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Adjustment of issue positions based on network strategies in an election campaign:
a two-mode network autoregression model with cross-nested random effects

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Abstract

During election campaigns, political parties deliver statements on salient issues in the news media, which are called issue positions. This article conceptualizes issue positions as a valued and longitudinal two-mode network of parties by issues. The network is valued because parties pronounce pro or con positions on issues in more or less extreme ways. It is longitudinal because the media report new statements of parties on issues each new day.

In political science, issue positions are often assumed to be stable throughout the election campaign but this article shows that parties adjust their issue positions systematically to the issue positions of other parties. Applying concepts from social network analysis, notably structural balance and transitivity, we analyze the evolution of the network of issue positions showing that issue positions adopted previously by other parties as well as previous reports on support and criticism among parties have substantial and statistically significant effects on subsequent issue positions.

Our dynamic adjustment model is estimated by means of a two-mode network autoregression model with cross-nested random effects. The data about issue positions and support and criticism among parties come from a daily content analysis of newspaper and television news during the Dutch national election campaign in 2006.

Keywords

election campaigns; issue voting; media; semantic network analysis; two-mode networks ;
longitudinal design ; structural balance

1 Introduction

During election campaigns, politicians debate salient political issues in the media. They take different stances, pro or con on a variety of issues; some stronger than others. It is straightforward to conceptualize issue positions as a valued two-mode network of parties by issues. This, however, is hardly ever done because political campaigning research usually focuses on comparisons of complete election campaigns, either in time or across countries, for example on the basis of media coverage (Budge & Farlie, 1983; Kriesi, et al., 2006), expert surveys (Laver & Hunt, 1992), or party manifestoes (Budge, Klingemann, Volkens, Bara, & Tanenbaum, 2001). The variety of positions taken by parties on idiosyncratic issues in different campaigns is reduced to positions taken on a limited number of issue dimensions such as the left-right dimension (Castles & Mair, 1997) and a secondary cultural dimension (Kriesi, et al., 2006) by means of common sense or by means of multivariate analysis techniques such as factor analysis (Budge, Robertson, & Hearl, 1987), weighted multidimensional proximity scaling (Kriesi, et al., 2006), correspondence analysis (Kreppel & Tsebelis, 1999) or even undimensional unfolding (Van Schuur & Kiers, 1994). With only a few issue dimensions left per election campaign it does not make much sense to apply a two-mode network approach. In majoritarian two-party systems a network approach resembles even more the sledgehammer to crack a nut, since it's fairly trivial that the two parties will attack each other and will disagree with each other's issue positions.

In a non-majoritarian multiparty system, a network approach becomes indispensable, especially when the assumption of stable issue positions is questioned, as we do here. Do parties adjust their issue positions to the positions of other parties during an election campaign? The normative view on representative democracy requires parties to offer voters a choice between distinct sets of clear-cut issue positions spelled out in party manifestoes (Mansbridge, 2003; Miller, 1999). Shifts in issue positions within an election campaign tend to be perceived as opportunistic and populist appeals of parties to catch a broader share of the de-aligned voters who deviate from a party's former ideological issue

positions (Kirchheimer, 1966). The timely order of shifts in issue positions is irrelevant from this perspective. But is this normative view in accordance with empirical reality? We doubt it and we put it to the test here.

For this test, a network approach is chosen. We conceptualize issue positions as a longitudinal valued two-mode network with day-to-day positions of parties on issues. We take an actor-based approach (Snijders, van der Bunt, & Steglich, 2010), situating a party in the context of previous issue positions as well as previous reports on criticism or support among parties, predicting the value of the party's subsequent issue position from tendencies towards balance and transitivity.

A joint analysis of the one-mode network of relationships between actors and the two-mode network of their issue positions is also central to the literature on advocacy coalitions (Sabatier & Jenkins-Smith, 1999) and the literature on decision making models (Stokman & Van Oosten, 1995). The advocacy coalitions literature shows that ally networks consist of actors who share their beliefs but also that actors adapt their secondary beliefs to their core beliefs in order to foster an ally network that may remain stable for a long time (Sabatier & Jenkins-Smith, 1999; Weible, 2007; Weible & Sabatier, 2005). The hypotheses to be tested in this paper concern *how* actors adapt their beliefs, i.e. their issue positions, to each other and to those of their allies. Our results show that issue positions during election campaigns are fairly volatile rather than stable. The literature on decision models predicts the outcomes of negotiations or issue positions shortly before a joint decision is made (Arregui, Stokman, & Thomson, 2004) on the basis of exogenous initial issue positions and issue saliency, which are estimated by experts. In contrast, we consider daily (changes in) issue positions as endogenous dependent variables.

2 Towards a two-mode dynamic network adjustment model

We model parties as actors that adjust their relations with one another and their positions on issues to previously established relations and previous issue positions of their peers. In

this respect, our model is an actor-based model for network dynamics (Snijders, van der Bunt, & Steglich, 2010). The essence of our model is that the one-mode network of support and criticism among parties – also known as attack or conflict versus cooperation in the literature – is changing as a function both of the one-mode network itself and of the pattern of issue positions in the two-mode network of parties by issues. Likewise the two-mode network of issue positions of parties changes not only as a function of the two-mode network itself, but also as a function of the one-mode network of support and criticism among parties.

In this special issue about two-mode networks we focus on changes in the two-mode network of issue positions of parties. In other words, we analyze the political influence process resulting in adjusted issue positions rather than on the selection process to obtain political friends and political enemies, but the explanation of changes in issue positions involves both the history of the two-mode network of issue positions and the history of the one-mode network of support and criticism among parties.

Our data are measured in continuous time on a day-by-day basis so we can make a strict distinction between the tie (issue position) to be explained and the network context of previous ties. Thus, we do not use network models that were developed specifically for cross-sectional data, which typically assume that equilibrium has been reached already, such as Exponential Random Graph models (Wasserman & Robins, 2005; Snijders et al., 2006). Neither do we use a specific longitudinal network model such as SIENA (Snijders, et al., 2010), which assumes binary or categorical relationships and which simulates the process taking place in between a few non-contiguous measurement waves (typically less than ten).

For a number of reasons a standard econometric model for continuous time series data is preferable as in event dyads research (Brandes, Lerner, & Snijders, 2009). First, our focus is on the extent to which parties take pro or con stances to issues rather than on ordinal values of positions, and on the precise degree of support or criticism among parties, thus on continuous tie value rather than on the discrete presence or absence of a

tie. In addition, our data cover the entire process on a daily basis, resulting in an ordinary time series, instead of snapshots as in a panel design. Third, a major distinction with SIENA-like models, which assume that actors take decisions one after another (Snijders, et al., 2010), concerns the simultaneous nature of decisions to be made in the political information environment. It's the daily news in the mass media that provides the information environment for politicians, with respect to both new or renewed issue positions of other parties and emerging patterns of support and criticism among parties. Parties have to react simultaneously to yesterday's news on a daily basis, without knowing how other parties reacted to this news. Their campaign teams usually do so after daily scheduled discussions about the latest news. They have to assume that both the voters and the other parties take into account the party's actions as they are represented in the mass media. Thus, we use media content as the data source both to build up the daily one-mode network of parties by parties and the two-mode network of parties by issues, and we will assume that parties act simultaneously on a daily basis. Note that a day represents the short term in our model.

2.1 *Definition of networks as matrices*

We distinguish between two types of network context: (1) the two-mode network $\mathbf{A}^t$ of media reports on issue positions, and (2) the one-mode network $\mathbf{B}^t$ of media reports on support and criticism among political parties. Although media reports are discrete events—a newspaper prints an article containing a statement of a party on an issue on a specific day—we assume that both politicians and voters aggregate the various news statements into a single cognitive map and take into account not just today's statements but also previously reported statements when attributing issue positions to parties. We treat an issue position as an image created from current and previous statements reported in the news media. This also applies to support relations among parties.

A party's position on an issue on a particular day is operationalized as the average of the values of that party's issue positions until that day, weighted by the *agenda setting*

power or *saliency* of the news on each of the previous days, as measured by the number of statements in the news about the party's issue position. Statements that are published in more news outlets are deemed more important because they are more successful at setting the public agenda (Rogers, Dearing, & Bregman, 1993). We therefore define two saliency networks $\mathbf{S}_A^t$ and $\mathbf{S}_B^t$ that correspond respectively to the two-mode network $\mathbf{A}^t$ of issue positions and the one-mode network $\mathbf{B}^t$ of support and criticism. Note that saliency can be zero if news about the issue position of a party is completely lacking. Political forces are like natural forces, they have magnitude (saliency) and angle or direction (value of the issue position). Magnitude is zero or positive like saliency, while angle can be positive or negative like issue positions.

Following the ideodynamical news effects model of David Fan (Fan, 1996; Fan & Tims, 1989), we assume that the force of yesterday's news to impress today's audience decays at an exponential rate. Here we will assume that its power decays with a half-life value of a week.

To arrive at hypotheses with respect to network influences on issue positions the entries of the matrices $\mathbf{S}_A^t$, $\mathbf{A}^t$, $\mathbf{S}_B^t$, and $\mathbf{B}^t$ have to be defined more precisely.

- $\mathbf{S}_A^t$ is the $m \times n$ matrix of the saliency of issue positions of parties at time point t . An entry $s_{A_{ik}}^t$ in matrix $\mathbf{S}_A^t$ refers to the saliency of party i with respect to issue k on a given day t (current day: $t = 0$) calculated from the number or frequency of news reports on the criticism or support (f_{ik}^t) at a previous day t , wherein this force decays by half after a week (7 days). Saliency $s_{A_{ik}}^t$ at time t is rescaled to a proportion because we divide by the weighted total number of statements on all issues by party i , which is equivalent to taking the relative outdegree. This ensures that the covariates (Eqs. 5, 6, and 7) are weighted averages with values in the value range -1..+1 instead of weighted sums.

$$\text{Eq. (1), saliency of an issue position: } s_{A_{ik}}^{t=0} = \frac{\sum_{t=-\infty}^{t=0} 2^{t/7} f_{ik}^t}{\sum_u \sum_{t=-\infty}^{t=0} 2^{t/7} f_{iu}^t}$$

- $\mathbf{A}^t$ is the $m \times n$ matrix of the pro-con value (quality) of the issue positions of parties at day t (range -1..+1). An entry a_{ik}^t in matrix $\mathbf{A}^t$ refers to the issue position of party i with respect to issue k on a given day t (current day: $t = 0$) calculated as the reported issue position on a given day (q_{ik}^t , range -1..+1), weighted by the number of news items reporting that issue position (f_{ik}^t), in which this weight decays by half after a week (7 days).

$$\text{Eq. (2), (value of) issue position: } a_{ik}^t = \frac{\sum_{t=-\infty}^{t=0} 2^{t/7} f_{ik}^t q_{ik}^t}{\sum_{t=-\infty}^{t=0} 2^{t/7} f_{ik}^t}$$

Equation (2) entails that the value of an issue position is shaped almost exclusively by the latest news in the case of continued, steady news about a topic, whereas it is almost exclusively determined by the direction of the news during news peaks from a distant past when the amount of news since then was negligible or absent. Note that the value of party i 's position on issue k does not change if no new statements are published. The definitions of the matrices $\mathbf{S}_B^t$ and $\mathbf{B}^t$ are highly similar to the definitions of $\mathbf{S}_A^t$ and $\mathbf{A}^t$,

- $\mathbf{S}_B^t$ is the $m \times m$ matrix of the saliency of support and criticism among parties at day t . An entry s_{ij}^t in matrix $\mathbf{S}_B^t$ refers to the saliency of party i with respect to party j on a given day t (current day: $t = 0$) calculated from the number of news reports on the criticism or support (f_{ij}^t). Saliency s_{ij}^t at time t is rescaled to proportions by the weighted total number of criticism and support statements issued by this party.

$$\text{Eq. (3), saliency of criticism news: } s_{ij}^{t=0} = \frac{\sum_{t=-\infty}^{t=0} 2^{t/7} f_{ij}^t}{\sum_u \sum_{t=-\infty}^{t=0} 2^{t/7} f_{iu}^t}$$

- $\mathbf{B}^t$ is the $m \times m$ matrix of support and criticism among parties at day t (range -1..+1). An entry b_{ik}^t in matrix $\mathbf{B}^t$ refers to the value of criticism or support of party i for party j on a given day t (current day: $t = 0$) calculated from the number of news items reporting support or criticism (f_{ij}^t) and the value of each support statement/criticism (q_{ij}^t , range -1..+1, negative for criticism, positive for support).

$$\text{Eq. (4), (value of) support/criticism: } b_{ij}^t = \frac{\sum_{t=-\infty}^{t=0} 2^{t/7} f_{ij}^t q_{ij}^t}{\sum_{t=-\infty}^{t=0} 2^{t/7} f_{ij}^t}$$

2.2 Hypotheses to explain the adjustment of a party's issue position

As noted before, the model predicts the value a_{ik}^t of party i 's position on issue k as reflected in the media on day t . A lagged version of the dependent variable is used to model a party's tendency to stick to its previous issue positions. If political parties stick to their issue positions, as commonly assumed in campaigning research, then the dependent variable would be identical to its lagged version. In network analysis, autoregression is also known as the *inertia* or conformity effect. In autoregression models, a time lag must be selected; how much time is needed for a party to change its issue position fundamentally if it would like to do so? In political campaigning, a two-week period seems to be reasonable. In the first week, other parties and internal deliberations cause fuzz, then one weekend is needed for internal party consultations, finally, another week is required in which the new policy is implemented in new statements, interviews, press releases, and so on. A period of two weeks is the medium term in our model.

Hypothesis 1, Autoregression, inertia. The issue positions of two weeks ago (a_{ik}^{t-14}) explain today's issue positions a_{ik}^t .

Note that the dependent variable and the autoregression predictor overlap because of a party's behavioral tendency to stick to its former issue position and also because issue positions reported more than two weeks ago are part of the calculation of both the dependent variable (cf. equation 2) and the autoregression covariate. In the special case that a party did not publish new statements on an issue position in the last two weeks, the dependent variable has exactly the same value as the lagged predictor. The estimated autoregression parameter will not only reflect the tendency to stick to one's former issue positions, but also the slow exponential decay of former issue positions, especially if a party or an issue is relatively less newsworthy. The design, then, favors strong effects of autoregression. As we are interested in showing that autoregression does not explain issue

positions completely, a tendency to overestimate autoregression renders results showing the impact of other predictors more convincing.

The autoregression effect does not take into account the network context within which the issue position is formulated, to which we turn now. The first two network context covariates combine information from the two-mode issue positions network and the one-mode support/criticism network. They indicate whether previous support and criticisms among parties affect issue positions. Do parties align their issue positions to those of their allies and enemies? The third network context derives the expected relationship between parties from their issue agreement. Figure 1 offers an impression of the three network context effects with examples of line values that allow the reader to check the formulas that follow. The predicted value is the calculated value of the covariate representing the network context.

Figure 1 - Predictions from three hypotheses in elementary network contexts (equal weights assumed)

For Hypotheses 2 and 3, we combine the two networks and focus on triples consisting of two parties and one issue in the combined network. Because arcs are always pointing from parties to issues (a party takes a position on an issue), we can distinguish between two network contexts: partisan transitivity—a party expresses the same position on an

issue as the parties it supports and the opposite position from the parties it attacks, for example, Party j on issue k in Figure 1—and ideological tit-for-tat—a party expresses the same position on an issue as the parties by which it is supported and the opposite position from the parties by which it is attacked.

Hypothesis 2, *Partisan transitivity*. Parties take issue positions in the media that are the opposite of the issue positions of the parties attacked by them, but similar to the issue positions of parties that are supported by them.

As an example one may think of Social-Democrats who decided to praise the Greens.

According to Hypothesis 3 the Social-Democratic party will support the issue positions of the Greens to avoid the emergence of a hostile impression on the side of potential Green voters in the remainder of the campaign. The hypothesis is labeled “Partisan transitivity” because the sign of the expected issue position according to Hypothesis 3 is in line with the sign of the existing path from the party to that issue mediated by the other party. The common sense idea is that choosing an ally brings about a tendency to accept the ally’s issue positions, whereas a struggle with your adversary brings about a tendency to attack also your adversary’s issue positions.

Hypothesis 3, *Ideological tit-for-tat*. Parties take issue positions in the media that are the opposite of the issue positions of parties who criticize them, and reversely, to support the issue positions of parties that supported them.

Ideological tit-for-tat or ideological reciprocity (Axelrod, 1984) represents the maxims: If you attack me, I will attack your salient issue positions; If you support me, I will adapt to your issue positions. Not responding negatively towards attacks will be considered as dovish and soft in a political environment, whereas not responding positively towards support will be considered as cynical (always being destructive towards everybody comes down to the ALLD-strategy(Axelrod, 1984)). Not responding in accordance with the prescriptions of indirect tit-for-tat in a game that allows for it will harm the reputation and status of the players involved (Nowak & Sigmund, 2005).

Partisan transitivity and ideological tit-for-tat predictors are calculated using the values of issue positions (matrix $\mathbf{A}^t$) weighted by their saliency (matrix $\mathbf{S}_A^t$) and similar information on the one-mode network of support/criticism among political parties $\mathbf{B}^t$ weighted (element-wise multiplication) by their saliency ($\mathbf{S}_B^t$). In the formulas below, element-wise multiplication is represented by the $\otimes$ symbol. matrix multiplication is implied if this symbol is absent. Element-wise division is represented by a division line. Partisan transitivity and ideological tit-for-tat are calculated as a matrix multiplication of matrix $\mathbf{B}^t$ with matrix $\mathbf{A}^t$ and its transpose respectively, in which the elements of the two matrices are element-wise weighted with the corresponding weight matrices $\mathbf{S}_A^t$ and $\mathbf{S}_B^t$.

$$\text{Eq. (5), Partisan transitivity: } \frac{(\mathbf{S}_B^t \otimes \mathbf{B}^t) (\mathbf{S}_A^t \otimes \mathbf{A}^t)}{\mathbf{S}_B^t \mathbf{S}_A^t}$$

$$\text{Eq. (6), Ideological tit-for-tat: } \frac{(\mathbf{S}_B^t \otimes \mathbf{B}^t)' (\mathbf{S}_A^t \otimes \mathbf{A}^t)}{\mathbf{S}_B^{t'} \mathbf{S}_A^t}$$

The third network context covariate is exclusively based on the two-mode network of issue positions. It measures whether parties adapt their issue position to the position of the parties with which they agree on most other issues or, conversely, take an opposite position from parties with which they disagree on most other issues. We label this tendency “Ideological realignment” because a party abandons its former idiosyncratic positions on specific issues so as to give voters the impression that they largely align with some of the other parties on almost every issue, and disagree with the remaining parties on almost every remaining issue. One may infer a matrix similar to $(\mathbf{S}_B^t \otimes \mathbf{B}^t)'$ in equations (5) and (6) to represent the *expected* criticism and support of parties for one another from their agreement with regard to their issue positions, thus from $(\mathbf{S}_A^t \otimes \mathbf{A}^t) (\mathbf{S}_A^t \otimes \mathbf{A}^t)'$, which is the inner product of the weighted matrix of issue positions with its transpose.

$$\text{Eq. (7), Ideological realignment} \quad \frac{(\mathbf{S}_A^t \otimes \mathbf{A}^t) (\mathbf{S}_A^t \otimes \mathbf{A}^t)' (\mathbf{S}_A^t \otimes \mathbf{A}^t)}{\mathbf{S}_A^t \mathbf{S}_A^{t'} \mathbf{S}_A^t}$$

Note that Equation 7 calculates the weighted average value of semipaths of length 3 between the party and the issue for which the tie value must be predicted (Figure 1, bottom). The semipaths may include all issues and parties. Equation 7 implies that a party adjusts its issue positions to more moderate issue positions if none of the other parties is either a full ideological friend or a complete ideological enemy when all issues are taken into account, for example if the party agrees on half of the issues with other parties but disagrees with regard to the remaining issues with the other parties. Ideological realignment yields only extreme issue positions for parties with full ideological friends or enemies.

Hypothesis 4, Ideological realignment. Parties adjust their issue positions on specific issues in their scarce interviews and sound bites in the media in such a way that they become consistent with the issue positions of parties with whom they agree on most issues and inconsistent with the issue positions of parties with whom they disagree on most issues.

3 Method

Having stated the model, we now turn to the empirical case study. This section describes the data, the data analysis setup, and the stochastic statistical method for multivariate analysis used to test the hypotheses.

3.1 Data

The data pertain to the 2006 parliamentary election campaign in the Netherlands. The Netherlands has a multi-party system with an electoral threshold of only 0.67% of the votes to obtain a seat in Parliament (150 seats). We consider the media coverage of the ten parties that obtained seats in Parliament after the elections: CDA (Christian-Democrats), PvdA (Social-Democrats), VVD (conservative liberals), CU (orthodox Christian-

Democrats), SGP (fundamental Christians), PVV (anti-immigrant party), D66 (left-wing liberals), GL (green party), PvdD (animal party), SP (socialist party). The topics of the campaign were regrouped into thirteen issues: left (social security, leveling of incomes), right (less taxes, cuts in government expenditures), value issues (employment), anti-immigrants, Christian norms and values (e.g. no work on Sunday), the environment, infrastructure (e.g. Schiphol airport, Rotterdam harbor), European Integration (e.g. entrance of Turkey), new left issues (e.g. free drugs), administrative reforms (e.g. referenda, direct forms of democracy), crime fight, education, and health expenditures.

We captured the content of two national television news bulletins in the Netherlands (NOS, RTL4) and the content of eight national newspapers (De Telegraaf, NRC Handelsblad, NRC Next, de Volkskrant, Metro, Spits, Algemeen Dagblad, Trouw). Protocol sentences were extracted from headlines and leads in newspaper articles and anchorman statements in television news according to a semantic network analysis method for manual content analysis (Kleinnijenhuis, de Ridder, & Rietberg, 1997). Two types of protocol sentences, each with a subject/predicate/object-template are relevant to this study: statements about issue positions with a “party / issue position / issue”-template and statements about support or criticisms from one party on another party with a “party / criticism or support / party”-template. Issue positions were coded on a pro-con scale ranging from -1..+1. Criticism and support statements were also coded on a -1..+1-scale.

The news from the last three months before the elections was analyzed (Kleinnijenhuis, Scholten, et al., 2007), which resulted in 5,636 statements on issue positions of parties (party / issue position / issue-statements) and 3,995 statements on support & criticism between two parties. The coding was done by trained human coders. The reliability of codings as measured by Krippendorff's alpha amounts to .74 for issue positions and to .76 for statements about support and criticism (Kleinnijenhuis, Van Hoof, Oegema, & De Ridder, 2007).

3.2 *Setup of data analysis*

All variables are calculated from current and previous statements in the news, so variables can only be computed reliably with a sufficient number of previous statements. For this reason, we analyze issue positions published in the media during the last 10 weeks of the campaign; the first few weeks only serve as network context. The last ten weeks of the campaign happened to start on *Prinsjesdag*, which is the start of the Parliamentary year in the Netherlands, always on the third Tuesday in September.

We included Sundays in the computation of the variables per day but we left the Sundays out of the analysis after having recoded the Sunday news to Monday news because television news programs are shorter on Sunday and only one newspaper appeared on Sunday in 2006. All in all we have 7,800 units of analysis crossed over three layers of 60 days (10 weeks, Sundays excluded), 10 parties, and 13 issues.

3.3 *Towards a stochastic model*

The specification of the stochastic longitudinal network model should account for network dependencies and for dependencies in time. Dependencies in time arise from a tendency of parties to stick to their old issue positions (hypothesis H1) and from remembrance of the past in the construction of network covariates (hypotheses H2, H3, and H4). Time dependencies can be modeled by means of autoregression or *inertia* parameters.

Network dependencies refer to a lack of independence among observations within the rows (parties) and within the columns (issues) of the network. For this reason, a straightforward linear regression model does not suffice. For one-mode networks MRQAP-regression has been proposed to arrive at plausible estimates of overall regression parameters and their standard errors (Dekker, Krackhardt, & Snijders, 2007), but we model the dependence of the observations on specific parties and issues explicitly by means of a cross-nested multilevel model.

The multilevel regression model is defined as follows. The lowest level contains statements (indexed by u), which are cross-classified by the political party making the

statement (indexed by i) and the issue that the statement is on (indexed by k). The dependent variable is the issue position of a party at time t (see Eq. 2). In addition to a fixed intercept (α) and fixed slopes ($X_u^{t-1}\beta$), we estimate varying intercepts ($\delta_{i[u]}$) and slopes ($X_u^{t-1}\beta_{i[u]}$) for political parties and for issues ($\gamma_{k[u]}$ and $X_u^{t-1}\beta_{k[u]}$). X_u^{t-1} is a matrix of predictors containing inertia (the autoregression parameter), partisan transitivity, ideological tit-for-tat, and ideological realignment scores calculated for the preceding day. We do not use predictors at the party and issue levels.

Eq. (8), The multilevel model $a_{ik[u]}^t = \alpha + \delta_{i[u]} + \gamma_{k[u]} + X_u^{t-1}\beta + X_u^{t-1}\beta_{i[u]} + X_u^{t-1}\beta_{k[u]} + \varepsilon_{ik[u]}^t$.

Parties and issues are said to be "completely crossed", since every instance of a party occurs at least once with each instance of an issue and vice versa. Therefore we will use a statistical package suitable of estimating parameters in a cross-nested General Linear (Mixed) Model, i.e. the R-package lme4 (Bates, 2010a, 2010b). This extends the use of cross-nested network regression analysis pioneered in the p2-model and previously applied to binary longitudinal one-mode networks (de Nooy, 2008; van Duijn, Snijders, & Zijlstra, 2004; Zijlstra, van Duijn, & Snijders, 2009) to continuous longitudinal two-mode data.

4 Results

4.1 Description of the variables

The dependent variable is the issue position of a party with respect to an issue on a given day, so we first present an overview of the issue positions of the parties during the last 10 weeks of the campaign. Table 1 shows the parties (left-wing to right-wing arranged from left to right) and issues (sorted top-down from issues supported by left-wing parties to issues supported mainly by right-wing parties), with average issue position in the cells. Overall, issue positions are more often pro than con (the overall average is .31). There are

marked differences among parties with respect to the pro versus con positions as well as among issues. Effects of these random factors are to be expected in the multilevel model.

Perhaps most interesting are the standard deviations of the issue positions of parties. If a standard deviation is zero, a party has maintained the same issue position during the last 10 weeks of the election campaign, which includes having no standpoint. This is the case only in a minority of party by issue combinations, which indicates that during the campaign the parties either exhibit some random variation in their issue positions or they adjust their issue positions systematically. Some parties are much more persistent in their issue positions, notably some new parties PvdD (zero variation on 7 issues) and the PVV (no variation on 6 issues), as well as the older small party CU (no variation on 6 issues). All three large parties (PvdA, CDA, and VVD) change their positions on all issues during the last 10 weeks of the campaign.

Table 1 - Average issue positions during the last 10 weeks of the 2006 Dutch election campaign ($N = 7,800$).

Issue		SP	GL	PvdA	PvdD	D66	CU	CDA	VVD	SGP	PVV
Environment	Mean	.82	.61	.95	.83	1.00	1.00	.23	.03	-.10	.00
	SD	.22	.30	.07	.38	.00	.00	.28	.38	.30	.00
immigrants	Mean	1.00	.76	.44	-.03	.48	.54	.27	.02	.22	-.48
	SD	.00	.29	.25	.21	.32	.34	.12	.24	.74	.32
Education	Mean	.94	.77	.81	1.00	1.00	.75	.40	.43	.46	-.56
	SD	.13	.35	.21	.00	.00	.44	.13	.21	.49	.63
Leftist	Mean	.82	.71	.49	-1.00	.30	.63	-.04	-.10	.49	.00
	SD	.15	.08	.22	.00	.48	.22	.21	.25	.69	.00
Health	Mean	.47	1.00	.56	1.00	.39	.70	.32	.21	.90	.00
	SD	.44	.00	.24	.00	.78	.25	.15	.27	.30	.00
Value	Mean	-.32	1.00	.59	-.10	1.00	1.00	.37	.59	-.80	.94
	SD	.50	.00	.37	.30	.00	.00	.24	.18	.60	.25
new left	Mean	.38	.31	.60	.97	.49	-.74	-.02	.72	-.21	.50
	SD	.56	.67	.18	.10	.46	.43	.25	.22	.27	.00
EU	Mean	-.87	.53	.13	.00	.98	.00	.12	.12	-.10	-.20
	SD	.34	.50	.45	.00	.13	.00	.48	.58	.30	.40
Infrastructure	Mean	-.45	-.19	.29	.00	1.00	.00	.28	.54	.00	-.78
	SD	.52	.55	.46	.00	.00	.00	.21	.15	.00	.00
Crimefight	Mean	-.74	.47	-.62	.00	.48	-1.00	-.11	-.57	.32	-.45
	SD	.59	.89	.37	.00	.60	.00	.22	.30	.47	.36
Rightist	Mean	-.27	.10	-.12	-.10	.20	.04	.32	.29	.10	-.22
	SD	.28	.42	.24	.30	.56	.68	.11	.17	.96	.90
Christian values	Mean	.52	.06	.77	.23	-.13	.98	.81	.51	1.00	.27
	SD	.50	.67	.22	.43	.33	.06	.13	.59	.00	.45
Democratization	Mean	.23	.83	.48	.00	.71	1.00	.43	.11	1.00	1.00
	SD	.70	.33	.57	.00	.38	.00	.38	.41	.00	.00

The issue positions of parties approximate a normal distribution, except for three peaks. Parties often simply state that they are against (-1), indifferent (0) or pro (+1) a specific instantiation or subissue of an issue. The distribution of the predictors is more or less normal with little peaks at the extremes only for the ideological tit-for-tat variable.

The predictors correlate positively with the dependent variable, especially the autoregression term ($r = .71$) and ideological realignment ($r = .54$) (Table 2). Inspection of scattergrams (not reproduced here) show that the linear relations can be expected. The correlations among some of the predictors are substantial, especially between ideological tit-for-tat and partisan transitivity (.40) or ideological realignment (.28). The latter predictor also correlates moderately with the autoregression term (.36).

Table 2 - Pearson correlations among the variables in the model ($N = 7,800$).

	Issue position	Issue position 2 weeks before	Partisan transitivity	Ideological tit- for-tat
Issue position 2 weeks before	.71			
Partisan transitivity	.19	.11		
Ideological tit-for-tat	.28	.17	.40	
Ideological realignment	.54	.36	.19	.28

4.2 Results

Table 3 shows the results of the network autoregression model with cross-nested random effects (Model 3), preceded by two bottom-line tests of the autoregression model without network effects and without cross-nested random effects (Model 1), and of a network autoregression model without cross-nested random effects (Model 2). A look at the goodness-of-fit criteria (e.g. -2 LogLikelihood) at the bottom the table shows that the full model does a better job than the network autoregression model, which does not allow for variations between different parties and different issues, which in turn does a better job than a bare autoregression model. The explained variance R^2 , which is not the best but the easiest to interpret measure of Goodness-of-Fit, amounts to 50% (0.499) for the

autoregression model, 60% (0.600) for the network autoregression model, and 70% (0.699) for the network autoregression model with cross-nested random effects.

Table 3 - Estimation results.

	1		2		3			
	Autoregression model (OLS)		Network autoregression model (OLS)		Network autoregression model with cross-nested random effects (REML)			
	B	SE(β)	B	SE(β)	Fixed part		Random part	
					B	SE(β)	SD(β) per party	SD(β) per issue
Inertia (autoregression)	0.71*	0.01	0.58*	0.01	0.46*	0.07	0.19	0.15
Partisan transitivity			0.06*	0.02	0.10	0.07	0.14	0.20
Ideological tit-for-tat			0.11*	0.01	0.18*	0.08	0.23	0.10
Ideological realignment			0.90*	0.02	1.31*	0.26	0.66	0.52
Constant	0.10*	0.01	0.04*	0.01	0.09*	0.03	0.05	0.08
Units	7800		7800		7800		10	13
Goodness of Fit								
R ²	0.50		0.600		0.70			
-2 LogLikelihood:	9321		7546		5800			

The relatively low explained variance of 50% for the autoregression model (Model 1) points out that issue positions are not stable during a campaign. Model 2 shows that parties adjust their issue positions with respect to issues on the basis of partisan transitivity, ideological tit-for-tat, and ideological realignment. Thus, hypothesis H1 and hypotheses H2, H3, and H4 can be confirmed. The evidence that parties adjust their issue positions sequentially and systematically on the basis of network strategies discards the alternative hypotheses that variations in issue positions in an election campaign are merely a matter of media noise, of coding unreliability, or of deliberate random ambiguities in issue positions of a party to catch voters who disagree with its issue positions.

The estimated parameters from the full network autoregression model with cross-nested random effects (Model 3) show considerable variation between parties and between issues with respect to the strength of autoregression, partisan transitivity, ideological tit-for-tat, and ideological realignment. It should be noted that the unstandardized regression coefficients in this table can be compared directly with each other, since all independent variables are measured on the same -1..+1-measurement scale.

Further standardization on the basis of sample standard deviations would be tricky (Gelman & Hill, 2007).

Partisan transitivity does no longer show significant effects at the aggregate level when cross-nested random effects are included, which means that generally speaking parties will not take over issue positions from another party simply because that party was supported recently. More likely the party will withdraw its support in case of unexpected issue positions of befriended parties but the dynamics of the one-mode network are beyond the scope of this paper. The random effects, however, suggest that the partisan transitivity effect holds for some parties and some issues.

Ideological tit-for-tat applies more generally, which means that parties do play an ideological tit-for-tat game. A party will respond to attacks from another party with issue positions that contradict the issue position of the attacking party. To put it differently, parties will "rationalize" attacks from others, which is a sensible strategy, since media effects research shows that attacks from other parties can be turned into an electoral advantage if "owned issues" can be put on the media agenda in turn (Kleinnijenhuis, Van Hoof, et al., 2007).

Ideological realignment shows the strongest effects across the board, which means that parties give up specific issue positions that are not shared by their ideological friends, whereas they will accentuate issue positions that are shared by their ideological friends or opposed by their ideological adversaries. This result shows that statements on issue positions in the media are consequential to the issue positions that other parties broadcast through the media. Thus, the discussion of political issues triggers its own development.

Table 4 presents the actual variation in strategies of different parties and their unique approaches to various issues, based on the summation of fixed and cross-nested random effects, alongside with an overview of the seats obtained in the Dutch Parliament in 2003 and 2006. To make sense of this table we first highlight the parties that used a specific strategy.

Table 4 - Variation in strategies between parties and between their approaches to various issues

				inertia	partisan transitivity	ideological tit-for-tat	ideological consistency	intercept
fixed effects				0.46	0.10	0.18	1.31	0.09
fixed plus random effects per party								
party	party family	seats 2003	seats 2006					
SP	socialists	9	25	0.34	0.26	0.71	0.72	0.02
GL	ecologists	8	7	0.38	0.11	0.32	1.18	0.15
PvdA	social democrats	42	33	0.36	-0.08	0.03	1.56	0.13
PvdD	animal rights	0	2	0.70	0.12	0.11	0.77	0.00
D66	progressive liberals	6	3	0.46	0.10	0.07	1.19	0.12
CU	orthodox Christian	3	6	0.66	0.03	0.21	0.73	0.06
CDA	Christian Democrats	44	41	0.10	0.13	-0.02	2.19	0.13
VVD	conservative liberals	28	22	0.34	-0.10	0.30	2.67	0.08
SGP	orthodox Christian	2	2	0.55	0.19	0.14	1.01	0.08
PVV/LPF	anti-immigrant	8	9	0.68	0.27	-0.07	1.12	0.14
fixed plus random effects per issue								
Christian norms and values				0.47	0.12	0.07	0.77	0.18
rightist (e.g. less taxes)				0.15	0.57	0.20	2.13	0.04
crimefight				0.66	-0.11	0.18	1.62	0.01
immigrants				0.32	0.12	0.23	1.68	0.11
new left				0.35	-0.03	0.26	1.26	-0.02
environment				0.61	0.08	0.22	0.82	0.06
education				0.43	0.24	0.11	1.22	0.20
leftist (e.g. social security)				0.34	-0.03	0.36	1.66	0.01
health				0.33	-0.10	0.14	1.44	0.18
valence (e.g. employment)				0.54	0.32	-0.02	0.65	0.20
democratization				0.54	-0.03	0.23	0.81	0.08
infrastructure (e.g. investments in roads)				0.61	0.01	0.17	2.13	0.06
Europe				0.55	0.19	0.22	0.90	0.06

The animal rights party PvdD and the two small orthodox Christian parties CU and SGP remained most stable during the campaign (0.70, 0.66 and 0.55) respectively, which is in line with the univariate description in Table 1. The largest party in the Netherlands in 2003 and 2006 (the centrist Christian-Democrats) was least consistent (CDA 0.10), even less consistent than the Social-Democrats (PvdA 0.36), which is remarkable since the Christian-Democrats mimicked the anti-Kerry campaign of Bush jr. with accusations backed up with daily new evidence to show that the PvdA was a flip-flop party.

The three largest parties PvdA, CDA, and VVD relied most heavily on the strategy of ideological realignment (1.56, 2.19 and 2.67 respectively). They neglected specifically those issues that would not help them to emphasize the agreement with parties with whom

they agreed on most issues, or the disagreement with parties with whom they disagreed on most issues.

SP and GL, the ideologically more extreme but fairly large parties to the left of the PvdA, relied especially on ideological tit-for-tat (0.71 and 0.33 respectively). Direct attacks on them, for example attacks on their competence to rule the nation, were reciprocated with issue positions that contradicted the issue positions of the parties attacking them. SP and PVV, the most extreme parties to the left and the right of the Dutch political landscape, relied also somewhat on partisan transitivity (0.26 and 0.27 respectively). Once they attacked a party, they would also consistently attack the issue positions of that party.

With the wisdom of hindsight one may conclude that the centre leftist PvdA and the centre rightist VVD, who relied almost exclusively on ideological realignment, lost the elections, presumably because they did not have an appropriate answer against the partisan transitivity strategy and the ideological tit-for-tat strategy of more extreme parties to the left and the right of them.

We now highlight the issues that were addressed with a specific strategy. Dutch politicians were especially stable in their statements on crime fight (0.66) but very unstable when it came to rightist issues, i.e. to precise tax reliefs and precise cuts in government expenditures (0.15). The issues that rank high on the ideological realignment strategy define the traditional left-right axis in Dutch politics, ranging from rightist issues (2.13), infrastructure (e.g. more roads, less traffic jams), crime fight (1.62), and immigrants (1.68) to leftist issues and health care. Positions concerning specific left or right-wing issues were realigned with each other, so as to give a clear picture to the voters of the major divisions between the parties in the Dutch party landscape. To a much lesser degree realignment took place for issues that define unique parties, such as Christian norms and values (CDA, CU and SGP, 0.77 only), the environment (GL and PvdD, 0.82), and democratization (D66 and GL, 0.65). Ideological tit-for-tat is strongest for leftist issues (0.36), which means that attacks on a party were often reciprocated with statements

about (the waste of money for) social security. Partisan transitivity, however, was strongest for rightist issues (0.57), which means that once a party decided to attack or to support another party, it usually also attacked or supported that party's issue position with respect to rightist issues.

Thus, rightist issues such as lower taxes and cuts in government expenditures play a pivotal role in Dutch campaign politics. Parties are extremely unstable in their precise issue position but they realign their position in agreement with their overall (dis)agreement on issues with other parties. If they attack other parties, they also attack their issue position with regard to rightist issues. This is in line with advocacy coalitions theory, which predicts that actors adapt their beliefs to their allies. To sum up, the estimated cross-nested random effects displayed in Table 4 provide remarkably fresh insights into the campaign strategies used in the Dutch electoral campaigning to adjust issue positions on a daily basis.

5 Discussion

An actor-based model for network dynamics (Snijders, et al., 2010) applied to the question whether and how parties adjust their issue positions during a political campaign predicts that parties adjust their issue positions on the basis of their information about previous relationships with other parties, as summarized in the longitudinal one-mode network of actors by actors, and their information about previous issue positions of parties, as summarized in the two-mode network of actors by issues. We tested three hypotheses, which were inspired by general network principles of transitivity and structural balance. Parties adjust their issue positions to the issue positions of parties supported by them (H2, partisan transitivity), parties adapt their issue positions to the issue positions of parties that support them while they contrast their issue positions to those who attack them (H3, ideological tit-for-tat), and parties bring issue positions in line with the parties with whom they agree across the range of all issues (H4, ideological

realignment). The predictions that follow from these hypotheses contradict the prevailing consensus in the comparative political science literature (Budge, et al., 2001; Kriesi, et al., 2006) that parties stick to their issue positions in a given campaign (H1, autoregression or *inertia*).

The two-mode network autoregression model with cross-nested random effects that we used to test the hypotheses, assumes that during an election campaign parties decide *simultaneously* on statements about their relationships towards other parties (not the topic of this article) and new statements about their issue positions, and that they rely on the media for the latest news in the media about statements of other parties. The model was applied to daily news about the patterns of criticism and support between parties and issue positions of parties from the last 10 weeks of the Dutch election campaign 2006. The parameter estimates show that parties adjust their issue positions indeed on the basis of partisan transitivity, ideological tit-for-tat, and, most notably, ideological realignment, with 70% explained variance. The variations per party show that the three largest parties CDA (centrist), PvdA (centre left), and VVD (centre right) stuck especially to a strategy of ideological realignment. Whereas the VVD and the PvdA lost at the elections, the electoral gains went to extreme parties at the left (SP) and the right (PVV) of the political landscape, which applied partisan transitivity or combined this strategy with ideological tit-for-tat. The variations per issue show the pivotal role of rightist issues (e.g. lower taxes, cuts in government expenditures) in Dutch politics, among others since issue positions of parties are extremely unstable, whereas parties will react on attacks from their adversaries with attacks on the issue positions of their adversaries with respect to rightist issues.

It should be acknowledged that the estimation of the relative influence of autoregression in the model used here as compared to the influence of the daily news that undergirds the adjustment of issue positions depends on the precise assumptions with respect to the length of the period to observe stability or change in issue positions (here two weeks) and on the speed of the exponential decay of the saliency of previous news

(here a half-life of a week). However, sensitivity analyses that we conducted with other values for the autoregression ‘gap’ and the decay function yield the same substantive results (results can be obtained from the corresponding author). Therefore, we are convinced that each set of reasonable assumptions will lend support for the conclusion that autoregression is not the full story since the adjustment of issue positions during a campaign can be attributed to network based party strategies. It is unlikely that parties stick to predefined issue positions during an election campaign as assumed in much election research. Further research needs to establish whether the changes in issue positions are consequential to election outcomes and policies implemented after the elections.

The network autoregression model with cross-nested random factors applied in the current research deviates from the assumptions often used in longitudinal network research, for example in SIENA (Snijders, et al., 2010). The model used here assumes interval measures of ties in the one-mode and two-mode networks rather than binary measurements. An information environment is assumed that can be estimated on the basis of a content analysis of the daily news, which results in far more time points than in panel network studies. In addition to data on relationships (i.e., criticism or support) and behaviors (i.e., issue positions), our model uses data on the saliency of these relationships and behaviors. The heavy data requirements seem to limit the usefulness of the model. However, due to the availability of browsers and social media on the internet and recent advances in web mining, content analysis software, and text mining algorithms for syntactic parsing and sentiment analysis, gathering the data that meet the requirements of the model will become more easy. Variants of the modeling approach developed in this article can be applied not only to other election campaigns, but also to a variety of different research areas in business, politics, and social life, where actors interact with each other, while building up their own preferences and behaviors.

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