Become who you are: The homing pattern in Partisanship as a self-reinforcing stochastic process*

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Abstract

Partisanship is characterized by a "homing" pattern in which individuals pick a party and alternate between supporting and not supporting it. We present a stochastic model in which the probability to announce an attachment depends on an initial propensity to support the party and the number of times support has been announced before. The model reproduces the empirical distributions of the total number of utterances of party preferences in German panel data holding the longest and most dense measurement of Partisanship worldwide.

1 Introduction

Voters announcing a partisan attachment are not only likely to vote for "their" party, find its candidates more appealing and follow its position on a given issue. Rather, they will also support it for extended periods of time. Newer work, however, has indicated that partisanship is more dynamic than expected and that most voters oscillate in and out of a strongly bounded attachment [29, 25]: Instead of always sticking with a party, they alternate between partisan support and independence. Also, they do not seem to pick freely from the partisan menu but rather confine support to a subset of parties. As a consequence, a voter may support a party at one point in time, then claim no partisanship later on, after which he or she returns to supporting the same party again only to switch back into independence again later on. This "homing" pattern is present in the United States and Canada [5, 4], Great Britain [29, 4] and Germany [25, 29, 21]. Naturally, the question arises what might produce it.

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We present a stochastic process that produces the observed pattern. Its idea is that partisanship is two superimposed types of information: *which* party a voter identifies with and *whether* or not that identification is announced. Allowing both decisions to be independent, we fix the former and model the latter as an autocorrelated process. Since announcement behavior thus becomes self-referring, our model indicates that much of the dynamics in partisanship is neither a reaction to political events nor measurement error but rather the patterned traces of an ongoing identification with a stable structure. Our model also suggests that the two main competing theoretical models of partisanship – the social identity model and learning models proposed by Rational Choice – may be unified into a coherent whole. We proceed as follows: After introducing our dataset, we describe the homing pattern. Next, we present the model and validate it. We then discuss how our findings relate to the main models thought to underlie partisanship including ramifications for adjacent debates.

2 Data

We analyze 965 individuals from the German Socio-Economic Panel (SOEP) [26]. This survey has been following respondents since 1984 and also keeps track of all other persons in their household. Among the questions asked is also the German standard partisanship question which captures the concept well [9]. Our individuals have answered the partisanship question in all waves from 1984 to 2010, yielding 27 consecutive answers.[1] Apart from 14 respondents, all belong to the 9076 original West-German respondents the panel began with.

To clarify whether our subset may have become biased by panel attrition, we used Chi-square and Mann-Whitney tests to check how representative our individuals are of the initial sample on indicators related to partisanship. Except for gender, these tests indicated that the subset is indeed different, but the extent of deviations is small and significance appears mainly due to the high number of cases: For political interest[2], the subset has slightly more respondents strongly interested (30.8 vs. 26.9 per cent) and less without any interest (8.7 vs. 14.5 per cent), yet average interest is virtually identical (1.38 vs. 1.34; no interest = 0, very high = 4). Individuals are slightly better educated (24.4 vs. 29.1 per cent general elementary, 73,1 vs. 68.8 per cent middle and higher education) and more affluent (3182 vs. 2987 DM net monthly household income). The subset covers more individuals born between 1930 and 1960 while holding fewer born 1900 to 1930. However, these cohorts do not differ much in terms of their propensities to switch parties or drop an attachment, except for a slightly lower propensity of those born 1940-1949 to drop an attachment [25, p. 590].

[1] While on the whole 1084 respondents provided such a complete history, 119 were excluded because they belonged to one of four overlapping groups whose inclusion would have severely burdened analysis: 61 named "other" parties, yielding ambiguous trajectories, 39 attached to two or more parties simultaneously. Another 39 mentioned parties founded after 1984 (PDS, WASG or Die Linke) and 23 named one of the extreme right wing splinter parties without SOEP recording which one. The remaining 965 always named a single party (or no attachment) and confined themselves to the four major parties, that is social-democrat SPD, conservative CDU/CSU ("Union"), Greens and liberal-democrat FDP.

[2] Political interest was not asked in 1984. We used the 1985 value instead.

100%	**(965)**	**respondents total**			
of which	**21.0%**	**(203)**	**always hold an attachment**		
	of which	38.4%	(78)	with SPD only	
		43.3%	(88)	with CDU/CSU only	
		3.0%	(6)	with FDP only	
		2.5%	(5)	with Greens only	
		12.8%	(26)	shift and name other side (left/right) ...	
		o. w.	69.2%	(18)	... never
			19.2%	(5)	... once
			11.5%	(3)	... two or more times
	74.9%	**(723)**	**sometimes hold an attachment**		
	of which	30.7%	(222)	with SPD only	
		30.6%	(221)	with CDU/CSU only	
		1.1%	(8)	with FDP only	
		2.1%	(15)	with Greens only	
		35.5%	(257)	shift and name other side (left/right) ...	
		o. w.	33.8%	(87)	... never
			37.0%	(95)	... once
			29.2%	(75)	... two or more times
	4.0%	**(39)**	**never hold an attachment**		

Table 1: Breakdown of individuals according to frequency of attachment, party named and side of left-right divide chosen.

3 The homing pattern as an empirical puzzle

Partisanship is characterized by a pattern described as "homing" in and out of a directionally bounded attachment [25, 29]. Two aspects describe this pattern: First, individuals subset available parties and turn their back on one set while, second, varying support for the other [29, p. 32]. As a result, attachments are both stable and unstable: Voters name the same party over and over again, yet *how often* they do so (instead of claiming no partisanship), varies widely. This way, voters are most consistent in which party they do *not* name. This section describes the pattern in detail in order to outline our empirical puzzle.

Directional choice At first glance, partisanship appears unstable. Of all respondents, only 216 (22.4 per cent) never change their answer between, the rest registers a wide diversity of shifts with some changing up to 18 times. Looking at the number of parties involved in these changes, however, indicates that this impression is only superficial: 66.6 per cent of respondents only mention a single party in 27 years, another 23.9 per cent (231) shift between two parties. Separating respondents according to whether they always, sometimes or never held an attachment fleshes out this picture (see Table 3): While 203 always named an attachment, 39 never mentioned one. The majority (723, 74.9 per cent), however, is located in between these extremes, sometimes holding an attachment and sometimes not.

Within the three groups, there is even more stability: Of those always holding an attachment, 87.2 per cent never change the party named. Only a minority shifts attachment and most of them do so between the usual coalition partners (SPD and Greens vs. CDU/CSU and FDP) staying consistently on one side of the left-right divide. Of those who crossed the divide, the larger part quickly returned after a single-year. For respondents only sometimes attached, the picture is comparable: Nearly two thirds of those who at some point have claimed independence always returned to the same party over and over again. While they are less faithful than the first group, their choice is remarkably stable directionally. The remaining 35.5 per cent in this group who shift their attachment between parties is considerably larger. Yet, for 70.8 per cent of them, movement is constrained to or mostly to usual coalition partners. Only 75 persons mention the other side more than once. Obviously, the left-right divide is a strongly structuring pattern here, as well.[3] Most respondents are highly stable in the directional aspect of attachment. They call themselves independents from time to time but usually return to the same party over and over again. Those who do change usually transfer attachment from aunt to uncle and back but do not leave the family. Taken together the whole system is quite stable, not just at the level of parties but even more so at the level of the left-right divide.

Recoding individuals into left (SPD/Greens) and right (Union/FDP) attachments with independence as a third category, we may visualize the directional stability of partisan attachments in a two-dimensional histogram or heatmap (see Figure 1). In the plot, announcements of a left attachment constitute the horizontal and announcements of a right attachment the vertical axis. Each cell is shaded according to the number of individuals expressing a given combination of answers. Individuals always claiming independence are located in the lower left corner. Going from there to the left are individuals that increasingly often mention a left attachment but never a right partisanship. Going from the lower left upward, the same applies for a right attachment. Stepping from the lower left into the plot, individuals with an increasing frequency of attachments are located along parallels to the main diagonal.

The plot shows how strongly individuals stick to their side of the left-right divide. Most concentrate at the edges meaning that they may be infrequent supporters of their own side but never sympathize with the other camp. Only 18.5 per cent of respondents ever crossed the divide and come to rest in the interior of the triangle. If we count individuals that only mentioned the other side once as basically anchored in one camp, we may directionally account for 91.7 per cent of respondents by simply stably assigning them to one side. Looking at the main diagonal shows that although a substantial number of individuals always holds a partisanship, virtually no one moves between the camps and that this pattern remains when partisanship is increasingly intermixed with independence. What determines the camp is obviously much more stable than whether or not the camp is supported.

Frequency of announcements Partisan stability can be gauged by counting how often an individual names a given side, yielding the share of persons that behave loyal to a party or side to a given degree (see Figure 1, right and [29,

[3] The divide can also be seen in the average number of shifts from one party to another between waves: On average, 8.8 individuals change across the divide while 12.6 do so within. Given that there are twice as many possibilities of shifting across than within, the observed ratio of 0.70:1 strongly deviates from the ratio of 2:1 expected for random changes.

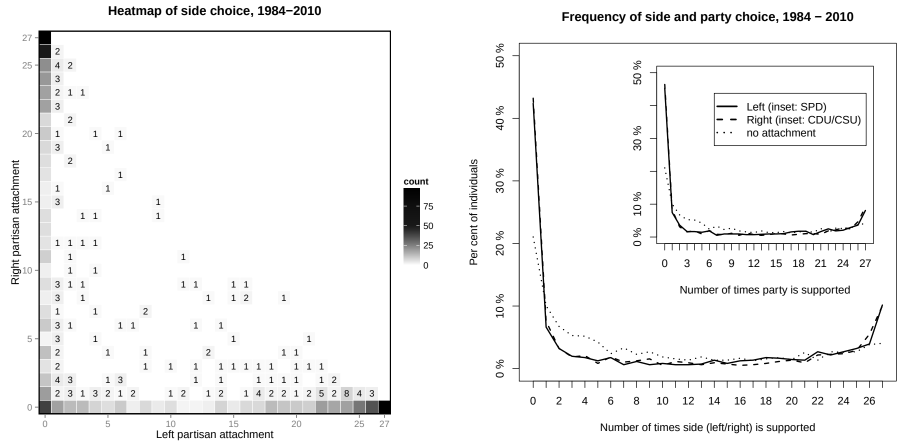

Figure 1: *Left*: Heatmap indicating count of individuals announcing attachment with left (SPD, Greens) or right (CDU/CSU, FDP) side. Bottom-left to bottom-right: increasing announcements of left attachment, bottom-left to top-left: increasing right attachment. Diagonal from top-left to bottom-right: individuals constantly announcing attachment but shifting across divide. For sparsely populated cells, numbers indicate count of individuals. *Right*: Constancy of announcements for both sides (margins of heatmap). Inset: Constancy of announcements only for major parties for SPD and CDU/CSU.

p. 42f]). Effectively, this amounts to taking the margins of our heatmap.[4] For both sides, a large share of individuals never picks that side. This spike at zero count is followed by a sharp drop to a few individuals (between one and two per cent of the subset) who select the side more often. When approaching regions with higher support rates, the number of individuals rises again: 14.1 per cent of individuals (136 respondents) have named a left attachment for 27 years in a row or only failed to name it once, 15.5 per cent (150 individuals) have similarly named a right attachment. The constancy of naming no attachment, however, is quite different, dropping slower and only slightly rising for those who (nearly) never name a partisanship. Its deviation from a binomial indicates that shifts into independence are not random.

Another aspect of partisanship is its stickiness over time [29, p. 41]. Cross-tabulating adjacent waves, we can calculate an individual's propensity to announce a partisanship given his or her attachment in the preceding year (see Table 2). The heavy diagonal indicates that respondents tend to stay with their current choice while the elevated probabilities for turning into independence and for returning into an attachment capture the homing pattern. Indeed, the only category communicating with all other states is independence. Change between the other states is widely absent, except for changes within blocks.

Even for a time-horizon of nearly three decades, partisanship follows a clear and simple pattern: Individuals appear stably anchored in one side of the left-right divide which they (if ever) leave mostly for negligible periods of time. Yet, support for one's own side is volatile: some always announce an attachment

[4]Figures for the left-right divide and for the two major parties are virtually identical, so we report details for sides only.

t / t+1	Indep.	SPD	Union	FDP	Greens
Indep.	0.778	0.097	0.099	0.012	0.013
SPD	0.113	0.860	0.012	0.002	0.012
Union	0.111	0.010	0.867	0.010	0.001
FDP	0.168	0.028	0.096	0.701	0.006
Greens	0.123	0.100	0.009	0.001	0.768

Table 2: Transition matrix 1984-2010.

while most are faithful only at an intermediate level. The lack of directional movement and the virtually identical appearance no matter whether parties or sides are considered makes the shifts into independence appear astonishingly independent of the substantial content of partisanship. We will use this fact in the next section as basis for our model of the homing pattern.

4 The model

Our model considers an agent's announcement of an attachment to a party (or alternatively, side of the left-right divide) in regular panel survey waves. Let $x(t) \in \{0, 1\}$ be the announcement of the agent in wave t, where 0 stands for no attachment and 1 stands for announcing a partisanship for a party. Note that the directional choice in partisanship is treated as constant, i.e. if an agent announces a partisan attachment, it is always with the same party. Time evolves in regular discrete steps $t = 1, 2, \dots, t_{\max}$. Thus, partisanship of an agent is modeled as a sequence of 0's and 1's $(x(t))_{t=1}^{t_{\max}}$.

We model the evolution of an agent's partisanship as a stochastic process where probabilities depend on the whole history of the agent's partisanship. The key static parameter is the agent's *interest in politics* $q \in [0, 1]$ or probability to announce a partisanship independent of his/her history. The history of an agent's partisanship is summarized in the number of announcements up to time t as $\bar{x}(t) = \sum_{s=0}^{t} x(s)$ with $\bar{x}(0) = 0$. The *probability to announce a partisanship* at time $t+1$ is $p(t, \bar{x}(t)) = (\bar{x}(t) + q)/(t + 1)$. The probability of announcement at time $t = 1$ is thus equal to the interest in politics $p(0) = q$. The probability for announcements at later times $t + 1$ is determined more and more by the fraction of already announced partisanships up to time t and only to a fraction of $1/(t + 1)$ by q. The dynamic stochastic equation of an agent's partisanship announcements is

$$x(t+1) = \begin{cases} 1 & \text{with probability } p(t, \bar{x}(t)), \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

In terms of probability theory, each announcement is a draw from a Bernoulli random variable with a success probability $p(t)$, while $p(t)$ depends on t, $\bar{x}(t)$ and q. The modeling framework and the computation is demonstrated by an example in Table 3. Each next step in the process $x(t)$ depends on the full history before. The process is thus not a Markov process. From Equation (1) a

Data	Year	1984	1985	1986	1987	1988	1989	1990
	Partisanship	Yes	No	Yes	Yes	No	Yes	Yes
Model with $q = 0.5$	t	1	2	3	4	5	6	7
	History of Partisanship up to $t-1$	none	1	1	1	1	1	1
				0	0	0	0	0
					1	1	1	1
						1	1	1
							0	0
								1
	$\bar{x}(t-1)$	0	1	1	2	3	3	4
	$p(t-1)$	0.50	0.75	0.50	0.63	0.70	0.58	0.64
		by random draw with probability $p(t-1)$						
	$x(t)$	1	0	1	1	0	1	1

Table 3: Example data and its representation in the model. The new party attachment of an agent (Yes or No) is assigned by a random draw with a probability which is computed from its history of partisanship and the fixed parameter q with $\bar{x}(t) = \sum_{s=1}^{t} x(t)$ and $p(t-1) = (\bar{x}(t-1) + q)/t$.

process on $\bar{x}$ can be derived with the dynamic stochastic equation

$$\bar{x}(t+1) = \begin{cases} \bar{x}(t) + 1 & \text{with probability } p(t, \bar{x}(t)), \\ \bar{x}(t) & \text{otherwise.} \end{cases} \tag{2}$$

This process is a time-dependent Markov process, as the new number of announcements only depends on the number of announcements so far and the current time step. It is also self-reinforcing, as it rewards an attachment with an elevated probability to utter another attachment. At the same time, not stating an attachment leads to a lower probability to utter another attachment. The effect of these competing processes is that agents who announce a partisanships several times early in their career are rather likely to remain partisan in the future while the ones who do not are likely to remain unattached.

By fixing the parameter q to a certain value one can simulate the evolution of partisanship announcements of a society of N agents analog to the real-world data from the SOEP. With this simulated society we can extract the aggregate signature of the homing pattern as the histogram of $\bar{x}(t)$ as in Figure 1 (right). Additionally, the theoretical distribution of $\bar{x}(t)$ can also be computed iteratively by multiplication of the time-dependent Markov transition matrices. To that end, we define the probability mass function of $\bar{x}(t)$ as a row vector

$$F(t) = [F_0, F_1, \ldots, F_{\bar{x}}, \ldots, F_{t_{\max}}]$$

where the index $\bar{x}$ represents the number of announcements and $F_{\bar{x}}(t) \in [0, 1]$ represents the relative frequency of this number of announcements at time t. It must hold $\sum_{\bar{x}=0}^{t_{\max}} F_{\bar{x}}(t) = 1$. By the nature of the process, it is clear that $F_{\bar{x}}(t) = 0$ whenever $\bar{x} > t$, as there can only be as many announcements as time steps. The dynamic equation of the probability mass function is thus

$$F(t+1) = F(t)T(t) \tag{3}$$

where $T(t)$ is the Markov transition matrix derived from Equation (2). Its transition probabilities are

$$T_{\bar{x},\bar{x}+1}(t) = \begin{cases} p(t,\bar{x}) = \frac{\bar{x}+q}{t+1} & \text{when } \bar{x} \leq t, \\ 0 & \text{otherwise,} \end{cases}$$

$$T_{\bar{x},\bar{x}}(t) = \begin{cases} 1 - p(t,\bar{x}) = \frac{t+1-\bar{x}-q}{t+1} & \text{when } \bar{x} \leq t, \\ 1 & \text{otherwise.} \end{cases}$$

All other transition probabilities are zero, as in one time step $\bar{x}$ can only either increase by one or stay as it was. Note that the matrix indices start with $\bar{x} = 0$ in this formulation. The entries for $\bar{x} > t$ are just noted for completeness of the matrix definition. In the computation of model trajectories the fraction of agents with more announcements than time steps will always be zero. An example transition matrix for $t = 2$ is

$$T(2) = \begin{bmatrix} \frac{3-q}{3} & \frac{q}{3} & 0 & \cdots & & & \\ 0 & \frac{2-q}{3} & \frac{1+q}{3} & \ddots & & & \\ \vdots & \ddots & \frac{1-q}{3} & \frac{2+q}{3} & & & \\ & & & 1 & 0 & & \\ & & & & \ddots & \ddots & \end{bmatrix}.$$

The theoretical distribution of the number of announcements of partisanship after $t_{\max} = 27$ time steps – similar to the histograms extracted from the data – can for example be computed for a certain value of q by

$$F(27) = F(0)T(0)T(1)T(2)\cdots T(26)T(27)$$

with $F(0) = [1, 0, \ldots, 0]$ (i.e. at time zero all agents have zero announcements).

5 Model validation, analysis and prediction

Parameter estimation How well does our model produce the homing pattern? Frequency and constancy of attachments solely depend on q, so we may fit our model by dichotomizing the partisanship variable (i.e. *announced* vs. *not announced*) and calculate the share of individuals who have named an attachment a given number of times. We can then find an aggregate distribution from the Markov process by sweeping the range of q, looking for a distribution that minimizes the sum of squared distances to the data. The resulting value is an estimation for the average outset probability in our subset. Since the fitting procedure is on a macro level, we used the obtained value of q to inform another, agent-based model yielding artificial micro data which we can compare more extensively to the empirical observations.

Optimizing model fit by least square minimizing the distances of histogram and theoretical prediction yields an estimated value of $q = 0.641$ indicating that

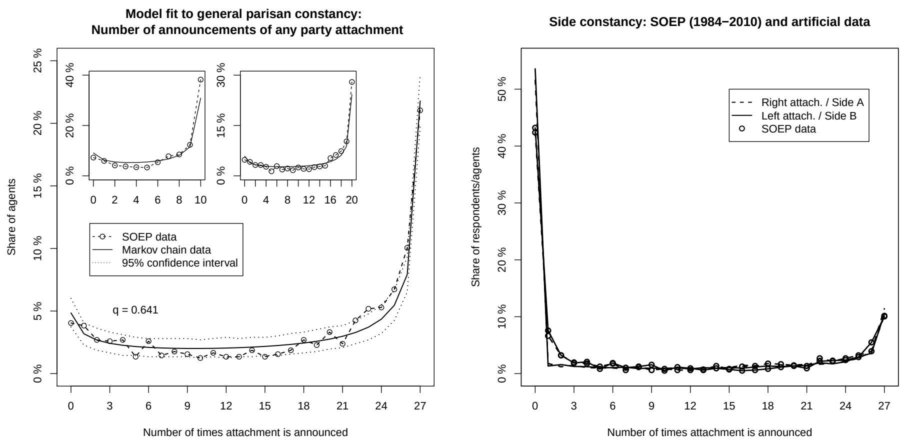

Figure 2: Fit between SOEP and artificial data ($q = 0.641$) for counts of attachments. *Left:* Data from Markov chain, confidence intervals from 1000 runs of agent model ($n = 965$). Insets: Model behavior for first 10 and first 20 steps of panel. *Right:* Constancy of side choice. Simulated data from Agent model ($n = 5000$, Side A:Side B = 1:1).

individuals have a close to two thirds chance to name an attachment in the first round. Visually, the fit to the SOEP data is good (see Figure 2, left). On average the Markov chain estimation is 0.67 percentage points off from SOEP data. The agent-based model reproduced the Markov chain data, indicating that both models are aligned. In the following we will compare this agent-based artificial data to our subset from the SOEP. To simulate a left-right divide, we randomly labeled one half of the agents as "Side A" and the other as "Side B".

Model validation The plots for constancy of side choice fit the data well, too (see Figure 2, right): The only difference between the artificial data and the SOEP is a higher fraction of individuals never naming one side and a small area in the bottom left of the plot indicating that there is more individuals in the SOEP who name a side once or twice than our artificial data would expect. However, this difference is trivial since we fixed the directional choice of partisanship[5] keeping our agents from experiencing short-lived attachments to the other side observed in the SOEP which mainly inflate counts of one and two attachments. On average, our model is off by 0.92 percentage points (Side A vs. right partisanship) and 1.03 percentage points (Side B vs. left partisanship). Excluding bins with two or less mentions, these values drop to 0.39 and 0.42.

Interestingly, our model produces all the behavioral patterns observable in the data from a single process: As in Figure 1, there is a group of agents who (nearly) never announce an attachment, at the same time some (nearly) never fail to mention a partisanship. In between there is a close-to-uniformly distributed area in which agents more or less often announce a partisanship. These multiple types of behavior have been observed before, but assumed to

[5]Setting directional choice constant, we treat it as running on a different, slower time scale that can be held fixed for the purpose of modeling the short-term homing pattern.

t / t+1	Indep.	Side A	Side B
Indep.	0.682	0.155	0.162
Side A	0.180	0.820	0.000
Side B	0.178	0.000	0.822

t / t+1	Indep.	Rep.	Dem.
Indep.	0.703	0.137	0.160
Rep.	0.140	0.837	0.023
Dem.	0.129	0.024	0.847

Table 4: Left: Transition matrix for agent data ($q = 0.641$, 5000 agents, Side A:Side B = 1:1), calculated over 27 waves. Right: Transition matrix from four-wave NES panel 1992-1996, reproduced from [1, p. 215]. Cells rearranged.

stem from qualitatively different processed going on within voters [21, p. 478]. However, our model shows that the broad variety of empirical partisans may all be of the same breed (and not even require that individuals vary in parameters).[6]

Another way to investigate the fit is to compute transition matrices as in Table 2 from the simulation data. Again, results agree with empirical evidence: The matrix has the expected heavy diagonal indicating the low propensity of partisan shifts. At the same time, both sides commute with the "no partisanship" category which retains respondents at a lower rate than both sides of the divide. Our matrix also quite well resembles data for the United States registering changes between democratic and republican partisanship and independence (Table 4).

While our model reproduces many characteristics of the data well, there are also aspects for which the fit is lower (Figure 3, right): Counting the number of changes per agent indicates that our simulated voters record somewhat more shifts to and from independence than do real people. Also, while a cross-sectional view calculating the share of partisans per year produces a considerable artificial partisan ebb and flow, the empirical data shows more variance and a visible dealignment trend indicating that while partisanship can be modeled as primarily extra-political it is obviously not exclusively so.

Prediction Another way to assess model quality is to examine its predictive power. For each individual in our dataset we set $q = 0.641$, calculated $\bar{x}(t)$ from the history of partisan announcements 1984-2009 and derived the proba-

[6] One criticism may relate to age and argue that all agents begin their partisan career at $t = 1$ and thus have an identical "age". As a robustness check we created an artificial panel in which agents had an age-structure identical to SOEP: For every individual we had five agents start the random process 17 years (rounds) before that individual was born to mimic a lag for political socialization. We ran the panel until the artificial year 2010. As an example: For a person born 1950 we would have five agents start at "year" 1967 and run for 44 rounds. We took the artificial years 1984-2010 and re-calculated all statistics. Results do not change.

Prediction matrix: 82.4 % correct, $\phi = 0.714$		Observed: attachment	Observed: no attachment
Predicted	attachment	561	118
	no attachment	52	234

Table 5: Confusion matrix indicating number of correct and false predictions for 2010 partisanship based on SOEP data 1984–2009. See also Figure 3.

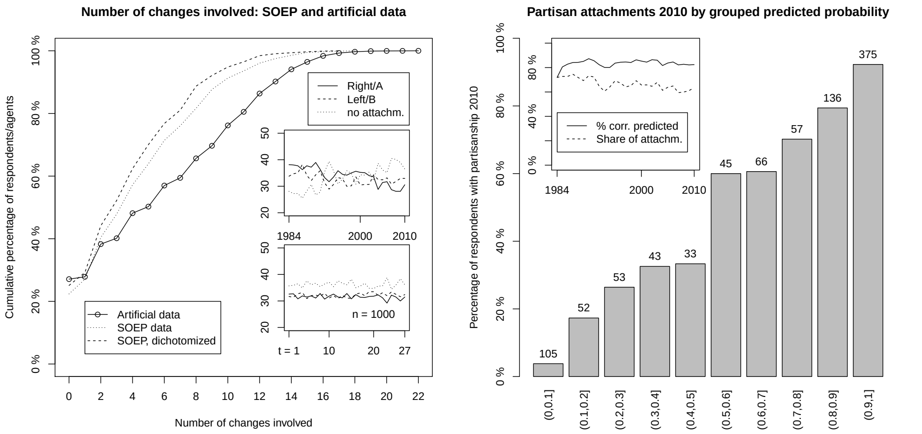

Figure 3: *Left:* Observed number of changes in 27 waves, cumulative share of respondents for artificial data (1000 agents, $q = 0.461$, Side A:Side B = 1:1), regular SOEP data and dichotomized (attachment vs. no attachment) data. Insets: Share of individuals attached to one/no side in SOEP 1984–2010 (upper inset) and share of agents attached to one/no side (lower inset, 1000 agents). *Right:* Share of individuals in SOEP announcing a partisanship in 2010 as function of grouped announcement probability, predicted from partisanship announcements 1984–2009. Group size above bars. Inset: Correctly predicted individuals in SOEP and share of partisans (dashed line). Prediction based on years 1984 to last year before predicted one.

bility of announcing a partisanship in 2010. The results are depicted in Figure 3 (right) showing the share of respondents who indicated an attachment by their grouped probability. The linear rise in the share of partisans over all probability groups indicates that our model predicts individual behavior quite well. Around a predicted probability of 0.5, classification is somewhat reduced but this may also be due to the rather small count of individuals. Dichotomizing predicted probability and tabulating it against observed attachments for 2010 yields a Classification matrix with false positives and false negatives (Table 5). We find that 82.4 per cent of cases are classified correctly and that we are a bit more likely to expect no attachment when in fact there is one. Interestingly, the predictive fit is also quite high, when shorter time spans are used: Predicting partisan attachments for 1984 (with $\bar{x}(t) = 0$) and the successive years (including announcement history from the beginning of the SOEP until the year preceding the predicted one) always yielded a correct prediction of around 80 per cent of individuals (inset Figure 3, right), independent of the share of partisans in the empirical data.

Model analysis If we take our model as an acceptable approximation, the role of q is obviously central. For $q = 0$ voters would not develop any attachment, for $q = 1$ everyone would be partisan all of the time. A natural question then is: What happens, if q changes? Figure 4 plots the share of individuals that announce a given number of partisan attachments over possible values for q within a timespan of ten years. Two aspects become visible: First, with

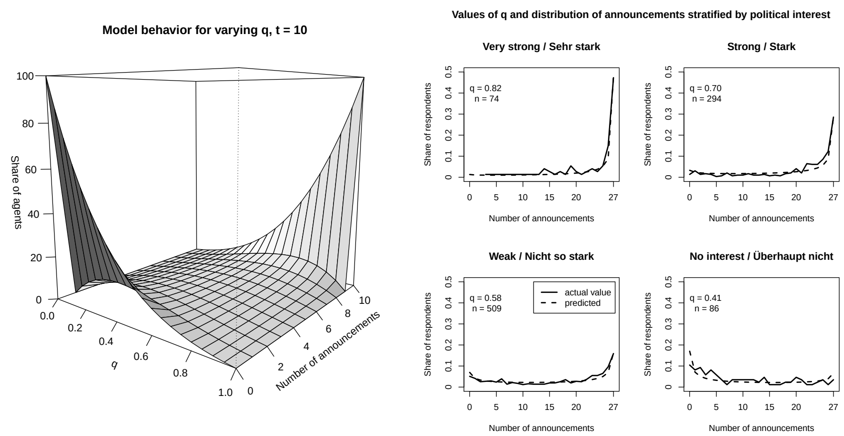

Figure 4: *Left:* Share of partisans naming a given number of attachments over a timespan of $t = 10$ years over varying q. *Right:* Aggregate distributions of partisan announcements for different levels of political interest plus best fits from Markov chain model. Values for q and number of respondents in plots.

declining q the share of durably attached individuals decreases nonlinearly but without any kinks or jumps (far side of the surface). Similarly, the number of unattached voters increases (near side). Thus, if q were to decline, the stable base of the party system would slowly erode rather than abruptly break down.

The second aspect is that the share of partisans with intermediate numbers of attachments does not change much over the range of q. The area between both extreme peaks is essentially flat or only mildly convex. However, since voters in this area take up a sizable part of the electorate, some of them can be expected to appear as partisans in a cross-sectional analysis. Yet, the model indicates that these individuals are not very reliable indicators of the overall size of faithful supporters. Including them is bound to overstate the number of steadfast partisans in the system to an unknown degree.

One important question is the meaning of q which we have defined as a measure of political interest. So far we have not shown that this choice is warranted. One simple way to check this is to stratify the dataset along political interest. This yields four very different aggregate distributions of partisan announcements (see Figure 4, right). Fitting different values of q for all four, we find that for all groups, q rises from 0.41 for no interest at all to 0.82 for very strong interest with the resulting distributions again aligning well with the data. This indicates that individuals strongly interested in politics are about twice as likely to "catch" the idea of partisanship and therefore retain an attachment with a higher probability. Given that political interest has already been advanced as an explanation of partisanship [29, p. 53] in several other works, this result is certainly reassuring.

6 Discussion

Even today, most voters "give every appearance of having some generalized prior commitments or predispositions to support a particular party" [3, p. 2]. Yet, while partisanship continues to be a major building block in all models of voting behavior, the causes behind it are still contested (see [3, 14, 13]). We discuss which contributions our model may give to the understanding of partisanship.

Models of partisanship Undoubtedly the main debate concerning partisanship is whether it is a function of voters' identities or whether it is as an attitude stemming from an evaluative process [3, p. 5]. The former (*party identification*) model argues that party adherents see themselves as part of a social group of partisans. Because this membership has an emotional significance to them, they follow the group's norms such as holding the "appropriate" attitudes, casting a vote for the "right" party or the like. Usually, partisanship is seen as embedded in a web of pre-political identities such that "secondary party identities are founded on primary group memberships (race, religion, social class, trade union membership, region and so on)" [3, p. 8] (see also [20, 19, 27]). As a consequence, partisanship affects behavior and short-term attitudes while itself remaining independent from them. Similarly, model expects high partisan stability due to the sluggishness of identities [11, p. 23].

The *party evaluation* model assumes partisanship to stem from a favorable evaluation of a party, i.e. how attractive a voter deems its leaders, platform an the like. Subsequently, partisanship is independent of group attachment and more akin to a favorable attitude [3, p. 5] (see also [24, 23, 3]). At their core, most models in the evaluation tradition are learning models that take partisanship to be a function of issue preferences and retrospective performance evaluations [3, p. 13]. In the most influential one [10], partisanship is a function of present and past evaluations of party performance, a "running tally" of evaluations. Because experience may change, partisanship may change, too.

While the literature often sees both models in stark contrast, our results indicate that they may in fact be quite compatible. To see why, we have to note a few things: First, partisanship appears to be two superimposed types of information: an element of direction that guides the choice of party and an element of salience that governs whether or not that choice is announced or "revealed". Both appear disjunct: We can both fit q without knowledge of directional information and treat over 90% (if we allow minor deviations) of respondents as if their direction was set in stone[7], independent of their announcement behavior. Second, partisanship appears strongly remote from politics since we can generate most of the patterns in the data without a model of politics and since directions survive strong changes in German politics like the end of the Cold War, party system pluralization and changes in party positions.[8]

[7]We do not mean to say that change is totally absent – shifts *do* happen and it is important to understand them. Yet, we have doubts that independence indicates a genuine political choice since it can be modeled widely intra-individually and since few respondents translate independence into a true consequence and change sides. Rather, what *makes* me a Social Democrat is obviously different from what makes me *realize* I am one.

[8]We do not claim that politics is totally absent from partisanship: When we calculated transition matrices from our data (cf. Table 2) it became apparent that there is variation in them that seems to follow political events. Insofar, both political and non-political elements may be brought together by viewing the transition matrices as the sum of two matrices: One is essentially stable, captured in our model (i.e. heavy diagonal, exchange with independence etc.) and widely non-political. The other contains deviations from it and holds what about partisanship reacts to politics. Also, we do not believe that social communication is irrelevant for partisanship. On the contrary, we believe that it is the main force governing the directional component [29, 28, 11]. Yet, our model suggests that social communication is at best weakly

While both aspects clearly speak for the identification model, which we indeed take to be the basis of the directional element of partisanship, our findings suggest that parts of the story are still missing because this model is silent about what may cause the autocorrelated lapses in and out of partisanship. Here, we believe, is where the learning models advanced by the evaluation model come in. That today's announcement is affected by yesterday's is strongly reminiscent of classical models of learning: Once the connection which party is most appropriate has been made, it becomes easier to repeat it in the future – much like the proverb stats that repetition is the mother of learning.

In other words: Although individuals seem not to shift in direction, they still have to learn which party is appropriate from them. Even with a low initial probability, an individual can in principle develop a full-fledged partisanship. Yet, this partisanship can only come about through a process of repeated activation or learning. Seen from this point of view, both the identity and the evaluation model may be taken to simply refer to different aspects of partisanship: While the former seems appropriate for the directional component, the learning perspective taken by evaluation models appears better suited to understand the salience component. Of course, this requires to re-evaluate what it exactly is that voters learn – after all, what is the "right" party for one's primary group may well be some translation of mean benefit streams.

Are leaners partisans? A common observation is that people claim independence but behave partisan [16, 15, 6, 7, 8, 22]. These "leaners" fit uncomfortably with both models of partisanship: Identity-driven partisan behavior should end when the identification ceases. Yet, this is also true for an avaluation-driven one. Empirically, however, leaners are partisan, not only regarding stability of voting behavior but also in terms of most other attitudes and behaviors [22, 15], among these even participating in primaries [15, p. 82]. Still, a good explanation what makes a person a leaner is hard to find [15, p. 179].

Our model suggests a simple answer: Leaners are partisans who have been interviewed while the salience of their partisanship was suspended – much like e.g. most people hold a gender identity without thinking of themselves in terms of men or women all of the time, obviously without this identity dissolving in the meantime. A corollary of this idea is that the leaner question should travel: Faced with an appropriately phrased item, most independents in a cross-sectional slice of the SOEP should indicate that they still prefer their usual party of choice. Unfortunately, a survey item that would allow us to test this conjecture is currently unavailable.

Measurement errors and partisanship as latent construct Another question is whether partisanship is a latent construct that is measured with error. Here, especially work from the party identification tradition has shown that individuals quickly return to a long-time position when perturbed [11, chap. 2]. Yet, this literature has also concluded that much of the apparent dynamics in partisanship is not true change but rather white noise [12, p. 450]. Our model suggests, that this conclusion should be reconsidered. Much of the apparent instability in partisanship is indeed no change in the strict sense, yet the shifts

relevant for the salience component – knowing that "people like me" are Republicans does not automatically require me to be a partisan, too.

in and out of partisanship are not just random. Rather, they are a substantial and interpretable aspects of the model. Interestingly, if these shifts are actively modeled, measurement appears to be more reliable than expected. However, our model also suggests that directional choice if often difficult to ascertain.

Multiple types of voters? Others have asked if partisanship might follow different models in different voters [2]. For example, Kroh and Selb [17, 18] argue that some individuals behave in line with the identification model while others follow the evaluation model, depending on whether they share their parents' partisanship or not [18, p. 571]. Similarly, Neundorf and colleagues [21] identify two subpopulations with different degrees of partisan stability which they regard as representatives of the respective models of partisanship [21, p. 478]. Bartels and colleagues [1] argue that the behavior of voters shifts from the identification to the evaluation model with increasing age [1, p. 220]. Our results indicate, however, that we do not necessarily need to assume different types of voters. Rather, most of the dynamics in the data can be produced from a single process without even having to vary its parameter.

7 Conclusion and Outlook

We have developed a stochastic process able to explain the homing pattern in partisanship. This process is guided by its own history: Voters enter the electorate with a probability to hold an attachment that depends on political interest. Each round, they use this probability to stochastically decide whether or not to announce a partisanship. They remember the results of their decisions and draw on their memory when deciding whether or not to announce a partisanship. As time goes by, the initial probability phases out and personal history takes over while a voter's partisan trajectory develops from two competing tendencies: On the one hand, taking sides begets taking sides, so individuals are drawn towards a stable partisanship. On the other, attachments are constantly subject to erosion – without regular updating, even the strongest partisanship may weaken and become irrelevant. This process of taking sides superimposes itself on a constant choice of party and sometimes hides, sometimes uncovers which side one is on. Since individual history governs how often this choice becomes visible, all voters are in a sense partisans, yet they still have to learn from themselves how to become what they were all along.

From our model, we draw several implications for the theoretical debates on partisanship. First, given that direction and announcement may be decomposed into independent processes, it becomes possible to associate both competing identity and evaluation models of partisanship with different aspects of the overall indicator. Second, the directional component of partisanship may indeed be viewed as a latent construct, yet measurement is better than expected and disturbances are an essential part of the model. Third, while our findings fit the idea that leaners are "closet partisans" [8], we can show that it is probably unnecessary to assume that voters function along different theoretical models.

So far, our work only scratches the surface. We have not yet been able to make partisanship exactly as "sticky" as in reality. Also, there is still no dealignment trend in our model. Another point to take into account for future work is, that our model was tested on individuals who have answered the partisanship question 27 times in a row. Our tests indicated that these people are not completely representative of the sample but but that differences are small. Yet, even if these people turned out to be a special “corner” of the dataset, chances are that the process observed in them can be found similarly or in a slight degradation in the rest of respondents, too – it might simply suffice to capture response failures as random events or slightly modify out approach. In any way, we are confident that once the crack in the wall has been found, it becomes much clearer how and where to look next.

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