters or get indifferent voters to be more politically engaged. The first explanation is more typical of situations where a narrow understanding of the *friends-and-neighbours* effect is evident, while the second is truer of situations where the broader understanding reigns. Moreover, opening up the scale of the analysis makes the first explanation irrelevant – that is, isolated local cases aside, voters tend to cast their vote for local candidates, even when they know just as much about them as they do about their rivals.

The effect was first described by Valdimer Key Jr, in his 1949 book *Southern Politics in State and Nation*, but in a negative connotation: it turned out that the localist factor was more important than the political platform of the candidate. Next came the methods proposed by Raymond Tatalovich in 1975 and John Van Wingen and Joseph Parker in 1979 that estimate the friends-and-neighbours effect by calculating the correlation between the level of support for a candidate and the distance between voting districts and that candidate’s hometown. These approaches differ in that the first describes the dependence as linear, while the second describes it as logarithmic.

$$\begin{aligned} \text{Tatalovich friends-and-neighbours effect } V(D) &= aD + b, \\ \text{Van Wingen–Parker friends-and-neighbours effect } V(D) &= b \left(\frac{1}{D} \right)^a, \end{aligned}$$

where V is the percentage of support for the candidate, D is the distance to the candidate’s voting district, b is the level of support in the candidate’s voting district, and a is the strength of the friends-and-neighbours effect. Another obvious scalar spatial effect of voting is the *campaign effect*, according to which a voter is more likely to support a candidate in areas where they have campaigned more actively.

During an election campaign, candidates and parties are forced to choose constituencies and regions into which more resources will be channeled in order to secure victory. This is done based on two main factors. First, attention is paid to areas where the electoral strategy will be most effective, that is, areas with the highest numbers of undecided voters who are more likely to lean towards the chosen candidate. Second, this electoral strategy

tries to adjust the inherent geographic favoritism of the electoral system in order to prevent wasted votes. For example, in single-member plurality systems, large parties try to avoid receiving excess votes, as they would prefer a more even distribution of voters across the country to hypertrophied support in certain regions. At the same time, small parties are interested in consolidating their supporters in individual districts, since equal distribution across the territory necessarily leads to a large number of lost votes and, subsequently, seats. These considerations, among others, affect the decision whether a candidate should visit a region on his or her campaign trail for rallies and meet-and-greets with voters, or whether a media campaign will suffice.

Researchers are effectively left guessing as to the size of the resources that candidates direct to various regions during their election campaigns. Indicators they look to typically include the distribution of regional shares in the overall campaign budget, or the volume of campaign materials, although gaining access to such data is far from easy. This is why the main indicator for evaluating the campaign effect is the number of times a candidate visits individual districts, and for how long, as well as the number of pre-election events held there – we could just as well call it the pre-election visit effect. In our opinion, these metrics could be supplemented by an assessment of the nature of the spatial distribution of these visits (in terms of turnout and regularity).

Eric Mintz is considered a pioneer in the analysis of the geography of election campaign tours following his 1985 study into the impact of candidate visits on the 1984 Canadian federal election. One of his followers, Thomas Holbrook, used regression analysis to prove that each of Harry S. Truman's campaign visits during the 1948 U.S. presidential election brought him an average of 0.248% support. Major election campaigns have effectively turned into a race to see how many regions across the country candidates can visit, because the more meet-and-greets and events the candidate holds in different regions, the greater the spatial effect of his or her campaign will be. For example, during the 2020 U.S. presidential campaign, during the final three weeks before voting, Donald Trump visited 48 cities in 15 states, while Joe Biden visited 23 cities in 10 states. That is, both candidates managed to visit at least two cities per day.

The final scalar effect of voting is the *issue voting effect*, which states that voters tend to support candidates more in areas they pay greater attention to during their election campaigns. For example, a party that is against tearing down residential buildings to make way for new ones in Moscow will find more support in those districts of the capital where this is happening and public opinion is rather negative towards it.

While a scalar is a value that remains the same when the spatial coordinate system changes, the value of the vector depends on its location relative to other elements of space. Suppose we are studying the relationship between the share of workers and support for the left party in two cities, A_i and B_j , located in places i and j , respectively. The left party received 60% of the votes in City A_i , where 40% of the residents are working class, and 40% of the votes in City B_j , where 20% of the residents are working class. This territorial differentiation reflects the geography of ideological and political cleavages in society. Imagine we can change the coordinates of these cities, but the dependence remains the same: 20% of the residents of City A_j are working class, and the left party will receive 40% of votes; while 40% of the residents of City B_i are working class, and the left will receive 60% of the votes. What this means is that the results depend solely on the properties of the place itself, and that we are dealing with a scalar effect in electoral geography. But what if dependence is determined not by the properties of a given place, but rather by that place's location in space (for example, it belongs to a belt of cities that traditionally supports the left? Suppose that, now, the left receives 30% of the votes in City A_j , where 20% of the population is working class, and just 50% of the votes in City B_i , where 40% of the population is working class. What we have here is an example of the vector voting effect, also known as the *neighbourhood effect*. In this example, the neighbourhood effect will be 10% in both cities (see Table 2). This effect belongs to a large family of contextual voting effects in political science that describe how external factors influence the nature of electoral choice.

Initial situation		No neighbourhood effect		Neighbourhood effect	
A_i	B_j	A_j	B_i	A_j	B_i
20% → 40%	40% → 60%	40% → 60%	20% → 40%	40% → 50%	20% → 50%

Table 2. The neighbourhood effect

So, let us get this straight: *if you change the location of an object and its properties do not change as a result, then we are dealing with non-spatial (scalar) dependence that is determined by the properties of the object itself. If the properties of the object do change when placed in a different location, then we have spatial (vector) dependence.*

The neighbourhood effect means that support for a candidate (or party) is greater in districts that are adjacent to regions where support for this candidate (or party) is higher than the national average. Accordingly, the inverse neighbourhood effect is when support for a candidate (party) is lower in districts that are adjacent to regions where support for this candidate (or party) is lower than the national average. A more formal expression of the neighbourhood effect is that the share of people who vote for a candidate (party) tends to show a positive correlation with the share of those who vote for the candidate (party) in neighbouring districts. In other words, the neighbourhood effect is observed when there is significant spatial autocorrelation in the level of support for a candidate (party) and, as a result, stable spatial differentiation of the electoral landscape.

The neighbourhood effect was conceptualized in 1969 by David Reynolds in the article “A Spatial Model for Analyzing Voting Behavior”, and then further explained that same year by Kevin Cox in his paper “The Voting Decision in a Spatial Context”. Cox based his explanation of this principle on Torsten Hägerstrand’s theory of the spatial diffusion of innovations. According to Cox, the regular spatial clustering of specific candidates and parties is somewhat similar to the way in which rumours or diseases spread. The voter’s behaviour is determined by the influence of the information that dominates in the area where he or she lives. Each person acts as a node in the network of information flows, acting simultaneously as the addressee, transformer and sender of signals. The effectiveness of connections between nodes, and thus of the dissemination of information in the network, depends on the number of addressees, the distance between them and quality of the political culture. The neighbourhood effect is thus explained by the density and quality of the connections between voters: higher density and quality means that voters tend to repeat the voting decisions of their neighbours. William Miller described the essence of the neighbourhood effect using the simple formula “those who speak together vote together”, and this conjecture about the nature of the effect of the communication network on electoral behaviour was confirmed by Robert Huckfeldt and John Sprague’s 1995 study on how people in Indianapolis and St. Louis voted in the presidential elections.

An important addition to our understanding of the neighbourhood effect was provided by the models of environmental effects identified by Miller based on his observations of the UK electoral landscape in 1977. Describing the neighbourhood effect, Miller pointed out that the dependence can manifest itself differently for different parts of society (class, strata, ethnic groups, etc.), which partly explains situations when the effect is minimal (Fig. 1). Miller identified the following environmental (neighbourhood) effect models:

- 1) *consensual environmental effect* – the classic neighbourhood effect, where communication between people strengthens the position of the dominant political force in the region;
- 2) *no environmental effect* – the absence of the classic effect, when communication between people does not affect their electoral behaviour;
- 3) *reactive environmental effect* – the opposite of the classical type, when communication between people increases their mutual annoyance, anxiety and hostility, and, as a result, this weakens the position of the dominant political force in the region;
- 4) *Przeworski environmental effect* – when the neighbourhood effect acts differently on individual parts of society: say, one segment of society is influenced by the majority, while another is indifferent to it, and a third votes differently in defiance.

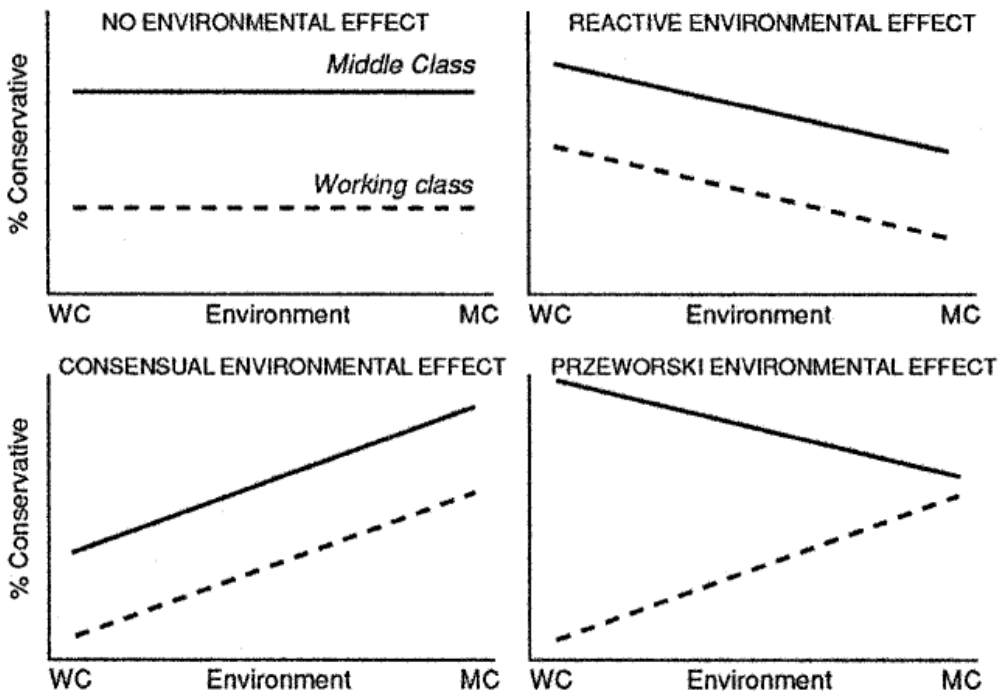


Fig. 1. Miller's environmental (neighbourhood) effect

Source: Miller W.L., *Electoral Dynamics in Britain since 1918* (London: Macmillan, 1977), 266.

As we see, the neighbourhood effect is not equivalent to the geography of ideological and political splits in society, including those that are based on territoriality. It can be said that the geography of voting (the electoral and geographic differentiation of society) is a reflection of the geography of ideological and political divisions anchored in space by the neighbourhood effect. The geography of cleavages would create smooth territorial transitions in the spatial continuum of the state, but the neighbourhood effect polarizes society in space by, among other things, creating a territorial dimension for non-territorial (social, ideological and other) splits.

To assess the degree of clustering of the electoral space, either simple indicators of geographic concentration and spatial relationships or spatial statistical analysis methods can be used.

The *localization coefficient* measures the relative distribution (or relative concentration) of supporters of a given party in a specific region in relation to the country as a whole.

$$\text{Localization coefficient} = \frac{X_i / \sum X_i}{N_i / \sum N_i} * 100,$$

where X_i is the number of supporters of the party in region i , $\sum X_i$ is the total number of supporters of that party in the country, N_i is the total number of voters in region i , and $\sum N_i$ is the total number of voters in the country. If the localization coefficient is greater than 1, this means that the party is relatively more concentrated in the region being observed.

While the localization coefficient estimates the relative distribution in space of supporters of one party among all voters, the *geographic disparity index* compares the proportional distribution in space of supporters of two different parties.

$$\text{Geographic disparity index} = \sum_{i=1}^N \frac{(X_i / \sum X_i) - (Y_i / \sum Y_i)}{2} * 100,$$

where X_i and Y_i are the number of supporters of parties X and Y in region i , $\sum X_i$ is the sum of supporters of these parties in the country as a whole. The index ranges from 0 to 100, where 0 means absolutely equal spatial distribution of the two parties across the country, and 100 means completely opposite spatial distribution.

$$\text{Geographic segregation index} = \sum_{i=1}^N \frac{(X_i / \sum X_i) - (Y_i / \sum Y_i)}{2} * 100$$

The *geographic segmentation index* is similar to the geographic disparity index. The difference is that it compares the performance of one party relative to voters in the country as a whole, rather than the performance of two parties. It is also measured on a scale of 0 to 100 and has the same threshold interpretations.

In order to assess the neighbourhood effect, it is important to both determine the level of space clustering, and to identify the strength of the geographical interaction between objects – i.e., how connected and interdependent they are. This is done using the *gravitational model*, borrowed from Isaac Newton's equation of universal gravitation.

$$I_{ij} = k \left(\frac{P_i * P_j}{D_{ij}^b} \right),$$

where I_{ij} is the force of gravity (spatial interaction) as it is directed from Place i to Place j , k is a constant, D_{ij}^b is the distance between i and j with distance exponent b , and P_i and P_j are the number (or share) of Party P 's supporters in regions (electoral districts) i and j . Points i and j are mapped as centroids or administrative centres of regions or electoral districts. For most investigations in absolute two-dimensional space, it is reasonable to use $k = 1$ and $b = 2$.

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