

A Multilevel Model of Party Identification*

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Abstract

We introduce a multilevel model of Party Identification by expanding an existing formalization of social categorization theory and present a preliminary analysis. In the model, agents use information about themselves and social contacts to infer their membership in small social groups. This information is captured as a prototype from which agents adopt appropriate attitudes for group members. It is also used to judge which of a set of parties on a second level is considered as representing the agent's group, resulting in partisan attachment. We investigate the effects of variable ("opinions") and unchanging ("traits") elements in the prototype and the effects of social structural homophily among agents. We find that without homophily, a heavily polarization in opinions may carry over to polarized traits producing situations in which parties find it rewarding to cater only to the interests of subgroups in the population. Homophily erodes this outcome, pointing to the importance of opinion homogeneity in socio-structural groups.

1 Introduction

Elections re-confirm a political community by pointing out who is to govern in the following years. One of the earliest findings (Chapin, 1912) about this process is that while voters are in principle free to pick a different party at each election, they rarely do so, instead voting for the same party for long stretches of time. This ubiquitous phenomenon is known as partisanship and has been theorized to stem from an identification with a party that, under the name of "party identification" (PID, Campbell et al. 1960), forms a cornerstone of social-psychological models of voting. Another observation is that elections organize around parties that can quite readily be sorted according to similar underlying principles in most Western countries along large-scale social groupings. These alignments are usually highly stable although they may be subject to change

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from time to time. This paper tries to integrate both observations by offering an agent-based model of the interpersonal origins of voters' party identification, tying it to the structure of a party system based on the currency of electoral returns. It proceeds as follows: Section 2 outlines the inter-individual basis of voters' party identification tying it to an individual's knowledge about his or her membership in large-scale groups. Section 3 introduces the agent-based model, section 4 gives preliminary simulations, analyzes the model and discusses the results. Section 5 concludes.

2 Theory

2.1 Individual-level calculus of party identification

The term *partisanship* describes the observation that voters tend to vote for the same party over long stretches of time (Bartle and Bellucci, 2009, p. 1). In the literature, two distinct, yet often intermixed explanations for this phenomenon exist. The first one regards partisanship as based in voters' identities. According to it, people feel attached to a party much like to a religious denomination (Miller and Shanks, 1996). This attachment is referred to as *party identification* and held to guide voters to a stable electoral decision. Having the ability to color perceptions, it was taken to be able to stabilize itself and remain often unmoved except for far-reaching changes in individual circumstances. While the original work (Campbell et al., 1954, 1960) derived this notion from reference group theory, later work (Greene, 1999, 2004; Green et al., 2002) has shifted the theoretical basis to social identity theory. Here, a social identity refers to a person's self-image as being part of a group meaning that voters perceive themselves to be embedded within a larger aggregate.¹

The other approach argues that an individual's attachment stems from a continuously updated balance sheet of party performance, a "running tally" of evaluations (Fiorina, 1981). In this view, voters are thought to form loyalties not based on a sense of belonging but rather on how attractive they deem a party's leaders, platform etc. over the course of time. Recent work has tried to organize the debate among the two threads and concluded that this interpretation is

¹According to Social Identity Theory (Tajfel and Turner, 1979) and its later extension Social Categorization Theory (Turner et al., 1987), an individual develops a social identity by categorizing his or her environment into an in-group (of which the person is a member) and an out-group (of which her or she is not a member). Members of the in-group are then regarded as "part of 'me and mine'" (Smith and Mackie, 1995, p. 233) and given both favorable evaluations and preferential treatment while members of the latter are regarded as "outsiders", seen and treated less favorably and in more stereotypical terms. Reasons for such behavior are, in the view of Social Identity Theory, to bolster self-esteem (e.g by participating in group success) and, in the view of Self-Categorization Theory, uncertainty reduction (Hogg et al., 2004, p. 255).

related to the social-psychological concept of attitude (Rosema and Thomassen, 2008; Rosema and Krochik, 2009; Bartle and Bellucci, 2009).² Concerning the conceptualization of partisanship, this definition implies that people attaching to a party favorably evaluate that party, meaning that partisans can be grouped on the basis that they share a common (favorable) perception of an external object. Bartle and Bellucci follow a similar idea when they suggested to call this thread the *party evaluation* aspect of partisanship (Bartle and Bellucci, 2009).

The latter tradition holds a clear concept of what the object of attachment is – it can logically only be the party as organization producing personnel and policies – whereas the identity-based tradition offers three competing views: Individuals may (1) either identify with the party as organization, or they may (2) identify with the set of other adherents. Additionally, in the latter situation, identification may (2a) either exist independently of other social identities a voter may hold or (2b) it may be informed by what groups are connected to the party (see Bartle and Bellucci, 2009, p. 8f, Belknap and Campbell, 1951, p. 620f). The first interpretation is close to a mental quasi-membership, whereas the second one views party adherents as a meaningful group of its own right. The third regards adherents as group as well but effectively ties identification with it to an identification with large-scale social groups outside the political realm. All three interpretations are present in the current literature (see e.g. Bartle, 2003, p. 218 discussing the first, Miller and Shanks, 1996, p. 120 the second or Green et al., 2002 the third one).

While we do not wish to exclude attitudinal elements a priori, our model focuses on the identity-centered approach. This is mainly due to two reasons: First, it has been shown that identities may strongly affect the attitudes a person holds (Hogg and Smith, 2007) thus warranting the notion that identity may precede evaluation. We will return to this point below. Additionally, while the literature has not explicitly or consistently tried to distinguish among the three identity-based approaches outlined, existing work indicates that identification with a party is best described as an embeddedness among party adherents that is informed by other identities voters hold (2b).

For example, Bartle (2003, p. 227) has produced evidence from focus groups that is clearly inconsistent with the notion of a direct identification with a party organization.³ Regarding large-scale partisan groups, Belknap and Campbell

²In social psychology, an attitude is defined as a cognitive representation summarizing an individual's evaluation of an external object. Usually, it is either acquired through directly interacting with the respective object or through interpersonal communication (see e.g. Smith and Mackie 1995, p. 266ff).

³In Bartle's study with focus groups (Bartle, 2003) strongly identifying participants explicitly denied any "sense of belonging" with their party (purposefully depicted as an organization by the author who was present during the discussions) and a soccer team analogy that was suggested as an alternative. Furthermore, they drew a distinction between the party and

(1951) found that people in favor of a party believed that others also in favor of that party would hold attitudes similar to their own. Newer studies (Greene, 1999, 2000, 2004, 2005, see Weisberg and Greene, 2003 for a summary) have begun to probe for elements of a social identity. Their findings bolster the idea that voters conceive of themselves as anchored in large-scale groups of partisan bases that helps them to divide the political world into “us” and “them” (Greene, 2004, p. 138). This has led to a general trend in the literature in which the notion of a direct attachment is successively supplanted by the idea of partisan social groups (Bartle and Bellucci, 2009, 9).⁴

2.1.1 Partisan coalitions as nested identities

Work following the third view extends these results and connects partisan groups to other segments of society by focusing on how a party identification relates to other identities citizens might hold. The central idea is that individuals possess mental images or stereotypes of what the partisan groups stand for. Voters then match up these images against their own self-image to see where they fit into the political picture and attach to the party that best mirrors the picture they have of themselves. This approach sustains the notion of PID as a social identity but sees the process of identification as embedded in and dependent on a wider web of social identities that reach beyond immediate politics. Thus, when determining their partisan identity, voters effectively ask themselves: “What kinds of social groups come to mind as I think about Democrats, Republicans, and Independents? Which assemblage of groups (if any) best describes me?” (Green et al., 2002, p. 8).

The approach builds on findings by the Michigan group (Campbell et al., 1960, chap. 10, Converse, 2006) that highlighted the role of groups in everyday conceptualizations of politics. Campbell and colleagues found that only a minority of voters showed signs of ideological thinking (Campbell et al., 1960, p. 217). Instead, most individuals used an “ideology by proxy” that conceived of parties as taking care of the needs of large-scale social groups. This connection located parties in an “affective relationship” to the group and served as the

themselves as a group (Bartle, 2003, p. 226). This differentiation is even more striking, given that participants were able to distinguish between short-term preferences and the long-term attachment to a party that motivated the development of the indicator (Bartle, 2003, 226f), proving that they had grasped the underlying concept. All in all, this led Bartle to the conclusion that “we still know relatively little about what parties really mean to people” (Bartle, 2003, p. 227).

⁴An interpretation of party identification as a social identity also seems very promising insofar as it explains most textbook observations such as the usual priority of PID to short-term political attitudes (Johnston, 2006), its tendency to move issue positions (Markus and Converse, 1979), its effects on cognition (Cohen, 2003; Bartels, 2002), that one’s “own” party, its candidates and programs receive a more favorable evaluation (Schoen and Weins, 2005, p. 212f; Greene, 2004) and other known correlates (for an overview of the argument, see Weisberg and Greene 2003; Greene 1999).

basis for the individual's trust (Campbell et al., 1960, p. 234f).⁵ In its most elaborate form, this conception regarded politics as a contest among groups with conflicting goals in which parties were stewards of the group's interest. Recently, this notion has been re-examined showing that while ideological reasoning had somewhat increased a view of politics as the realm of groups was still the modal way of categorizing political information (Lewis-Beck et al., 2008, p. 279f).

Work charting this realm of groups for the US has found that the links between parties and groups are highly stable and agreed across society. For example, Baumer and Gold (2007) found that voters possess a quite accurate image of what parties stand for. This image is based both on connections to large-scale social groups – such as the Republican Party being for “big business” and the Democratic Party for “the working man” – and on attitudinal-like elements such as the Democratic Party favoring active government and the Republican Party opposing it (Baumer and Gold, 2007, p. 469).

The links between groups and parties are among the most stable elements of a partisan image (Geer, 1991, p. 224, Baumer and Gold, 1995, pp. 36-39). Interestingly, voters do not only explicitly associate parties and groups but rather also bring group-images to bear in an indirect way: Winter (2010) found that Americans irrespective of political orientation or gender link male attributes to Republicans and female traits to Democrats both consciously and unconsciously, indicating that ideas about gender may affect political cognition.

Consistent with the idea that parties are conceived as representing competing group-coalitions, next to the socially agreed-on links between groups and parties there exists a valenced reaction to these links that depends on an individual's position among the respective groups (cf. Weisberg and Greene 2003, p. 111), or in other words: How a person relates to a party depends on how he or she relates to the groups attached to it. For example, Miller and colleagues (Miller et al., 1991; Miller and Wlezien, 1993; Wlezien and Miller, 1997) found that voters' on the one hand connect parties and social groups. On the other hand, the attitudes they hold towards these groups influence their attitudes towards the corresponding party because “[s]ocial groups regularly serve as important and relevant categories that influence one's self concept, as well as one's understanding of social and political relations” and because voters are aware of which groups share concerns with them (Miller and Wlezien, 1993, p. 7).

That these links are indeed group-based is bolstered by a row of other find-

⁵Next to this group-oriented individuals, the Michigan group noticed another type of person that solely seemed to focus on the individual candidate. Because this distinction seemed prevalent in all strata of the electorate, they regarded it as a highly significant finding. However, since we focus on partisan identification this group is of less interest to us. This neglect is also justifiable insofar as individuals with a party orientation based on group-connections made up the largest group among the interviewed.

ings. For example, the descriptions of partisan coalitions are positively or negatively loaded depending on the side an individual is located on (Green et al., 2002, 9f). With respect to Candidates choice, McDermott (2009) found that “[v]oters with a group identity that is shared by an incumbent [...] are significantly more likely to support that candidate.” (McDermott 2009, p. 613, see also Philpot and Walton 2007; Stokes-Brown 2006). A stable link between a party and a group and their effect on individual behavior creates a partisan coalition (Stanley and Niemi, 1991) that may work as the core of a cleavage (see Horowitz, 1993 for related work on ethnic parties in developing democracies). In it, the base of a party may be thought of as an aggregation of nested groups that comes into play when the complex structures of every-day life have to be mapped into the confined space of politics. That no explicit names are used for partisan groups outside the US may simply be caused by their reduced visibility in countries with a strong cleavage structure compared to the heightened salience in the US (see Burden and Greene 2000).⁶

Since most work on party images is concentrated in the US, an affirmation of this notion is difficult. However, for Germany individuals are clearly able to link groups to parties consistent with the prevailing cleavage structure (Baker et al., 1981, p. 239-241). Also, identifying with groups associated with cleavages predicted party identification both in Germany and Great Britain (Zuckerman et al., 2007, chap. 3). Based on the notion of ethnic parties and considering a sample of twelve African countries, Norris and Mattes (2003) found that ethnic social identity significantly predicted party identification, especially in strongly fragmented societies.

Newer work has also begun to view party coalitions at a higher resolution. For example, Jackson and Carsey show that partisan coalitions vary across US-states (Jackson and Carsey, 2002, p. 66). While membership in some groups such as Blacks or Jews had a sizable impact across the whole nation, other group influences on PID varied, giving the coalitions distinct local colorings (Jackson and Carsey, 2002, p. 77f). Since the influence was conditional on group size they conjectured that their results might be explained by contextual influences on party identification neglected so far (Jackson and Carsey, 2002, p. 67). It is this contextual explanation that we will now turn to, trying to build a model based on individual interaction from the bottom up that will meet with the macro-level picture outlined so far.

⁶Interestingly, this idea finds support in the work of Bartle (2003). Here, partisans deliberately formed neologisms such as “Labour-ite” and “Conservative-ite” (Bartle, 2003, p. 226) to describe their long-term attachments. Based on the idea that a person is somehow related to a party, this grouping indicates that the idea of a large-scale group consisting of other partisans is a concept for them that is both accessible and acceptable, although they obviously lack a colloquial term for it.

2.2 A social calculus of party identification

Party identification can be understood as the knowledge about being a member of a partisan coalition that is coupled to other identities. However, most work implicitly treats PID as a matter of individual choice. Here, we argue that this picture is incomplete since neither the choice of a PID nor its connection to other identities is developed in isolation. We will outline a general modeling framework and discuss how interaction in small groups forms the basis of a social identity locating a person within the large-scale framework outlined above.

2.2.1 A social logic of electoral behavior

Explanations based on social influence abound, since “[i]t is both obvious and well known that the immediate social circumstances of people’s lives influence what they believe and do about politics.” (Zuckerman, 2005, p. 3). However, this fact is rarely regarded in survey-based research (Huckfeldt, 2007, p. 101f). Only recently, a renewed interest in interpersonal explanations of political behavior has taken hold. Since no integrated picture has emerged yet⁷ (Beck et al., 2002, p. 57f), most work today still builds on the research of the Columbia school (Lazarsfeld et al., 1955; Berelson et al., 1966).

At the heart of this approach lies a microsociological model of interaction in which personal opinions are formed through social communication. In this *social cohesion model* (Kenny, 1994; Levine, 2005a, p. 139f), interaction is an important means of disambiguating reality. Therefore it is also expected to influence both which facts are perceived important and how they are evaluated (for a description, see Burt, 1987; Zuckerman, 2007). Special attention is devoted to contacts involving frequent interaction, usually family and close friends. The model is intimately connected to research on small groups. These foster adherence to group standards leading to a development of common views and preferences within immediate social circles (Schoen, 2005; Lazer et al., 2008; Huckfeldt et al., 2004; Ikeda and Huckfeldt, 2001, p. 137f). This convergence is strongest if individuals frequently communicate with significant others, if communication takes place in an already homogeneous environment, and if it is explicitly political (Schoen, 2005, p. 138). Since it is accompanied by a tendency to seek out similar others, homogeneous groups of socially close persons have better chances of uniform opinions.

While the model is a dominant framework in research on social influence, it has also attracted criticism. Skeptics argue, that it attributes too much

⁷While several bodies of work exist, these are still spread out over diverse traditions such as work on spatial and contextual models (Johnston et al., 2004; Eagles, 1995; Bowler, 1991), small-group research (Katz et al., 2004; Gastil et al., 2008; Grove, 1965) or studies in network science (Lazer et al., 2008; Knoke, 1991; Beck, 2002; Huckfeldt et al., 2004).

influence to intimate – or “strong” (Granovetter, 1973) – ties. Yet, intimacy can not unambiguously be connected to influence (Levine 2005a; Huckfeldt and Sprague 1991 but see Kenny 1994). They also emphasize that “weak ties” carry information over greater social distances and allow for disagreement as a precondition to opinion change (Huckfeldt et al., 1995, p. 1027f). The focus on small groups also raised the question why analysis of public opinion should not just concentrate on the aggregated group level instead (Huckfeldt et al., 1995, p. 1028). Recent work, however, has yielded results, that might reconcile the social cohesion model with its critics. It has been shown that the perceived number of common acquaintances affects how much strength an individual attributes to a personal tie (Levine, 2005b) raising the idea that intimacy as a mechanism might be a function of network transitivity.⁸

2.2.2 Social influence on party identification

Work on the social embeddedness of political behavior has also found effects on party identification. For example, children are strongly affected by their parents’ PID although the effect declines with age (Niemi and Jennings, 1991) and is conditioned by external factors (Franklin, 1984; Carmines et al., 1987). For Germany the directional transmission of PID has been quite stable in recent decades (Zuckerman et al., 2003, 2007). Inheriting a party identification seems to stabilize it against external influence (Kroh and Selb, 2008). However, PID is also subject to adulthood socialization: Spouses align their PID both directionally and in the frequency with which a party is named (Kenny, 1994; Zuckerman et al., 2005; Schmitt-Beck et al., 2006; Zuckerman et al., 2007; Stoker and Jennings, 2005). More generally, occurrence and direction of PID of any one member of a family household is strongly dependent on the presence and direction of identifications of other household members (Zuckerman et al., 2007, p. 65) and influence runs not only from parents to children but also the other way around (Zuckerman et al. 2007, p. 157f; (Schmitt-Beck et al., 2006)).

Apart from findings inside the family, most work initially assumed that PID was quite stable with respect to other influences. However, it also reacts to spatial relocation by adjusting to the political climate in a new place of residence (Brown, 1981, 1988; Finifter and Finifter, 1989; MacDonald and Franko, 2008).

⁸In small-group research this idea parallelizes the social cohesion model and its main rival, the *structural equivalence model* which has been mainly championed by Burt (1987). This model builds on the idea that individuals develop similar positions and behavior because they are influenced by the same people. Since persons within a small group – such as a family or a circle of close friends – usually are all acquainted with each other, these persons are both (nearly) structurally equivalent to each other and their relations are embedded in the same set of ties resulting in a situation in which both models would expect a maximum degree of interpersonal influence. Additionally, all ties would be likely to be considered “strong” by the individual.

While most of this work focused on party composition of the receiving location, others have directly looked at social contacts and clarified that PID is indeed subject to interpersonal influence (Kenny, 1991, 1994; MacKuen and Brown, 1987; Huckfeldt and Sprague, 1995). Additionally, the announcement of a PID is also dependent on the stability and homogeneity of party identification within wider interpersonal networks (Liu, 2011; Ikeda et al., 2005).

2.2.3 Prototypes as core elements of social identities

Party identification is a social identity building on identification with large groups. Therefore, we need to understand how this identification comes about. The cognitive underpinnings to social identity theory go under the name of social categorization theory (Hogg, 2006, p. 113, Turner et al., 1987). It defines a group as a construal of the self used to divide the world into groups of “us” and “them”. Groups are persons sharing the same social identity meaning that members have a common understanding of who they are, what their common attributes are, and how they relate to those not in their group (Hogg, 2006, p. 115). Mentally, groups are represented as prototypes or categories of people, as “a fuzzy set of attributes (perceptions, attitudes, feelings, and behaviors) that are related to one another in a meaningful way and that simultaneously capture similarities within the group and differences between the group and other groups of people who are not in the group (Hogg, 2006, p. 118).”

Prototypes obey the principle of metacontrast (Hogg et al., 2004, p. 253) which holds that prototypes maximize entativity.⁹ They do so by optimizing the relation between perceived similarity within groups and differences between groups. Thus, prototypes focus on attributes that describe groups members well while simultaneously setting them apart from others. As a consequence, they are not a simple group average but rather resemble exaggerated, often nonexistent, idealized group members (Hogg, 2006, p. 118). Since they contain a comparison with others, prototypes are not fixed but context-dependent.¹⁰

When a prototype becomes salient, it is incorporated both into perception of others and into the definition of oneself (Hogg, 2006, p. 118f). This implies two things: First, others are perceived in a depersonalized manner and regarded as group-representatives meaning that their group attributes are emphasized and

⁹Entativity is understood as the perception of a group or category encapsulated in the prototype as being an entity of itself instead of a mere aggregate of individuals (Ip et al., 2006, p. 369). See Campbell (1958) for the original concept.

¹⁰An example would be a gathering of political scientists and economists. In this situation, we would expect them to compare themselves to each other, focus on the different disciplines and conceive of themselves as different groups. However, when physicists were to enter the room, the comparative context would change which would in turn would affect the prototypes. Now, we would expect economists and political scientists to deemphasize differences among them and instead focus on the differences between them as social scientists vice versa the physicists as natural scientists.

their individual attributes deemphasized. This process happens both for in- and out-group members. Second, depersonalization also applies to the categorizing individual himself, leading to a view of oneself as possessing traits more associated with the in-group. Since a social identity not only consists of attributes but also of attitudes that group members are expected to share (Hogg and Smith, 2007; Smith and Hogg, 2008), depersonalization elevates these attitudes to a quasi-normative standard that is then voluntarily internalized. This way, categorization can lead to a convergence on one or more prototypical attitudes within a group that is not just compliance to social pressure (Hogg and Smith, 2007, p. 97): “When you categorize yourself [...] you view yourself in terms of the attributes of the in-group [...], and since prototypes also describe group-appropriate ways to feel and behave, you feel and behave normatively.” (Hogg, 2006, p. 119).¹¹

2.2.4 Small group interaction and party identification

Most work on party identification centers on identification with large groups, i.e. non-interacting persons sharing a common trait. This view has been criticized by Zuckerman (2005) who identifies a shift in the group concept behind PID and points out that the origins of PID lie in an individual’s social surroundings (Zuckerman et al., 2007; see also Green et al., 2002, p. 23, 71): The Michigan scholars acknowledged small group influence on political thinking (Campbell et al., 1960, p. 76) but doubted this influence could be captured in surveys (Zuckerman, 2005, p. 13). As solution, they drew on Kurt Lewin’s work to operationalize group identification as a subjective closeness to social categories (see Campbell et al., 1960, p. 296) but overlooked that this broke with Lewin’s concept of a group as interdependent individuals, changed their theoretical mechanisms from small to large groups (Zuckerman, 2005, p. 9, 13) and turned PID into a concept motivated from individual psychology and small group research (Campbell et al., 1960, p. 120) but applied to large groups.

Group identities in small groups have only recently received closer attention in social identity theory (Postmes et al., 2005b,a).¹² Early work usually

¹¹This change in perception taking place under categorizing is quite far-reaching because the concepts of self and the perception of others are linked in the social identity. Thus, categorizing oneself reaches beyond a mere re-interpretation of oneself but also encompasses a change in how everyone else is perceived, so that “[c]hanges in levels of self-categorization reflect not only differences in views of the self but also different *worldviews*” (Brewer and Gardner, 1996, p. 91).

¹²In social psychology, a similar distinction between small and large groups exists and large-scale identities have dominated social identity theory for a long time (Postmes et al., 2005a, p. 4, Lickel et al., 2000, p. 225, Hogg, 2006, p. 117). However, the theory’s mechanisms are not confined to large-scale groups (Hogg, 2006, p. 126, Hogg et al., 2004) and recent work has shown that the theory is indeed applicable for directly interdependent individuals as well (Postmes et al., 2005a, p. 33). Yet, only little research seems to have investigated how a concrete link from small to large groups might look like (Hogg et al., 2004, p. 260-262).

assumed that people simply accept identities as “given” (Huddy, 2001, p. 138). Subsequently, most work centered on how an identity is inferred from processes among given groups. However, recent work shows that next to this deductive way of inferring the contents of an identity there exists an inductive way in which members of a small group may autonomously form an identity either through inferring it from observing other members or via explicitly or implicitly negotiating a shared understanding of reality (Postmes et al., 2005a, p. 9). In this case, the process of identification elevates negotiated or inferred group traits to a quasi-normative status. Since identification is a prerequisite for others to be able to serve as source for validation and since validation in turn can foster identification with a group the processes of communication within the group, social validation – as in the social cohesion model – and identity formation among group members are tightly intertwined (Postmes et al., 2005a, p. 10) suggesting that the social cohesion mode may be tied to identity formation.

Identity formation in small groups in turn can then be tied to identification with large groups through a peculiarity captured in the concept of a social (or group-based) identity: While its origins stem from processes internal to the individual it connects them to attributes cast in terms of group attributes. On the one hand, knowledge about a group identity is insofar internal as the individual (who may have generated and refined this identity on his or her own) possesses knowledge about what group he or she belongs to, how this group can be described and how it relates to other groups. On the other hand, identity also has an external component to it insofar as it is agreed on socially meaning that it is shared within the in-group and (usually at least to a certain extent) even with the relevant out-groups. Through this *common* definition of reality, a social identity is able to convey information on “what we are, what we think, and what we do” (Postmes et al., 2005a, p. 10) – no longer from an individual but from a social perspective.

Since in this shared definition, groups are captured in form of a prototype containing characteristics of the group, its contents can not directly involve individual-level (idiosyncratic) concepts but must rather rely on categorizing descriptions: “Identity is thus about being in the sense that it helps us define and position the self within social structure” (Postmes et al., 2005a, p. 10). Since these descriptions are incorporated into the individuals self-construal a social identity can take on a mediating role between the individual and his or her surroundings in terms of groups allowing it to locate him- or herself within a framework cast in terms of categorizing descriptions of groups of people. This way it can function as a bridge from a personally experienced surrounding of individuals, their construction of a (small) group identity and the usual world of (large) groups that politics is about.

In political science nearly no work investigates the connection between small and large group identities as described above since a regular assumption is that identity directly rests with large scale categories. However, one study by Walsh (2004) on the construction and role of social identities in every-day political talk finds evidence directly supporting the notion outlined above (for comparable findings, see Lichterman 1999). Starting from findings that individuals categorize politicians with the help of social group categories in relation to their own position among these categories (Walsh, 2004, p. 25) she investigates how every-day talk in small groups may create social identities that serve as a “lenses” politics is viewed and interpreted through (Walsh, 2004, p. 2f) by following a group of retired men (who call themselves “Old Timers”) that regularly meet in a corner store to “hang out” and that among other things also chat about politics.

One of her main findings is that starting from initial similarities in their self-images the men develop an understanding as a group and use the conversations to form a shared social identity. The understanding of what “type of people” they are is developed by drawing on commonalities among themselves and contrasting themselves to the other customers in the store (Walsh, 2004, p. 71f). This common identity and the perspective it informed in turn facilitated conversation about morally laden topics such as politics which in turn helped to stabilize the identification with the group (Walsh, 2004, p. 84-89, for the importance of moral norms as markers of identity, see Reicher and Emler, 1984). Their development of a social identity allowed them to fill otherwise abstract categories of large scale groups and the political events they were connected to with meaning and relate them to their own lives (Walsh, 2004, p. 71f, 170).

The category system the “Old Timers” had generated and experienced this way was then applied to sort through politicians and political events that are then discussed in the mens’ own terms. In this process, the men related to politics not based in their individual self-concepts but rather to their collective self-definition as “Old Timers” (Walsh, 2004, p. 118): “When talking about candidates, the Old Timers sift through the options not on the basis of issues but through the lens of the kind of people they perceive the candidates to be. Are they people like *us*? Are they people *we* would want to be *our* leaders?” (Walsh, 2004, p. 113). Given this use of a social identity it is of little wonder, that the perspective it created also informed their party identification (Walsh, 2004, p. 164-166).

The above discussion has suggested an interpersonal basis for a party identification. Based on day-to-day interactions, individuals generate a social identity that captures their membership in a small group. This membership is defined without a clear connection to politics and thus not primarily a political identity.

However, by clarifying this identity, two processes allow a bridging to the collective realm of politics: First, the definition of a small group prototype fosters a convergence of opinions towards a common, over-individual standpoint. Second, since the prototype is framed in terms of attributes reaching beyond individual idiosyncrasies, it can convey a concrete experience of what being a member of a large scale social group is like, filling otherwise abstract categories with concrete, personal experience. This inter-individually derived identity can then be tied to a party via partisan images that indicate if the individual’s group and which other groups form its electoral base. Since this attachment to the party is mediated through and embedded in other identities, it works as a social identity that need not be directly coupled to a party – rather, the party may appear as an arm that “people like me” have to reach into the world of politics.

3 The Model

3.1 Related work in opinion dynamics

Since we model the socially driven evolution of an individual-level characteristic, our model is from the field of opinion dynamics. This field is concerned with how social communication shapes global opinion outcomes such as the appearance of a consensus, of polarized opinions or of dynamical opinion swings. Models are united by two ideas: First, an individual’s opinion is socially influenced, and, second, interaction fosters some form of contagion (Castellano et al., 2009, p. 594). Opinions are either represented as discretized or continuous. The best-known examples are the discrete models referred to as voter model (Clifford and Sudbury, 1973; Miguel et al., 2005), majority rule model (Galam, 2002), social impact theory (Nowak et al., 1990), Sznajd model (Sznajd-Weron and Sznajd, 2000; Sznajd-Weron, 2005), the Axelrod (1997b) model of cultural dissemination (using vectors as opinions) and continuous models of bounded confidence (Deffuant et al., 2002; Hegselmann and Krause, 2002; Lorenz, 2007, 2010). In most models individuals move towards the opinion of others, in the case of bounded confidence they only do so if opinions are not too far apart.

Among the most frequent results are that consensus (all agents hold the same opinion) is an absorbing state (Tessone et al., 2004; Behera and Schweitzer, 2003; Stauffer et al., 2000) but often enough also populations freeze in a clustering of opinions (Nowak et al., 1990; Sznajd-Weron and Sznajd, 2000; Axelrod, 1997a). Some models also yield stalemate situations (Sznajd-Weron and Sznajd, 2000). Usually, central questions are how consensus forms or how conflicting opinions survive (Huckfeldt et al., 2004; Stauffer et al., 2006; Axelrod, 1997b). Adding randomness as an element of interaction usually introduces a disordered state

that appears above a critical noise level. Below this level, noise may melt a frozen situation (Miguel et al., 2005). Other work has shown how the survival of heterogeneity is related to the underlying communication structure (Huckfeldt et al., 2004) indicating that non-regular topologies often facilitate the existence of metastable heterogeneous configurations (Klemm et al., 2003) but can also reduce their occurrence (Miguel et al., 2005). Most models that have been subjected to empirical tests have been used to explain election results (González et al., 2004; Bernardes et al., 2002).

While a common prototype (due to its role in attitude convergence) is an instance of contagion, the notion of maximizing prototype difference to other groups is a repulsive force. So far, only few models investigate such mechanisms (Jager and Amblard, 2005; Banisch, 2010). One instance is a formalization of social categorization theory (Salzarulo, 2004) and its implementation in an opinion dynamics model (Salzarulo, 2006). Here, agents use others' opinions to cluster their context into groups and adopt the most prototypical opinion in their own group. In principle, model behavior shows two phases, one with complete uniformity of opinions, the other with either strong polarization (if agents interact repeatedly) or additionally clustering and milder polarization in an intermediate region, if they interact only once (Salzarulo, 2006, 4.1). Since social categorization also lies behind party identification, the model is a natural starting point us and we outline in the following section.

3.2 Social categorization on the micro-level

The theoretical discussion has shown how identity formation and social categorization mesh with party identification. We can express this mechanism by characterizing an individual i on all D relevant comparison dimensions with a value from the interval $[0; 1]$, resulting in a vector $x_i \in [0; 1]^D$. Given n individuals, we can define $X = \{x_i\}_{i=1}^n$ as *context* meaning the position of all individuals on the relevant dimensions. The idea behind the metacontrast principle is then to find an optimal partition of the context X that fulfills two requirements: First, it should cluster all individuals into groups and provide a defining point (the prototype) for each group. And second, it should pick the points to minimize distances of group members to their prototypes (i.e. the prototype should give a good description by lying close to all group members) while maximizing distance of prototypes to the members of the other groups (i.e. it should distinguish well among groups by being remote from their members).

This task can be achieved by using a function measuring the distance between individuals and a fuzzy group-membership function that tells us whether an individual x_i is a member of the group described by prototype x_p . We will

call these functions $d(x_i, x_j)$ and $\mu(x_i, x_p)$, respectively. For the clarity of exposition, we will for now assume them as given and later return to their definition. Provided a context X and a prototype x_p , we can calculate both average distance of individuals in a group (the intra-group distance) and average distance of individuals not in the group (inter-group distance) to x_p :

$$d_{intra}(x_p, X) = \frac{\sum_{i=1}^n \mu(x_i, x_p) d(x_i, x_p)}{\sum_{i=1}^n \mu(x_i, x_p)}$$

and

$$d_{inter}(x_p, X) = \frac{\sum_{i=1}^n (1 - \mu(x_i, x_p)) d(x_i, x_p)}{\sum_{i=1}^n (1 - \mu(x_i, x_p))}.$$

Prototypes should minimize intra-group distance *compared* to inter-group distance so both terms must be combined:

$$P(x_p, X) = a \cdot d_{inter}(x_p, X) - (1 - a) \cdot d_{intra}(x_p, X).$$

$P(x_p, X)$ can be thought of as a prototypicality function: Given a context X and point x_p (which need not be a prototype) it evaluates how well x_p would serve as a group center by weighting against each other how well x_p minimizes intra-group distance and how well it maximizes inter-group distance – the better x_p fits as a prototype, the larger $d_{inter}(x_p, X)$ and the smaller $d_{intra}(x_p, X)$ become causing $P(x_p, X)$ to grow. The parameter a governs out-group aversion or how much the position of the prototype is affected by the presence of other groups. Since a prototype optimizes intra-group distance with respect to inter-group distance, $P(x_p, X)$ must be at a maximum meaning that for a given context there are as many prototypes (and thus, groups) as maxima of $P(x_p, X)$. Given these points, a group can be defined as all individuals closer to the same prototype than to any other.

We still need to define $d(x_i, x_j)$ and $\mu(x_i, x_p)$. There are many ways to achieve this but two simple solutions are

$$d(x_i, x_j) = \sum_{\alpha=1}^D (x_{i\alpha} - x_{j\alpha})^2 \quad \text{and} \quad \mu(x_i, x_p) = \exp\left(-\frac{d(x_i, x_p)}{w^2}\right),$$

with $x_i, x_j \in [0; 1]^D$ and α running over all relevant dimensions. Distance among individuals is thus squared euclidean distance and group membership decreases exponentially with distance from the prototype implying that membership is fuzzy and that more prototypical individuals are more important for calculating d_{inter} and d_{intra} . Additionally, the exponential ensures that the

prototype of a group is evaluated as $\mu(x_p, x_p) = 1$. The parameter w can be thought of as an average size of groups in opinion space.

This formalization is already well-suited for our problem domain. However, its only implementation (Salzarulo, 2006) assumes that the positions of individuals on the relevant dimension may be subject to change. While this approach is suitable for systems solely driven by attitudes, party images and small-group identities also contain unchangeable features such as skin color or gender. We therefore subdivide x_i into a component holding variable elements (referred to as *opinions*) and one containing unchangeable elements (referred to as *traits*).

3.3 Model description

Agents are located on a regular grid of length L with periodic boundary conditions. They communicate in a Moore neighborhood and use the full information (i.e. all characteristics = traits plus opinions) on their neighbors to infer groups in their social contexts. One time unit (sweep) consists of L^2 steps in which an agent is randomly picked, surveys its context, retrieves its group prototype and adopts the opinions contained therein while leaving traits unchanged.¹³

We still need to resolve how to connect our model of social identity to party identification. This is because party identification is only implicitly defined as the outcome of a process in which individuals map their self construal into the political realm. Within a primarily non-political group environment they learn what groups they belong to, what “kind of people” they are. Yet, these understandings must be tied to a party allegiance, based on a partisan image. One solution is to introduce competing parties that appeal to voters in order to endogenize the announcement of a party identification based on a publicly available partisan images. How parties and groups become associated is not fully clear. However, Walsh’s subjects, asking whether a candidate is “like us” (Walsh, 2004, p. 113) suggests that it is in principle based on social distance between the candidate and the group prototype, i.e. whether a representative of a party is close enough to potentially be a member of the group.

Party competition have also been analyzed with agent-based models since they allow e.g. to relax the often restrictive assumptions needed for an analytic solution of classical models, giving quite realistic model behavior. For example, Kollman and colleagues explored parties competing on only limited information

¹³Categorization is implemented as stochastic optimization: To find their own group, agents need only find the closest maximum of $P(x_p, X)$ since this is the prototype of their group. Thus, starting from its own characteristics x_i and context X , agent i randomly changes elements of x_i by a small amount and evaluates the resulting characteristics $x_{i'}$. If $P(x_{i'}, X) \geq P(x_i, X)$ it again randomly changes $x_{i'}$, re-evaluates and repeats until no further improvement is possible. If $P(x_{i'}, X) < P(x_i, X)$, it returns to x_i and randomly changes its elements anew. Whenever a vector element would leave the interval $[0; 1]$ it is set to the edge of the interval. The resulting x_p is the closest local maximum and the prototype of the agent’s group.

about voter positions (Kollman et al., 1992, 1998). Their finding that parties trying to maximize vote share end up with converging but distinct platforms is a readily observable outcome. Laver (Laver, 2005; Laver and Sergenti, 2010) has extended this framework to multiparty systems and tested different strategies that parties might use. His main result is that a simple pavlovian behavior termed “hunter” – if a shift in position increases vote share, repeat, otherwise modify platform randomly – is both theoretically plausible and outperforms more complicated strategies. Calibrating his model to Irish opinions polls indicated that most parties may be described as hunters (Laver, 2005, p. 277).

We model party behavior as optimization based on limited information. Parties are described by a vector of partisan images of the same size as those of agents. Unlike agents, however, parties may modify all elements of this vector implying the assumption that parties can influence their outward appearance. Following the “hunter” strategy (Laver, 2005), parties each round randomly change elements by a given stepwidth.¹⁴ Additionally, they record the most recent change to their image. At the end of each sweep, agents compare party images to their group prototype and signal which party is closest. Parties are then presented the share of agents attaching and modify their image accordingly: If their share stays constant or increases, they re-apply the change, otherwise they turn 180° and pick a random step into the half-circle they are now facing.

Agents signal attachment after comparing party image and group prototype. Since $\mu(x_p, x_i) \in [0; 1]$ the characteristic group function can be interpreted as a probability of x_i being a member of group p . Assuming that a person would certainly vote for a party perfectly describing his own group, agents signal attachment with a probability proportional to distance calculated via $\mu(x_p, x_{party})$ with x_p denoting their group prototype and x_{party} party image. Since this allows attaching to more than one party, we resolve conflicts by keeping a list of all parties the agent would have attached to and pick party i with probability

$$p(party_i) = \frac{\mu(x_p, x_i)}{\sum_i \mu(x_p, x_i)}$$

with i running over all parties on the list. Thus, individuals may feel attached to more than one party and if in doubt they are more likely to attach to the party closer to their social identity.

4 Analysis

Our analysis focuses on coalitions between agents and parties. For this purpose, a partisan coalition may be thought of as a party explicitly addressing a

¹⁴The vector is constrained to the space $[0; 1]^D$.

subpopulation plus a subpopulation possessing an elevated tendency to attach to a party. We are therefore looking for model behavior in which parties have an incentive to concentrate on a bounded population of agents described by a trait and vice versa for groups of agents showing a stable attachment to a party. Since work reported here is an ongoing project, results are preliminary.

We proceed as follows: We simulate model behavior for two combinations of parameters that were identified to belong to the two different phases (consensus and polarization, see Salzarulo 2006, fig. 13) of the underlying opinion dynamics model. We do so first for a population with two opinions and no traits and second, for a population with one opinion and one trait.¹⁵ Agents are initialized with uniformly distributed traits and opinions. Two parties compete, starting from random positions. To analyze agent behavior, we tracked a sample of 20 per cent of all agents. We conducted 50 simulations per parameter setting, each consisting of 10,000 sweeps on a lattice with 2500 agents. We discarded the first 2000 sweeps to reduce the influence of initial conditions.

We first analyze agent behavior in the space made up by opinions and/or traits (opinion/trait space) by mapping out their expected position, calculated via summing trajectories over the underlying space and normalizing for simulation length and sample size meaning that they can be read as the probability of finding a randomly picked agent at a certain point in opinion space in the course of a simulation. Reported results are averages over conducted simulations. In models based on two opinions, for both phases investigated, results follow the one dimensional case: In the consensus phase, agents converge on the middle position on both opinion dimensions while in the polarized phase agents ended up equally distributed over the four possible extreme combinations of opinions. This indicates that model behavior at both points is not qualitatively different from one-dimensional results and allows us to use both cases as baseline.

Fixing one characteristic substantively changes the trajectory of agents. While opinions still converge in the consensus phase, agents' traits are naturally unaffected, yielding a distribution spread evenly all over the trait dimension. Similar behavior can be observed for the polarized phase in which traits are again unaffected but agents diverge with respect to their held opinion forming two clusters at the extremes of the opinion scale (see figure 1).

While agents hold polarized opinions, they are unaffected in terms of the trait involved. However, this result does not carry over to partisan images on the macro level.¹⁶ In the baseline cases with two opinions, party images follow

¹⁵Parameters used were $w = 0.80$ and $a = 0.05$ (meaning groups are large and aversion among them is small) for the consensus and $w = 0.40$; $a = 0.20$ for the polarized phase (where groups are small and large repulsive effects cause opinions to diverge toward the boundaries of the range).

¹⁶To calculate partisan images, we proceeded similarly as with agents, noting the probability

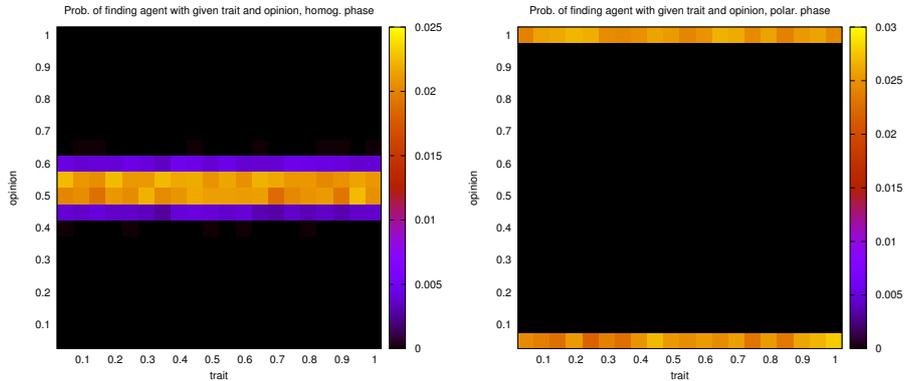


Figure 1: Probability of finding an agent with a given combination of trait and opinion in a run of the model (avg. over 50 runs, 8,000 sweeps each). Other than for opinions, fixed traits do not converge (left, consensus phase, $w = 0.80$, $a = 0.05$) or diverge (right, polarized phase, $w = 0.40$, $a = 0.20$).

agent positions in opinion space. In the consensus phase, parties converge on the center of the two-dimensional space since agents concentrate there. This situation resembles the one analyzed by Laver (2005) except for that parties may converge completely, since attachment is stochastic. In the polarized phase, partisan images follow the agents to the four corners of opinion space showing that the macro system resembles the micro configuration here as well.¹⁷

With respect to traits, however, results depart from expectations. For consensus, the uniform spread of agents along the trait dimension does not show up in a spread-out of partisan images. Rather, the images of both parties are still located in a circular area in the center and indistinguishable from the ones in the baseline case. Obviously, simply fixing the description of agents along one of the dimensions does not create a meaningful element in terms of a partisan coalition when agents consider groups to be large and repulsive forces as weak.

Results are also different from expectations in the polarized phase: At each of the extreme ends of the opinions spectrum, parties stably occupy two distinct regions along the trait dimension (see fig. 2). These regions are clearly set apart and indicate that within a given part of the opinion spectrum parties are forced to decide between broadcasting support for one of two “wings” described in terms of traits. Inspection of single runs showed that this behavior is much the same whether both parties occupy the same half of the opinion spectrum or not. Additionally, the positioning behavior is independent of party behavior on the

that a party would on average occupy a certain region in the space made up by opinions and/or traits.

¹⁷Analysis for single simulations revealed that parties are always located in one corner and do not switch between them since the area between the corners is too broad to cover given the maximizing behavior of the hunter algorithm. For two parties, this means that on average half of the agents is not attached to any party.

other half of the opinion spectrum.¹⁸

We can explain the behavior of partisan images by examining how prototypes mediate between agents' opinions/traits and their party attachments. In a nutshell, the role of prototypes differs for both types of characteristics. While they may produce a bias in how agents' traits translate into attachment behavior, a similar effect is absent for opinions. To see this, recall that agents accept a group prototypical opinion as their own. Thus, their opinion directly follows their group prototype and the latter is a perfect representation of the former. When agents use the group prototype to determine party attachment, their behavior is the same as may be expected from individual opinion.

Traits, on the other hand, can not be brought into line with a prevailing group image. Thus, for at least some members the trait of the group prototype and their own will be different and the trait expressed in the prototype may to a certain degree misrepresent an agent's individual trait. Using the small group prototype for partisan attachment, agents may therefore attach to a party less because it is close to their individual trait and more because it is close to the trait seen as descriptive for their group. These differences become exacerbated in the polarized phase, because the prototype is not only affected by other agents' traits but also by their opinions. Agents do not change their neighborhood so distances among their traits contribute a fixed amount in the evaluation of $P(x_p, X)$. Yet, as polarization grows, the contribution from differences in opinions become larger and begin to dominate the clustering. Since prototypes reflect not only in-groups but also out-groups they exaggerate differences between groups. Therefore, the growing differences from opinion polarization also lead to an exaggeration of differences in traits among the groups, causing agents to view their trait (via the group prototype) as more extreme than it really is.

Mapping out agent prototypes for both consensus and polarized phase confirms this explanation: In the consensus phase prototypes resemble an ellipse spread out along the trait dimension as agents with the most extreme opinions

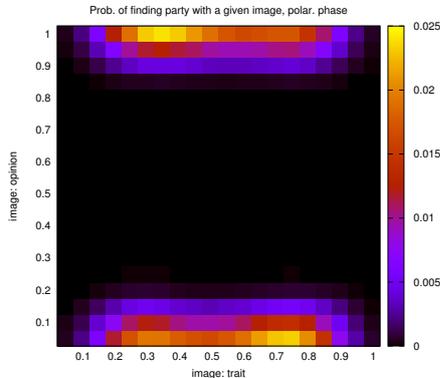


Figure 2: Average probability of finding a party with a given partisan image (polarized phase, $w = 0.40$, $a = 0.20$).

¹⁸To see this, consider that for an agent located on one extreme opinion and a party on the other, $d(x_p, x_{Party}) > 1.0$ and thus $\mu < 0.0019$ rendering chances of an influence between both extremes effectively negligible.

accept more moderate prototypical opinions in their groups until a central opinion is reached. At the same time, agents with extreme traits are also pulled to the center but can not follow this tendency since they can not change traits. At the point in parameter space investigated, this pull seems to be large enough to allow parties a competition in the dead center of trait/opinion space avoiding a connection to a distinct subpopulation.

Accordingly, prototypes split along the opinion dimension in the polarized phase. This also affects the distribution of traits in the prototype, inducing a substantial polarization: Agents gather at the extremes of the trait spectrum (see fig. 3), splitting it into opposing camps that autonomously define themselves in opposition to each other. This split forbids parties to find a partisan image that is applicable for all agents in one opinion camp. Rather, they are forced to broadcast support for only one of the two emergent “wings” since these would not accept the party as representing both camps at the same time.

Seen this way, the model hints at cross-polarizations within partisan images. Given the right circumstances, attitudinal (issue) conflicts might drive apart a population along social structure simply because both dimensions become linked in group descriptions. However, it is difficult to ascertain whether such processes may occur in reality: Lumps and skews in empirical distributions might provide pre-existent features a split could easily originate from. On the other hand, connections among agents are independent of their actual traits. This latter point is highly unrealistic since especially social networks are notorious for homophily, meaning that individuals with similar socio-structural characteristics lump together (see McPherson et al. 2001 for a review). For example, similar occupation is a strong factor in friendship choice among adults (Verbrugge, 1977), race and religion for dyads discussing important matters (Marsden, 1988) or cultural status for marriage (Kalmijn, 1994). Reasons for this tendency are widespread and include geography (availability of potential contacts), family backgrounds (e.g. intergenerational transmission) or foci of activity in which similar people gather (McPherson et al., 2001, p. 429ff).

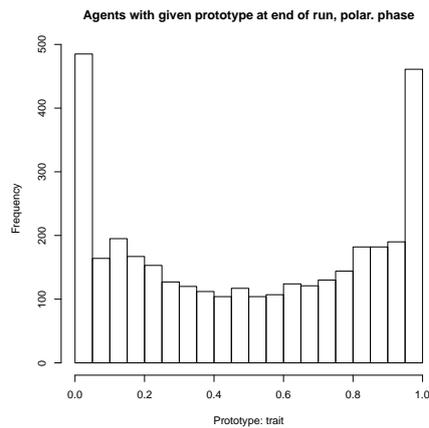


Figure 3: Distribution of trait representation in agent prototypes after 10.000 sweeps, sum over 15 runs, polarized phase, $w = 0.40$, $a = 0.20$.

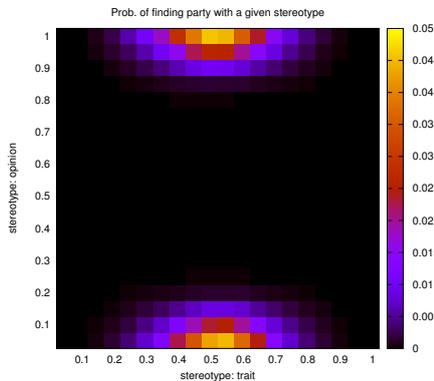


Figure 4: Probability of finding a party with a given partisan image (polarized phase, $w = 0.40, a = 0.20$, homophily activated, plot is average over 50 runs, 8.000 sweeps each).

To investigate the effects of homophily, we resort to ties in line with the Schelling model of racial segregation (Schelling, 1971). After updating its group prototype, an agent calculates the share similar agents in its neighborhood. If this share falls below a threshold t , the agent is considered unhappy, randomly picks another agent and – if this one is unhappy, too – they switch places.¹⁹ Note, that homophily is solely based on traits, and not opinions. Although attitudes and networks are recursively entangled (Lazer, 2001), politics is a weak driver in contact selection (Lazer et al., 2010), people

show leeway of tolerating alternative political opinions (Huckfeldt et al., 2004) and social transmission in general seems to be an important driver behind political behavior (Nickerson, 2008). Since traits are continuous, agent i regards neighbor j as similar with a probability equal to its group function $\mu(x_i, x_j)$.

We compare the scenarios described above²⁰ with runs for $t = 0.6$, well inside the segregated phase of other Schelling models (Gauvin et al., 2009, p. 299). Unexpectedly, homophily weakens coalitions: In the consensus phase, parties compete for the center of trait/opinion-space also with homophily present. On agent level sorting leads to a more faithful representation of traits in the group prototype, yet this change is too weak to influence party competition. In the polarized phase, results are more involved. Agents are still polarized with respect to opinions, yet party competition no longer shows the two maxima found above. Instead, competition is around the center of the trait-dimension. Social clustering has eliminated the diverging partisan bases (see fig. 4).

How can the breakdown of competition be explained? Recall, that opinion polarization induced a polarized perception of traits. Agents adopted the opinion in their group but neither changed trait nor their social contacts. Thus, diverging opinions shifted their in group prototype away, both for opinions (which

¹⁹Agents have to switch places since the grid is fully occupied. While switching does not guarantee that the new location is satisfying, this is of only minor concern since agents unhappy after a move have an inclination to keep moving until they find a satisfying location.

²⁰The scenarios investigated so far can be recovered from the expanded model by setting $t < 0$ implying that agents never move. Simulations for opinion-only scenarios are omitted since they contain no element that could drive homophily.

they assimilated) and for traits (which they could not). This effect is visible in figure 5 comparing agents' traits and their representation in the prototype. Homophily alters this situation: Agents still accept the prototypical opinion in their own group but now they also switch neighborhoods based on their trait.²¹ Thus, the existing process of minimizing the opinion-based contributions to $d(x_i, x_j)$ via the acceptance of group opinions is now accompanied by a process of minimizing the trait-based contributions in the distances among agents. As a consequence, agents are at some point no longer surrounded by others (possibly strongly) different in traits. Therefore, whatever polarization in terms of opinion now exists between in- and out-groups can no longer push substantially apart trait-representations because they are no longer substantial in the first place.²² This process happens for all expressions of trait, creating a situation in which both opinion (by definition) and trait (by homophily) are faithfully represented in the prototype (see fig. 5). Without the prototype polarizing trait perception in the prototype, however, the effect that produced the partisan competition above disappears.

Note, that the breakdown of party competition does not require a consensus within a homogeneous neighborhood: While homophily has caused traits to be (nearly) identical for all neighbors, opinions are both unaffected and still subject to polarization. Thus, agents moving to a new location may be far apart from prevailing opinions there. Since traits no longer provide information for categorizing, prototype formation must rely on the – polarized – opinions to sort agents into groups of which they in turn will adopt the (possibly even more polarized) opinion. Thus, identity formation mainly ignores social structure and seizes upon different opinions, solidifying existing boundaries within groups homogeneous in trait. In other words: A worker moving to an all-working-class neighborhood will find himself in a situation in which the neighborhood is heavily divided over a political issue into two opposing sides and – irrespective of his status as worker – simply sort himself into one camp.

Substantially, this means that in our model, trait can not become a predictor

²¹Interestingly, this also drives down an overall tension in the system: Neighborhood selection is based on traits and not inferred in-/out-group membership itself. Therefore the dynamics stemming from the Schelling model are independent of the social categorization process. As agents successively move to more and more homogeneous neighborhoods, their in- and out-groups not only become more homogeneous with respect to traits but also more homogeneous with respect *to each other* because the whole neighborhood shares the same trait expression. As a consequence, the distances among every conceivable configuration of in- and out-groups is lesser or equal than in a situation without tie resorting. In a sense, even if a neighborhood is heavily divided in terms of an opinion, the opposing agent camps are still closer together because they share the same “class” or “ethnicity”.

²²This can easily be seen when thinking of a situation in which all agents hold exactly the same trait. Beyond what is gathered from opinions, traits can not give any *additional* information to better distinguish among groups. Subsequently, all prototypes will have the same trait expression as the agents. Homophily can be thought of as a process trying to optimally approximate this state.

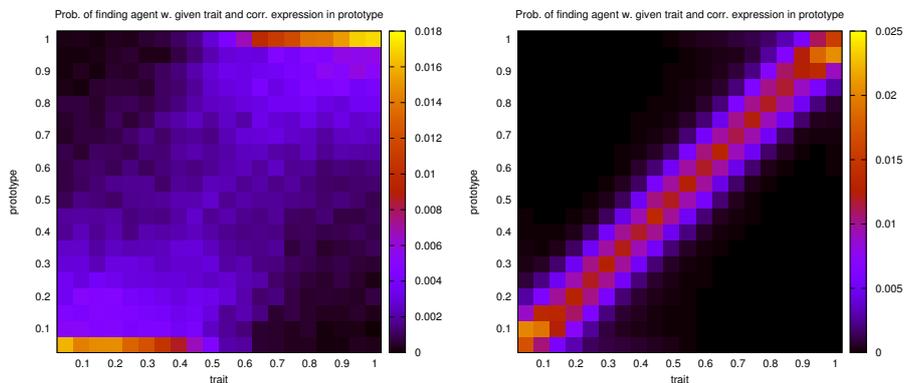


Figure 5: Probability of finding an agent with a given trait and expression of trait in the prototype in a run of the model in polarized phase $w = 0.40$, $a = 0.20$ (left: homophily deactivated, right: homophily activated). Plots are averages over 50 runs, 8,000 sweeps each.

of opinion or vice versa – for example people in lower parts of the social strata would be as much divided about an issue (e.g. for or against abortion) as people in the upper parts. Since it does not create a connection between a party and a given socio-structurally circumscribed part of society as described in cleavage theory, our result indicates intercorrelation *among* elements of partisan images as an important “glue” for creating such a cleavage, or more concretely: Positional statements in partisan images can only be part of a cleavage if they are correlated with a socio-structural distinction. It is a common observation that e.g. lower parts of the social strata favor redistributive policies while people in the upper parts are opposed to them. Given who will pay for and who will receive from such a policy, the correlation among trait (economic status) and opinion on redistribution is an instructive example. We have so far omitted this element from the model and it caused a breakdown of cleavage politics. Thus, when images like “for the working man” and “for active government” are attached both to the Democratic party and “for business and rich people” and “oppose active government” to the Republican party²³, this means that both elements are not associated with the party on an independent basis which would allow for an arbitrarily other combination. Rather, both images are correlated as part of a wider web of meaning.

Leaving out this correlation produces a competition for the center because it is a competition on two independent dimensions. Or in other words: People of a given walk of life do not simply attach to a party just because that is what people of this walk of life normally do. Rather, they attach because they consider the

²³Another example might be the association between women and/or female traits and the Democratic party and man and/or male traits and the Republicans with the parties’ respective relation to abortion.

party to be *for them* since it is connected to their group and the opinions therein. Identifying with a part of social structure thus has an ideological component to it, i.e. lower strata wish for redistribution and since a party communicates that it is *for* lower strata and that it is *for* redistribution, lower strata attach to it. In everyday language this correlation may then correspond to the notion of promises held and broken noted by Campbell and colleagues (Campbell et al., 1960, chap. 10) and possibly provide a bridge to more evaluative concepts of PID (cf. Fiorina 1981, chap. 4 and Green et al. 2002, p. 5).

5 Conclusion and outlook

We have introduced a multilevel model of party identification based on Social Identity Theory and presented preliminary results. The model is based on the notion that individuals feel as part of the electoral base of a party that contains non-political large-scale groups the individual identifies with. The individual's attachment to these groups is a function of immediate social surroundings. Through interaction, others and self are categorized as "types of people", as members of small-scale groups. The images or prototypes derived in this process are cast in terms of general, non-idiosyncratic characteristics. This allows a recognition of what describes individuals as group members and what membership in one of these categories (such as skin-color, gender, or religion) means from an individual perspective. Combined with partisan images that connect parties and groups this identity translates into a PID. Additionally, prototypes help decide whether representatives of a party are representative of people "like me" and they drive a process of attitudinal convergence within the group.

One innovation in our work is theoretical: We amend the notion of a social identity in voters (Weisberg and Greene, 2003) with a concrete micro-mechanism linked to party identification and base it in interpersonal face to face contacts. Since this mechanism is also tied to large groups, it allows to bring closer together the social-psychological framework with sociological models of voting behavior. The explicit integration of referent informational influence also allows for the integration and explicit connection of attitudes and identities.

We have formalized our model by extending an existing formalization of Social Categorization Theory (Salzarulo, 2004, 2006). Relying on a weighted social distance, agents construct a group prototype that gives an optimal distinction among groups by simultaneously minimizing distances in the group while maximizing distances to non-group members. Based on this prototype, agents adopt in-group opinions while their stable traits remain unchanged. To capture PID implicitly defined in this process, we coupled this micro-level model to a macro-level model of competing parties trying to attract voter attachments.

Analysis concentrated on whether constellations fitting the notion of a partisan coalition could be found and what role traits play in partisan images. We compared two points in parameter space which in one-dimensional implementations belonged to a consensus and a polarized phase (Salzarulo, 2006) and investigated model behavior for cases in which agents had two opinions and one opinion plus one fixed trait, respectively. While results are preliminary, one finding was that partisan images were indistinguishable for both cases in the consensus phase. Neither did traits become an important element of partisan images nor did agent prototypes show any sign of subdividing the population, failing to turn up coalitions.

Results were somewhat different for the polarized phase. In the case with two opinions, results did not differ much for the findings in the consensus phase. In the case with one opinion and one trait, however, agents' group traits were radicalized as a consequence of opinion polarization. This radicalization artificially drove the population apart and reflected in parties behavior on the macro level as they started to address different socio-structural sub-groups. The model thus showed how polarization on an issue could be able to drive a population into opposing camps circumscribed on an unrelated dimension. Yet, the observed effect was unstable with respect to homophily. Rather than solidifying coalitions self-selection among agents undermined them since agents escaped the confrontation with different traits they otherwise would have set off against.

This breakdown yielded an interesting insight: Homophily undermined the correlation among opinions and traits that produced coalitions. Without a mechanism to induce a relation between both elements of attachment decision, parties fell back into competing for the center of both distributions. Therefore, when a partisan image is to hold information related to an attitude, this information can only contribute to an electoral coalition when it is meaningfully related to social structure. To find how such a relation may come about is an important step for further development of the model.

Other aspects yet to explore are the question of how an individual decides for or against attaching to a party – asking whether a candidate is “like us” (Walsh, 2004, p. 113) suggests that candidates (and presumably parties) are subject to the same categorization as other individuals. Yet, our use of $\mu(\cdot)$ only partially accounts for this since it still disregards out-groups. Also, it may appear foreshortened to treat party images as public knowledge directly controlled by the parties. Most parties only rarely characterize their base explicitly, social learning in day-to-day contacts may be a better alternative. Finding a clear process that yields the construction of a commonly shared partisan image is an important task for the project.

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References

- R. Axelrod. *The complexity of cooperation. Agent-based models of competition and collaboration*. Princeton studies in complexity. Princeton university press, Princeton, 1997a.
- R. Axelrod. The dissemination of culture: A model with local convergence and global polarization. *The Journal of Conflict Resolution*, 41(2):203–226, 1997b.
- K. L. Baker, R. J. Dalton, and K. Hildebrandt. *Germany transformed*. Harvard University Press, Cambridge, Mass [u.a.], 1981.
- S. Banisch. Unfreezing social dynamics: Synchronous update and dissimulation. In A. Ernst and S. Kuhn, editors, *Proceedings of the 3rd World Congress on Social Simulation WCSS2010 (CD-ROM)*, Kassel, 2010. Center for Environmental Systems Research, University of Kassel.
- L. M. Bartels. Beyond the running tally: Partisan bias in political perceptions. *Political Behavior*, 24(2):117–150, 2002.
- J. Bartle. Measuring party identification: an exploratory study with focus groups. *Electoral Studies*, 22(2):217–237, 2003. A Tribute to Warren E. Miller.
- J. Bartle and P. Bellucci. Introduction: Partisanship, social identity and individual attitudes. In J. Bartle and P. Bellucci, editors, *Political parties and partisanship. Social identity and individual attitudes*, pages 1–25. Routledge, London, 2009.
- D. C. Baumer and H. J. Gold. Party images and the american electorate. *American Politics Research*, 23(1):33–61, 1995.
- D. C. Baumer and H. J. Gold. Party images and partisan resurgence. *The Social Science Journal*, 44(3):465–479, 2007.
- P. A. Beck. Encouraging political defection: The role of personal discussion networks in partisan desertions to the opposition party and perot votes in 1992. *Political Behavior*, 24(4):309–337, 2002.

- P. A. Beck, R. J. Dalton, S. Greene, and R. Huckfeldt. The social calculus of voting: Interpersonal, media, and organizational influences on presidential choices. *The American Political Science Review*, 96(1):57–73, 2002.
- L. Behera and F. Schweitzer. On spatial consensus formation. is the sznajd model different from a voter model? *International Journal of Modern Physics C: Computational Physics & Physical Computation*, 14(10):1331–1354, 2003.
- G. Belknap and A. Campbell. Political party identification and attitudes toward foreign policy. *The Public Opinion Quarterly*, 15(4):601–623, 1951.
- B. Berelson, P. F. Lazarsfeld, and W. N. McPhee. *Voting. A study of opinion formation in a presidential campaign*. Phoenix books. University of Chicago Press, Chicago, 5. impr. edition, 1966.
- A. Bernardes, D. Stauffer, and J. Kertész. Election results and the sznajd model on barabasi network. *The European Physical Journal B - Condensed Matter and Complex Systems*, 25(1):123–127, Jan. 2002.
- S. Bowler. Contextual models of politics: The political impact of friends and neighbours. *Political Geography Quarterly*, 10(2):91–96, 1991.
- M. B. Brewer and W. Gardner. Who is this "we"? levels of collective identity and self representations. *Journal of Personality and Social Psychology*, 71(1):83–93, 1996.
- T. A. Brown. On contextual change and partisan attributes. *British Journal of Political Science*, 11(4):427–447, 1981.
- T. A. Brown. *Migration and politics. The impact of population mobility on American voting behavior*. The University of North Carolina Press, Chapel Hill, 1988.
- B. C. Burden and S. Greene. Party attachments and state election laws. *Political Research Quarterly*, 53(1):63–76, 2000.
- R. S. Burt. Social contagion and innovation: Cohesion versus structural equivalence. *The American Journal of Sociology*, 92(6):1287–1335, 1987.
- A. Campbell, G. Gurin, and W. E. Miller. *The voter decides*. Row, Peterson, Evanston, 1954.
- A. Campbell, P. Converse, W. Miller, and D. Stokes. *The American voter*. Wiley, New York, 1960.
- D. T. Campbell. Common fate, similarity, and other indices of the status of aggregates of persons as social entities. *Behavioral Science*, 3(1):14–25, 1958.
- E. G. Carmines, J. P. McIver, and J. A. Stimson. Unrealized partisanship: A theory of dealignment. *The Journal of Politics*, 49(2):376–400, 1987.
- C. Castellano, S. Fortunato, and V. Loreto. Statistical physics of social dynamics. *Review of Modern Physics*, 81(2):591–646, May 2009.
- F. S. Chapin. The variability of the popular vote at presidential elections. *The American Journal of Sociology*, 18(2):222–240, 1912.

- P. Clifford and A. Sudbury. A model for spatial conflict. *Biometrika*, 60(3): 581–588, 1973.
- G. Cohen. Party over policy. the dominating impact of group influence on political beliefs. *ournal of personality and social psychology*, 85(5):808–822, 2003.
- P. E. Converse. The nature of belief systems in mass publics (1964). *Critical review*, 18(1):1–74, 2006.
- G. Deffuant, F. Amblard, G. Weisbuch, and T. Faure. How can extremism prevail? a study based on the relative agreement interaction model. *Journal of Artificial Societies and Social Simulation*, 5(4):1, 2002.
- M. Eagles, editor. *Spatial and contextual models in political research*. Taylor & Francis, London, 1995.
- A. W. Finifter and B. M. Finifter. Party identification and political adaptation of american migrants in australia. *The Journal of Politics*, 51(3):599–630, 1989.
- M. P. Fiorina. *Retrospective voting in American national elections*. Yale University Press, New Haven, 1981.
- C. H. Franklin. Issue preferences, socialization, and the evolution of party identification. *American journal of political science*, 28(3):459–478, 1984.
- S. Galam. Minority opinion spreading in random geometry. *The European Physical Journal B - Condensed Matter and Complex Systems*, 25(4):403–406, Feb. 2002.
- J. Gastil, L. Black, and K. Moscovitz. Ideology, attitude change, and deliberation in small face-to-face groups. *Political Communication*, 23(1):23–46, 2008.
- L. Gauvin, J. Vannimendus, and J.-P. Nadal. Phase diagram of a schelling segregation model. *The European Physical Journal B - Condensed Matter and Complex Systems*, 70(2):293–304, 2009. 10.1140/epjb/e2009-00234-0.
- J. G. Geer. The electorate’s partisan evaluations: Evidence of a continuing democratic edge. *The Public Opinion Quarterly*, 55(2):218–231, 1991.
- M. C. González, A. O. Sousa, and H. J. Herrmann. Opinion formation on a deterministic pseudo-fractal network. *International Journal of Modern Physics C: Computational Physics & Physical Computation*, 15(1):45–57, 2004.
- M. S. Granovetter. The strength of weak ties. *The American Journal of Sociology*, 78(6):1360–1380, 1973.
- D. Green, B. Palmquist, and E. Schickler. *Partisan hearts and minds. Political parties and the social identity of voters*. Yale University Press, New Haven, 2002.
- S. Greene. Understanding party identification: A social identity approach. *Political Psychology*, 20(2):393–403, 1999.

- S. Greene. The psychological sources of partisan-leaning independence. *American Politics Research*, 28(4):511–537, 2000.
- S. Greene. Social identity theory and party identification. *Social Science Quarterly*, 85(1):136–153, 2004.
- S. Greene. The structure of partisan attitudes: Reexamining partisan dimensionality and ambivalence. *Political Psychology*, 26(5):809–822, 2005.
- T. G. Grove. Attitude convergence in small groups. *Journal of Communication*, 15(4):226–238, 1965.
- R. Hegselmann and U. Krause. Opinion dynamics and bounded confidence. models, analysis and simulation. *Journal of Artificial Societies and Social Simulation*, 5(3):2, 2002.
- M. Hogg. Social identity theory. In P. Burke, editor, *Contemporary Social-Psychological Theories*, pages 111–136. Stanford University Press, Stanford, 2006.
- M. Hogg and J. Smith. Attitudes in social context. a social identity perspective. *European Review of Social Psychology*, 18(1):89–131, 2007.
- M. A. Hogg, D. Abrams, S. Otten, and S. Hinkle. The social identity perspective: Intergroup relations, self-conception, and small groups. *Small Group Research*, 35(3):246–276, 2004.
- D. L. Horowitz. Democracy in divided societies. *Journal of Democracy*, 4(4):18–38, 1993.
- R. Huckfeldt and J. Sprague. Discussant effects on vote choice: Intimacy, structure, and interdependence. *The Journal of Politics*, 53(1):122–158, 1991.
- R. Huckfeldt, P. A. Beck, R. J. Dalton, and J. Levine. Political environments, cohesive social groups, and the communication of public opinion. *American Journal of Political Science*, 39(4):1025–1054, 1995.
- R. Huckfeldt, P. E. Johnson, and J. Sprague. *Political disagreement. The survival of diverse opinions within communication networks*. Cambridge University Press, Cambridge, 2004.
- R. R. Huckfeldt. Information, persuasion, and political communication networks. In R. J. Dalton and H.-D. Klingemann, editors, *The Oxford Handbook of Political Behavior*, page 100. Oxford University Press, Oxford, 2007.
- R. R. Huckfeldt and J. Sprague. *Citizens, politics, and social communication. Information and influence in an election campaign*. Cambridge, 1995.
- L. Huddy. From social to political identity: A critical examination of social identity theory. *Political Psychology*, 22(1):127–156, 2001.
- K. Ikeda and R. Huckfeldt. Political communication and disagreement among citizens in japan and the united states. *Political Behavior*, 23(1):23–51, 2001.

- K. Ikeda, J. H. Liu, M. Aida, and M. Wilson. Dynamics of interpersonal political environment and party identification: Longitudinal studies of voting in japan and new zealand. *Political Psychology*, 26(4):517–542, 2005.
- G. W.-m. Ip, C.-y. Chiu, and C. Wan. Birds of a feather and birds flocking together: Physical versus behavioral cues may lead to trait- versus goal-based group perception. *Journal of Personality and Social Psychology*, 90(3):368–381, 2006.
- R. A. Jackson and T. M. Carsey. Group effects on party identification and party coalitions across the united states. *American Politics Research*, 30(1):66–92, 2002.
- W. Jager and F. Amblard. Uniformity, bipolarization and pluriformity captured as generic stylized behavior with an agent-based simulation model of attitude change. *Computational & Mathematical Organization Theory*, 10:295–303, 2005. 10.1007/s10588-005-6282-2.
- R. Johnston. Party identification. unmoved mover or sum of preferences? *Annual Review of Political Science*, 9(1):329–351, 2006.
- R. Johnston, K. Jones, R. Sarker, C. Propper, S. Burgess, and A. Bolster. Party support and the neighbourhood effect: spatial polarisation of the british electorate, 1991-2001. *Political Geography*, 23(4):367–402, 2004.
- M. Kalmijn. Assortative mating by cultural and economic occupational status. *American Journal of Sociology*, 100(2):422–452, 1994.
- N. Katz, D. Lazer, H. Arrow, and N. Contractor. Network theory and small groups. *Small Group Research*, 35(3):307–332, 2004.
- C. B. Kenny. Partisanship and political discussion. *Political Geography Quarterly*, 10(2):97–109, 1991.
- C. B. Kenny. The microenvironment of attitude change. *The Journal of Politics*, 56(3):715–728, 1994.
- K. Klemm, V. M. Eguíluz, R. Toral, and M. San Miguel. Nonequilibrium transitions in complex networks: A model of social interaction. *Physical Review E*, 67(2):026120, Feb 2003.
- D. Knoke. *Political networks. The structural perspective*. Cambridge University Press, Cambridge, 1991.
- K. Kollman, J. H. Miller, and S. E. Page. Adaptive parties in spatial elections. *The American Political Science Review*, 86(4):929–937, 1992.
- K. Kollman, J. H. Miller, and S. E. Page. Political parties and electoral landscapes. *British Journal of Political Science*, 28(1):139–158, 1998.
- M. Kroh and P. Selb. Individual and contextual origins of durable partisanship. In J. Bartle and P. Bellucci, editors, *Political Parties and Partisanship. Social Identity and Individual Attitudes*, pages 107–120. Routledge, London, 2008.

- M. Laver. Policy and the dynamics of political competition. *The American Political Science Review*, 99(2):pp. 263–281, 2005.
- M. Laver and E. Sergenti. *Party competition. An agent-based model*. Princeton University Press (submitted draft), Princeton, 2010.
- P. F. Lazarsfeld, B. Berelson, and H. Gaudet. *The people’s choice. How the voter makes up his mind in a presidential campaign*. Columbia University Press, New York, 2. ed., 4. pr. edition, 1955.
- D. Lazer. The co-evolution of individual and network. *Journal of Mathematical Sociology*, 25(1):69–108, 2001.
- D. Lazer, B. Rubineau, C. Chetkovich, N. R. Katz, and M. A. Neblo. Networks and political attitudes. structure, influence, and co-evolution. Working paper RWP08-044, Harvard John F. Kennedy School of Government, 2008.
- D. Lazer, B. Rubineau, C. Chetkovich, N. Katz, and M. Neblo. The coevolution of networks and political attitudes. *Political Communication*, 27(3):248–274, 2010.
- J. Levine. Choosing alone? the social network basis of modern political choice. In A. Zuckerman, editor, *The social logic of politics*, pages 132–151. Temple University Press, Philadelphia, 2005a.
- S. S. Levine. *The strength of performative ties: Three essays on knowledge, social networks, and exchange*. PhD thesis, University of Pennsylvania, 2005b.
- M. S. Lewis-Beck, H. Norpoth, W. G. Jacoby, and H. F. Weisberg. *The American voter revisited*. University of Michigan Press, Ann Arbor, 2008.
- P. Lichterman. Talking identity in the public sphere: Broad visions and small spaces in sexual identity politics. *Theory and Society*, 28(1):pp. 101–141, 1999.
- B. Lickel, D. L. Hamilton, G. Wierzchowska, A. Lewis, S. J. Sherman, and A. N. Uhles. Varieties of groups and the perception of group entitativity. *Journal of Personality and Social Psychology*, 78(2):223–246, 2000.
- F. Liu. Perceived partisan heterogeneity in communication networks and changes in party choice in a national election: evidence from taiwan. *International Political Science Review*, 32(1):61–78, 2011.
- J. Lorenz. *Repeated Averaging and Bounded Confidence. Modeling, Analysis and Simulation of Continuous Opinion Dynamics*. PhD thesis, Universität Bremen, 2007.
- J. Lorenz. Heterogeneous bounds of confidence: Meet, discuss and find consensus! *Complexity*, 15(4):43–52, 2010.
- J. A. MacDonald and J. Franko, William W. What moves partisanship? migration, state partisan environment change, and party identification. *American Politics Research*, 36(6):880–902, 2008.

- M. MacKuen and C. Brown. Political context and attitude change. *The American Political Science Review*, 81(2):471–490, 1987.
- G. B. Markus and P. E. Converse. A dynamic simultaneous equation model of electoral choice. *The American Political Science Review*, 73(4):1055–1070, 1979.
- P. V. Marsden. Homogeneity in confiding relations. *Social Networks*, 10(1):57–76, 1988.
- M. L. McDermott. Voting for myself. candidate and voter group associations over time. *Electoral Studies*, 28(4):606 – 614, 2009. Special issue on The American Voter Revisited.
- M. McPherson, L. Smith-Lovin, and J. M. Cook. Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27:415–444, 2001.
- M. S. Miguel, V. M. Eguiluz, R. Toral, and K. Klemm. Binary and multivariate stochastic models of consensus formation. *Computing in Science and Engineering*, 7(6):67–73, 2005.
- A. H. Miller and C. Wlezien. The social group dynamics of partisan evaluations. *Electoral Studies*, 12(1):5–22, 1993.
- A. H. Miller, C. Wlezien, and A. Hildreth. A reference group theory of partisan coalitions. *The Journal of Politics*, 53(4):1134–1149, 1991.
- W. E. Miller and J. M. Shanks. *The new American voter*. Harvard University Press, Cambridge, 1996.
- D. Nickerson. Is voting contagious? evidence from two field experiments. *American Political Science Review*, 102(1):49–57, 2008.
- R. G. Niemi and M. K. Jennings. Issues and inheritance in the formation of party identification. *American Journal of Political Science*, 35(4):970–988, 1991.
- P. Norris and R. Mattes. Does ethnicity determine support for the governing party? Working Paper 26, Afrobarometer, 2003.
- A. Nowak, J. Szamrej, and B. Latané. From private attitude to public opinion: A dynamic theory of social impact. *Psychological Review*, 97(3):362–376, 1990.
- T. S. Philpot and J. Walton, Hanes. One of our own: Black female candidates and the voters who support them. *American Journal of Political Science*, 51(1):49–62, 2007.
- T. Postmes, S. A. Haslam, and R. I. Swaab. Social influence in small groups: An interactive model of social identity formation. *European Review of Social Psychology*, 26:1–42, 2005a.
- T. Postmes, R. Spears, A. T. Lee, and R. J. Novak. Individuality and social influence in groups: Inductive and deductive routes to group identity. *Journal of Personality and Social Psychology*, 89(5):747–763, 2005b.

- S. Reicher and N. Emler. Moral orientation as a cue to political identity. *Political Psychology*, 5(4):543–551, 1984.
- M. Rosema and M. Krochik. Dissecting partisanship: in-group and out-group attitudes, social identity, and electoral choice. 2009. Annual meeting of the ISPP 32nd Annual Scientific Meeting, Trinity College, Dublin, 14.7.2009.
- M. Rosema and J. Thomassen. A theory of dual partisanship. 2008. Annual meeting of the ISPP 31st Annual Scientific Meeting, Sciences Po, Paris.
- L. Salzarulo. Formalizing self-categorization theory to simulate the formation of social groups. In C. Hernández, A. López-Paredes, J. Pajares, and J. M. Galán, editors, *Proceedings of the 2nd International Conference of the European Social Simulation Association*. University of Valladolid, Valladolid, 2004.
- L. Salzarulo. A continuous opinion dynamics model based on the principle of meta-contrast. *Journal of Artificial Societies and Social Simulation*, 9(1):13, 2006.
- T. C. Schelling. Dynamic models of segregation. *Journal of Mathematical Sociology*, 1(2):143–186, 1971.
- R. Schmitt-Beck, S. Weick, and B. Christoph. Shaky attachments. individual-level stability and change of partisanship among west german voters, 1984–2001. *European Journal of Political Research*, 45(4):581–608, 2006.
- H. Schoen. Soziologische Ansätze in der empirischen Wahlforschung. In J. Falter and H. Schoen, editors, *Handbuch Wahlforschung*, pages 135–185. VS Verlag, Wiesbaden, 2005.
- H. Schoen and C. Weins. Der sozialpsychologische Ansatz zur Erklärung von Wahlverhalten. In J. Falter and H. Schoen, editors, *Handbuch Wahlforschung*, pages 187–242. VS Verlag, Wiesbaden, 2005.
- E. Smith and D. Mackie. *Social psychology*. Worth Publishers, New York, 1995.
- J. Smith and M. Hogg. Social identity and attitudes. In W. Crano and R. Prislin, editors, *Attitudes and attitude change*, pages 337–360. Psychology press, New York, 2008.
- H. W. Stanley and R. G. Niemi. Partisanship and group support, 1952–1988. *American Politics Research*, 19(2):189–210, 1991.
- D. Stauffer, A. O. Sousa, and S. M. de Oliveira. Generalization to square lattice of sznajd sociophysics model. *International Journal of Modern Physics C: Computational Physics & Physical Computation*, 11(6):1239, 2000.
- D. Stauffer, S. Moss de Oliveira, P. M. Castro de Oliveira, and J. Sá Martins. *Biology, Sociology, Geology by Computational Physicists*. Elsevier, Amsterdam, 2006.
- L. Stoker and M. K. Jennings. Political similarity and influence between husbands and wives. In A. Zuckerman, editor, *The social logic of politics. Personal networks as contexts for political behavior*, pages 51–74. Temple University Press, Philadelphia, 2005.

- A. K. Stokes-Brown. Racial identity and latino vote choice. *American Politics Research*, 34(5):627–652, 2006.
- K. Sznajd-Weron. Sznajd model and its applications. *Acta Physica Polonica B*, 36(8):2537–2547, 2005.
- K. Sznajd-Weron and J. Sznajd. Opinion evolution in closed community. *International Journal of Modern Physics C: Computational Physics & Physical Computation*, 11(6):1157–1165, 2000.
- H. Tajfel and J. Turner. An integrative theory of intergroup conflict. In W. Austin and S. Worchel, editors, *Social psychology of intergroup relations*, pages 33–47. Brooks, Monterey, 1979.
- C. J. Tessone, R. Toral, P. Amengual, H. S. Wio, and M. San Miguel. Neighborhood models of minority opinion spreading. *The European Physical Journal B - Condensed Matter and Complex Systems*, 39(4):535–544, June 2004.
- J. Turner, M. Hogg, P. Oakes, S. Reicher, and M. Wetherell. *Rediscovering the social group. A Self-Categorization Theory*. Blackwell, Oxford, 1987.
- L. M. Verbrugge. The structure of adult friendship choices. *Social Forces*, 56(2):576–597, 1977.
- K. C. Walsh. *Talking about Politics: Informal Groups and Social Identity in American Life*. University of Chicago Press, Chicago, 2004.
- H. Weisberg and S. Greene. The political psychology of party identification. In M. MacKuen and G. Rabinowitz, editors, *Electoral democracy*, pages 83–124. University of Michigan Press, Ann Arbor, 2003.
- N. Winter. Masculine republicans and feminine democrats: Gender and americans’ explicit and implicit images of the political parties. *Political Behavior*, 32:587–618, 2010. 10.1007/s11109-010-9131-z.
- C. Wlezien and A. H. Miller. Social groups and political judgments. *Social Science Quarterly*, 78(3):625–640, 1997.
- A. Zuckerman. Returning to the social logic of political behavior. In A. Zuckerman, editor, *The social logic of politics. Personal networks as contexts for political behavior*, pages 3–20. Temple University Press, Philadelphia, 2005.
- A. Zuckerman. The social logic of political choice. picking a part in the context of immediate social circles. *Politische Vierteljahresschrift*, 48(4):633–649, 2007.
- A. Zuckerman, J. Fitzgerald, and J. Dasovic. The social logic of bounded partisanship among young persons. dynamic patterns in british and german households. 2003. Annual meeting of the American Political Science Association, Philadelphia Marriott Hotel, Philadelphia, 27.8.2003.
- A. Zuckerman, J. Fitzgerald, and J. Dasovic. Do couples support the same parties? sometimes. evidence from british and german household panel surveys. In A. Zuckerman, editor, *The social logic of politics. Personal networks as contexts for political behavior*, pages 75–95. Temple University Press, Philadelphia, 2005.

A. Zuckerman, J. Dasovic, and J. Fitzgerald. *Partisan families. The social logic of bounded partisanship in Germany and Britain*. Cambridge University Press, Cambridge, 2007.