

Diffusion Models of Cycles of Protest as a Theory of Social Movements

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Abstract

This paper develops a theoretical framework for understanding social movements as interrelated sets of diffusion processes. It first explains why such a conception is broadly useful to scholars of social movements, and then gives some preliminary examples of such theorizing. A social movement can be understood as a complex set of many actions by many different collective actors all oriented toward some very broad issue or goal. These actions affect each other as actors respond to what others have done, and as they accumulate, they build into the broad phenomena we collect under the label "social movement." This conception of a social movement is closely linked to the common recognition of cycles or waves of protest and collective violence. In particular, this conception recognizes that movement actors are affected by actions in other movements, not only their own, and that the dynamics of cycles of protest are driven by the interplay between dissidents and regimes, and between peaceful and disruptive forms of protest. This conception of social movements is closely related to much current thinking in the field and is also somewhat consistent with some of the social constructionist images of collective identities as emergent processes. By adding explicit diffusion concepts, we are able to formalize and mathematize many of our theoretical understandings, thus making it possible to create a coherent theoretical structure which can be linked to the wealth of new empirical data being collected on the time series of various kinds of violent and nonviolent events in a number of different nations. We are developing mathematical models of the diffusion of collective action in cycles or waves of protest, with a particular emphasis on the diffusion of collective violence and disruptive collective protest and the ways these are affected by cycles of non-disruptive protest, the formation and institutionalization of movement organizations, and the social control efforts of regimes. Multiple-equation models are being developed for expressing the interplay among different forms of action and between regimes and dissidents in such cases as the new social movements of Europe in 1975-1990.

Diffusion Models of Cycles of Protest as a Theory of Social Movements

This paper sketches the contours of a newly evolving theoretical conception of social movements which promises to yield important new insights into the dynamics of social movements and cycles of protest. It joins three intellectual streams. The first stream builds upon political process and cycles of protest theories to emphasize the strategic interactions among protesters and their opponents in shaping the trajectory of social movements. The second is the growing body of data and analysis of protest events. More and more scholars are collecting data from police and media sources on protest events across time, and are showing how these events affect and are affected by other political and social events. And the third is advances in diffusion theory which for the first time make it possible to apply mathematical diffusion models to real-life instances of collective action. Now I know that the mathematical models part of this is not likely to be exciting to most of this audience, but the broader approach is one which I believe will interest all scholars of social movements. This new approach has the potential of embedding protest actions in a larger context in which protest co-evolves in interaction with movement organizations, electoral politics, police repression, media coverage, ideological discourses and frames, and public policy. It is not attempt to dismiss older work on resource mobilization, political process, and framing theory, nor to ignore all of the synthetic theorizing that has been going on relating these different aspects of movements to each other, but rather an attempt to build on this work and cast it in a new light.

We begin with the fundamental observation that in social movements, actions affect other actions: actions are not just isolated, independent responses external economic or political conditions. Rather, one action changes the likelihood of subsequent actions. That is, diffusion processes are involved. This has long been recognized, for example in McAdam's work on "tactical diffusion", which showed that the civil rights movement was not a steady stream, but a series of bursts of action around bus boycotts, freedom rides, sit-ins, and demonstrations (McAdam 1983). Many scholars have noted in many ways that the actions of the protesters themselves cannot be understood in isolation, but rather need to be viewed as interactions with the police and other social control forces, as the police learn more effective methods of repression over time. Protest actions obviously interact as well with social policy changes and political speech-making (what we often call "elite support"). And, of course, over time one social movement affects another, as tactics and frames diffuse and produce the effects that (Meyer and Whittier 1994) call "movement spillover." The civil rights demonstrations and marches of the early 1960s not only led to civil rights legislation, but indirectly fostered the increased militancy and anger of Blacks and the elite responsiveness which contributed to the wave of black urban riots. The Black movement, in turn, was a direct inspiration for activists who explicitly studied the histories and writings of Black movement activist, including for example the Chicanos who founded La Raza (García 1989) and early feminists (Evans 1980).

These interconnections between events are directly tied to cycles of protest. It has long been recognized that social turmoil comes in waves. Social movements come and go. There are "rebellious centuries" (Tilly, Tilly, and Tilly 1975) and quieter ones. Recent history brings such waves readily to min, including the late 1960s, which saw waves of protest around the world, and the late 1980s, which witnessed the global waves of pro-democracy movements. Although there

is evidence that these cycles are affected by larger economic cycles (Frank and Fuentes 1994), the specific dynamics within the cycles are clearly more complex than could be explained by simple responses to external circumstances.

In short, diffusion processes are central in the evolution of social movements. Scholars are increasingly recognizing the theoretical importance of diffusion processes, and using diffusion language in discussing social movements. Until recently, however, these discussions have stayed at a fairly superficial level. The fact of the diffusion of action has been repeatedly demonstrated in quantitative data showing the dispersion of events across time or space, and in qualitative research documenting the direct connections between events. A wealth of new data has been and is being collected giving the time series of various kinds of violent and nonviolent events in a number of different nations (Hocke 1998; Jenkins and Eckert 1986; Kriesi, Koopmans, Duyvendak, and Giugni 1995; McAdam 1982; Olzak 1990; Olzak 1992; Olzak and Olivier 1994; Olzak, Shanahan, and McEneaney 1996; Olzak, Shanahan, and West 1994; Rucht, Koopmans, and Neidhardt 1998; Rucht 1992). Careful analyses of these data are yielding great payoffs in our understanding of the dynamics of collective events and the interplay between different modes of action by different actors. These data plus recent advances in the technology of modeling diffusion make it possible to give a much more detailed account of the mechanisms of diffusion and to integrate diffusion processes with the other processes known to be important in social movements.

Taking advantage of these data and technical advances requires reorientation of both social movement theory and traditional diffusion theory so that the two can be integrated. In this paper, we discuss the issues involved in integrating these theories, the steps that have been taken so far, and the tasks that remain. Although it is possible to imagine a full theoretical conception that is more complex than we are able to fully portray at present, we believe that the work accomplished so far indicates the tremendous advances that will be possible from completing the process of theoretical integration.

Re-orienting Social Movement Theory: From Entities to Distributions of Events

The linchpin of the integration of social movement theory with diffusion concepts is to re-conceive the basic concept of a social movement. As we, among others, have written elsewhere, there has never been much clarity about just what kind of thing a social movement is. All scholars agree that broad social movements need to be distinguished from specific social movement organizations, but disagree about whether movements are fundamentally types of social entities, preference structures, or sets of people. It has been argued elsewhere that it is a fallacy to conceive of a social movement as a coherent decision-making entity because social movements are generally characterized by large numbers of people doing different things for different reasons with different visions of what their purpose is (Oliver 1989). Social movements are not at all like hierarchical armies with generals and strategies, although some of the organizations in them are. Instead, social movements are more like diffuse action fields. This very general point has been argued in a variety of different ways by scholars from a variety of different theoretical traditions (Gusfield 1981; Melucci 1989; Oberschall 1978).

If we are to gain the advantages of diffusion theory, we need entirely to abandon the conception of a social movement as some kind of coherent entity, and instead conceive social

movements as distributions of events across populations. The term "event" is used in a general sense to encompass the actions of the various actors in a population, as well as their beliefs. In this sense, specific protest actions are events, but so is a resource flow from one group to another, and it is also an event when a certain proportion of the population comes to hold a particular belief. In this sense, we say that a social movement is at its peak when there are a lot of protest actions going on involving a large proportion of the population at risk.

An emphasis on the diffusion of action as the core process in a social movement is central to studies of waves of conflict and cycles of protest. Some scholars have focused specifically on the rise and fall of various forms of social movement organizations by building on the concept of "density dependence," in which movement organizations are founded and die off partly as a function of the number of other similar organizations creating legitimate models for action and competing for resources (Minkoff 1993; Minkoff 1997; Olzak and West 1991). In her work on waves of ethnic conflict, Olzak and her colleagues argue that collective violence first diffuses through a contagion effect and then declines through an exhaustion effect, when actors deplete resources or literally grow tired of acting (Olzak 1987; Olzak, Shanahan and McEneaney 1996; Olzak, Shanahan and West 1994). In his development of the concept of a cycle of protest, Tarrow argues that disruptive protest inherently entails an inflationary spiral, as groups compete for influence and increasingly radical actions are necessary to achieve disruptive impact (Tarrow 1994).

For scholars not used to thinking this way, the transition is difficult, but it is very important if we are to achieve a real understanding of the phenomenon we are studying. The transition perhaps can be compared to that in the study of evolutionary biology, when it is recognized that a species is not a distinct entity which can make choices about how to adapt to an environment, but a statistical distribution of traits across individual organisms. Species evolve when the distribution of characteristics within a breeding population changes. Social movements rise when the overall frequency of protest events rises in a population, they become violent when their ratio of violent events to non-violent events rises, and so forth. It has long been recognized that social movements lack clear-cut beginnings and ends: their origins are always found farther back in history than the sudden upsurge that calls them to public attention, and they always continue at low levels after they seem to have died down. Thinking statistically allows us to talk about the beginning of a particular social movement protest cycle as the point at which action begins to accelerate, and its end as the point at which action falls back to a low steady-state rate of occurrence.

This conception fits with empirical research about changes in social movements. For example, Diani and Lodi (Diani and Lodi 1988) showed that the ecology movement in Milan always had three strands and individual activists and organizations did not change strands, but that the character of the movement as a whole shifted as one strand gained members and became more active while another strand lost members and reduced its activity level. Epstein (Epstein 1991) makes a similar point about the women's movement in the US, claiming that although socialist feminism and radical feminism were both strong strands in the 1970s, socialist feminists tended to be or become academics and came to dominate women's studies, while radical feminists were more likely to enter working class occupations and be activists in social movements, so that by the end of the 1980s, radical feminism was a more significant presence in

activist communities than socialist feminism. Or again, the NAACP never changed its basic politics and strategy, but the Black Movement as a whole changed sharply as it was dominated first by the NAACP, then the SCLC, and then SNCC and other black power organizations and the urban riots (McAdam 1982; Morris 1984). Talking about these shifts is awkward if one imagines a social movement as a "thing," but is straightforward if one shifts to a populational, ecological framework.

Strategic Interactions and Coevolution. Social movements researchers have often been criticized for focusing too much on the actions of the movement and ignoring the actions of opponents or others in the environment in shaping the trajectory of a movement. It is very clear that the evolution of a social movement is always shaped by the actions of its opponents and bystanders. Attempts to discuss the strategic interactions between movements and their opponents have foundered as long as movements have been conceived as entities, because strategic analyses attribute more uniformity of purpose to both sides than ever is actually found to be true under empirical scrutiny. But a shift to an event-wise approach minimizes much of this problem. Individuals actors often behave strategically in particular actions at particular moments in response to particular events, even if they generally lack perfect knowledge or perfect wisdom. The government probably does not make a concerted decision to respond erratically to confrontational actions, but the sum total of its actions can certainly be erratic and intermittent repression. There can be strategic consequences for the trajectory of the movement as a whole as the accumulation of these smaller strategic events.

The biological concept of coevolution appears to have great utility for the study of social movements. Species often coevolve: for example, flowering plants and insects evolved together, in interaction with one another, as do parasites and their hosts. A kind of coevolution has clearly occurred between protesters and police in the US and Europe since the 1960s, as police have learned to channel and routinize protests to minimize their disruptive potential, and protesters have learned to work with the police to maximize their dramatic potential while minimizing their risk of bearing severe costs. States interact with movement by granting concessions, making policy reforms, channeling resources, or repressing.

A growing body of work is pointing to the importance of the dynamic interplay between different groups of collective actors. In particular, recent scholarship suggests that the dynamics of these waves or cycles are driven by the interplay between regimes and dissidents. Dissidents experiment with a wide variety of tactics as they seek to improve their position or redress grievances, and regimes respond with various forms of concession or repression (Koopmans 1993; McAdam 1983). Both dissidents and regimes are constantly learning both from their own experiences with each other, and from the successes and failures of other dissidents or regimes in other locales. Activists learn from others about new ways of disrupting or influencing the polity, what Oliver and Marwell (Oliver and Marwell 1992) call movement "technologies", and social control agents learn new ways of dealing with activists. Police agencies give and receive training in controlling violence and protests (McCarthy and McPhail 1997; McCarthy, McPhail, and Crist 1998; McPhail, Schweingruber, and McCarthy 1998). Political and economic elites may respond to violent or disruptive dissent by encouraging or facilitating nonviolent or nondisruptive forms of collective action (Koopmans 1993). Corporate foundations and government agencies gave money to black organizations in response to disruptive civil rights

protests and riots in the apparently-successful effort at “channeling black insurgency” (Jenkins and Eckert 1986; McAdam 1982). Elite money flowing into movement organizations creates jobs for activists and channels their activities into nondisruptive organizational influence strategies. These organizations may, at a later phase, initiate new forms of action, possibly sparking a new cycle of protest.

The interplay between movements and counter-movements also shapes the dynamics of protest cycles. A great deal of theorizing about major ethnic conflicts stresses the spirals of violence that arise as each side seeks revenge for the actions of the other. Competition theory (Olzak 1985) argues that ethnic conflict arises when groups come into economic competition with one another. These interactions are important even when the conflict is played out in largely nonviolent ways. For example, the two sides in the US abortion movement continually adjust their actions in response to the other side, as well as to the actions of the regime.

Waves within Waves and Campaigns Within Movements. A cycle of protest is typically conceived as one long wave of diffusion, but this is never actually the case. There are always smaller waves within waves. McAdam (McAdam 1983) showed that the bursts of activity in the civil rights movement followed tactical innovations. Myers' (Myers 1996) analysis of black riots showed three nested levels of waves: the decade-long wave, the seasonal waves ("long hot summers"), and, within those, clear evidence of smaller waves initiated by major riots which received extensive media coverage. Koopmans' (Koopmans 1995) data on the new social movements of Germany similarly shows clear evidence of smaller waves within the larger wave. The diffusion of collective action across national boundaries also shows similar evidence of waves within waves, a general wave of mobilization that transcended national boundaries, and nation-specific waves (Kriesi, Koopmans, Duyvendak and Giugni 1995). Similarly, a broad social movement is always made up of smaller campaigns in particular localities or involving particular issues. These empirical patterns are well recognized and have led many scholars to note the importance of diffusion processes in protest waves. But until recently it has not been possible to represent these effects in models of protest waves.

Resources and Opportunities. Resource mobilization and political opportunity remain central concepts for understanding social movements. Both these concepts can be readily reconceived as actions in a strategic interaction context, although only by dealing with the ambiguities that many have noted in the way both concepts are used. Resources are viewed both as constituent properties of a particular group and as stocks which can be transferred to others. If a group has resources that permit it to engage in some actions and not others, then these resources directly impact on the kinds of actions a group emits. Resources that are transferable stocks become salient when one group performs the action of giving the resource to another group.

Opportunities can similarly be reconceived as strategic interaction in a population of actors and actions. Although there has been some tendency to use the concept of political opportunity as a single dimension which there is more or less of, it is becoming increasingly clear that political opportunity is really a multidimensional space in which some groups or actions are facilitated or responded to, while others are repressed or ignored. In this sense, political opportunity becomes the probability that a particular action will meet with a particular kind of response or action from other actors.

Networks and communication. It is well established that the social ties linking actors and groups are central elements of social movements, and that these networks change in the evolution of a protest cycle. Network ties determine the targets of action, flows of resources, and flows of information. Actors are connected by a direct tie when they have direct contact with each other. This occurs when they are in physical proximity to one another, or when they have a prior social relationship. Chains of direct ties can indirectly link actors with others who are quite distant from them and lead to the widespread diffusion of information. When indirect ties are involved, it is possible to track the diffusion over time through successive circles of influence or along well-defined physical paths. Crowd actions in the past have diffused across time from a point of origin along major transportation routes (Rude 1981; Shibutani 1966) (e.g. Rude 1964, p. 25; Shibutani 1966, pp. 103-6). Individuals received communication about developing riots (Singer 1968) and sit-in campaigns (Morris 1984) by direct communication from prior acquaintances. Announcements at church services spread the word about the Montgomery bus boycott (Morris 1984). Activists encounter new ideologies and tactics at conferences with other activists (e.g. (Rothman and Oliver 1998)).

Mass Media. Even more important than chains of direct ties are the indirect ties actors have by way of mass media. In this instance, the actions of one group affect another by way of media coverage, and the influence can spread as far as the media are broadcast, without prior connection between the actors. Myers (Myers 1998) shows that large riots which received national media coverage increased riot propensities nationally, while smaller riots increased riot propensities within their local media catchment areas.

The media themselves are subject to diffusion processes. One outlet picks up a story and it may be picked up by other outlets. If enough outlets begin to cover the story, it becomes news, and the media will begin actively seeking more stories on the same theme. The result is the "media attention cycle" which has been shown to under-represent movements at the beginnings and ends of their cycles, and over-represent them in the middle, when the issue is "hot" (Cancian and Ross 1981; Downs 1972; McCarthy, McPhail, and Smith 1996).

Frames and Discourses. Making a speech, writing a pamphlet, and publishing an article or book are all actions which can be treated as events in a diffusion framework. While there are elements of ideology and identity construction that involve very different processes, frame shifts may be fruitfully analyzed in diffusion terms. It is possible to track the diffusion of particular terms through documents across time, for example the shift from "civil rights" to "black power" language, or the use of "Negro" to "Black" to "Afro-American" to "African American," or the shift from "feminism" to "women's liberation" to "women's lib" to "women's movement" or the shift from "Indian" to "Native American" to "American Indian." The shifting terms by which groups denote themselves are pointers to shifting political currents as they name and rename themselves in ongoing processes of collective identity construction. It is possible to trace the origin and diffusion of new terms such as "ecology" or "environmental biology." Literary analysts look for intertextual references in written works and the ways writers consciously or unconsciously play on the symbols and meanings they inherit from prior writers. It seems likely that words, concepts, and frames diffuse in processes very similar to the diffusion of knowledge about actions. Beginning with the programmatic statement of frame theory (Snow, Rochford, Worden, and Benford 1986), a growing body of scholarship shows how frames interact with the

kinds of actions groups pursue, the resources they attract, and the repression they receive. Thus, conceiving frame evolution in strategic interaction with other forms of action is certain to capture important elements of the dynamics of frame evolution. Just as with the actions and groups in a social movement, it is important to recognize that frames are always in competition with one another, and that there are always multiple frames available, even though one might be hegemonic in a particular period.

Re-Orienting Diffusion Theory to Encompass the Realities of Collective Action

The tremendous promise of diffusion theory for the study of collective action has just recently begun to be recognized, but the few scholars who have engaged it have made substantial inroads into improving diffusion models in ways that can handle the realities of collective action. Prior to these advances, diffusion modeling for collective action had become largely stagnant due to the mismatch between the mathematical assumptions necessary in deterministic diffusion models and the empirical realities of collective action waves. Advances beyond curves that seemed to closely fit cumulative event-count waves (e.g., Pitcher, Hamblin, and Miller 1978; Hamblin, Jacobson, and Miller 1973) were hard to come by and the usefulness of even the best of this work was questionable (the lack of follow-up, application, or extension is one evidence.) Furthermore, it proved quite difficult to directly test these diffusion-based models against other theories that accounted for waves of protest (waves cites here) and scholars abandoned the mathematically technical models for ones that seemed more substantively grounded.

Recent advances in diffusion modeling have provided an opportunity to re-orient diffusion modeling to overcome many of the difficulty of earlier approaches. In large part, this re-orientation is due to the introduction of diffusion notions into an event history or survival time framework. In classical diffusion models, analysts were forced to make a series of assumptions about the population so that mathematical models were tractable. These assumptions clearly aided the analysts ability to derive, modify, and test diffusion models, but at the same time forced the models in a realm of questionable validity since the assumptions were difficult to justify for virtually any social process (Mahajan and Peterson 1985).

Perhaps the two most damaging (and most useful for mathematical purposes) assumptions were what is termed spatial and temporal homogeneity. Classic diffusion models operate under the assumption that the number of prior adopters is the key element driving the adoption rate at any given point in time. In these models, all prior adopters contribute the same amount of pressure to adopt--no matter where they are or when they adopted. Implicitly, this means that all actors in a social system have equal contact with each other (or at least have an equal probability of contact with each other members) and that the influence of their behavior is just as salient today as it was a week, a year, or ten years ago.

Our empirical understanding of social systems and collective action does not reflect well on these assumptions. In fact, it has been demonstrated that in many circumstances, recent events have stronger effects on action and actors are more affected by others who are physically or socially close to them. Myers' analyses of riot data, for example, showed that there was a long-cycle effect of total riots in the decade, but that more recent riots had an additional effect short-term effect on the probability of rioting that decayed and died out over approximately one week (Myers 1997a; 1996). A follow-up study showed that riots were most infectious to those

who were close in both geographic space and social space (Myers 1998). Soule also demonstrated that the diffusion of shanty-town divestment protests traveled according to proximity in several types of social space (Soule 1997).

Correct models of the diffusion of collective action then, need to be able to capture both the effects of the total number of prior actions (adoptions) and the additional effects of more proximate actions. As Strang and Tuma (1993) authoritatively show (and numerous follow-up studies and related approaches substantiate; Davis and Greve 1997; Grattet, Jenness, and Curry 1998; Greve, Strang, and Tuma 1995; Soule, 1997; Hedström 1994; Mintrom 1997; Mooney 1997; Mooney and Lee 1995; Soule and Zylan 1997; Strang 1990; Strang 1991), event history models can accomplish this aim. Event history models accomplish this by shifting from a population focus to a individual risk focus. In such models, analysis can easily test multivariate models in which the hazard of individual adoption is the dependent variable and a variety of standard and diffusion-based covariates can be used. For example, if one were studying riots on the city level, one could incorporate variables indicating "intrinsic" properties such as the unemployment rate in the city or racial characteristics of the cities population (see Olzak and Shanahan 1996; Myers 1997a). Along side these, one can test diffusion models by specifying the number of riots that have previously occurred, or the number that have occurred in the prior week (temporal heterogeneity), or the number that have occurred in nearby cities (spatial heterogeneity). In this way, diffusion process can be directly tested against alternative theories about collective action waves.

A second technical problem related to classic models of diffusion is its assumption of single and perpetual adoption. Because so much diffusion research has been geared to the spread of technological innovations such as new farming methods or drugs, the assumption that adoption occurs once and use of the adopted technology continues from that point forward is a reasonable one. This is not the case for collective action, however. Units that engage in collective action can not only act more than once (repeated events), they also can return to their pre-adoptive state (reversibility). While the singular adoption model may be reasonable in some cases (e.g., Hedstrom's 1994 analysis of Swedish trade unions formation where only a few unions failed after being founded), it is not even approximately true for collective violence. Of the 313 cities that experienced urban civil disorders from 1964-1971 (Carter 1986; Myers 1996), 160 (51 %) experienced two or more riots and all cities went through long periods when they did not experience a riot--they had return to their pre-riot state of peace. Non-violent protest also does not fit the single adoption pattern. Activist cadres can and do initiate dozens of specific actions.

Classic diffusion models are not well suited to handling these sorts of events because their focus is squarely on the adopter as the key unit of analysis. Accommodating repeated events requires a shift to the adoption act as the key unit of analysis (Pitcher, Hamblin, and Miller 1978; Myers 1996) and focusing on reversibility also requires some knowledge of the duration of the adoption act. Event history extensions of diffusion models allow both of these conditions. Multiple adoption events from each unit can be accommodated via repeated events analysis and the duration of the event can either be examined alongside the duration between adoption events or as the focus of the analysis itself. This focus on events does not mean that the characteristics of the adopter have become irrelevant however. Event history diffusion models focusing on events (singular or repeated) allow both characteristics of the event and the actors to

be examined in the same model (Myers 1996), and in fact, all recent diffusion analyses using event history approaches have identified key elements of the actors that contribute to the diffusion process.

A third modification of classic diffusion models necessary to allow adequate application to collective action processes concerns the decline of the action wave. In classic diffusion models, the rate of adoption at any given time is a function both of the number of actors who have previously adopted and the number who have not yet adopted. This joint dependence accounts for the wave-like pattern: In the beginning, there are few prior adopter to levy influence--so the rate of adoption is low; in the middle, there are a large number of prior adopter who exert influence on a large body of potential adopter--so the rate of adoption is high; toward the end of the cycle, there are many to influence, but the body of potential adopters has waned and the rate of adoption returns to very low levels. In other words, the decline of the action wave depends on the saturation of the population: adoption must slow when there remains no one to adopt.

Collective action waves are subject to the kind of population depletion. They do decline, but because actors are subject to the possibility of repeated adoption, the population of potential actors does not decline. Thus we see a second complication introduced by repeated events: Some other mechanisms other than a declining population at-risk must be introduced to the models to account for the decline of a collective action wave. Some work has been done toward this end. Olzak (1987) and Myers (1997a) suggest that some sort of "exhaustion" effect is at work, in which it is assumed that actors use up their stocks of resources and/or literally become tired and give up. Myers (1997b) has developed a model in which the diffusion of repression counter-acts the surge of dissent and eventually brings the action wave down. These are only first attempts, however, and there is considerable work to be done to specify and verify the processes driving the downswing of collective action waves.

Apart from these areas where work is already in progress, as diffusion models of collective action develop, they will need to address several further theoretical issues to become fully capable of representing key issues involved.

Mechanisms and Processes of Diffusion. A careful specification of the proposed mechanism for the diffusion of a particular form of action is necessary to achieve a precise specification of the mathematical model used to represent the diffusion process. Classic diffusion models of contagion assume that infection occurs with a certain probability whenever a susceptible person encounters an infectious person. Although contagion-like models appear appropriate for the diffusion of beliefs or frames and the spread of rumors, and "new institutionalism" theory is based on the assumption that this kind of process produces the adoption of particular organizational innovations, the specification of the actual process of the diffusion of collective action is incomplete. We now know that events cluster and that some events are connected to others, but how diffusion actually occurs is somewhat of a black box.

To look inside the black box, we must first ask the question "what is diffused?" Early diffusion models are constructed as if action directly begets action, but there are a number of steps in the diffusion process that are overlooked using this approach and specifying these steps can lead to better mathematical models.

In a collective action diffusion process there are three elements in some sense are diffusing: Information, attitude, and behavior. When using an infectious disease model, one

element that is important is the actual biological entity that travels from person to person. Likewise in a social setting there must be an element that travels from actor to actor. This traveling element is not the action itself, but rather is information about prior actions. Information, however, is not what is adopted by the actors. Instead they adopt an action-oriented attitude that brings them into the pool of units who could engage in the diffusing behavior. Finally there is action. Given that adherents of an action ideology do not constantly act, actors who have adopted an attitude will display the diffusing behavior is a stochastic process. The move from attitude acceptance to behavior, then, must also be specified in the model.

Information travels among social actors via communication networks of one sort or another and these communication networks can have very different effects on the adoption patterns we observe. Some differences may arise because the communication network through which information flows only reaches some of the potential adopters. Furthermore, as the information travels the network, it is subject to filtering and distortion. The resulting distortion can further increase the rate of adoption or dampen it.

One communication system that commonly carries information in diffusion process is the mass media. Recently, there has been a surge in scholarly attention to media coverage of protest (e.g., Franzosi 1987; Hoake 1998; McCarthy, McPhail, and Smith 1996; McCarthy, Titarenko, McPhail, and Augustyn 1998; Mueller 1997; Oliver and Myers 1998; Oliver and Maney 1998), and as a result, we are presented with an opportunity to learn a great deal about how the media affects protest diffusion. For instance, several scholars have documented that newspapers are much more likely to report large events than small ones (Danzger 1975; Snyder and Kelly 1977; McCarthy, McPhail, and Smith 1996; Mueller 1997; Oliver and Myers 1998). If the media is the main communication network that carries the information driving a diffusion wave, we should be able to make some predictions about the infectiousness of individual events and the overall trajectory of the protest wave on the basis of the size or severity of events. The distortion produced by the media in this case advantages movements with large events and disadvantages those who can only produce small events. When we have this understanding of how the communication network reacts to events, we can come closer to a correct model of the effect of discontinuous "shocks" to a system that come from dramatic events or tactical innovations. It could also lead toward formal models that incorporate stochastic production of such innovations as action in general is accelerating.

Once information about a prior event reaches a potential adopter, the information creates an "occasion" for deciding (Collins 1981) whether or not to adopt. Most people spend most of their time going about their daily business. They do not think about whether to march in a demonstration, or petition city hall, or riot, and their daily discussions with others do not revolve around these questions. But hearing about collective action by others can lead people to start discussing the question of whether they, too, should do something collective. The likelihood that previous actions will create such an occasion is positively related to the size and drama of the action and to the similarity between the previous actors and the group under consideration. Occasion-creating should also show strong recency effects. Once a decision is made to accept an action orientation, then the number of actions observed should be a stochastic manifestation of attitude. Thus, we should expect to see sharply peaked "imitative" waves

resulting from occasion-creation: rapid rises followed by rapid declines. These kinds of sharp peaks are seen as oscillations inside the longer wave.

The racial riots of the 1960s provide an initial example of these kind of patterns. First of all, it has been shown that, consistent with what we know about media coverage of riots, more severe riots were considerably more contagious than less severe ones. The reach of the media network was showed to affect diffusion such that contagion was the most powerful within broadcast radii of television stations (Myers 1998). Riot contagion was also temporally limited such that immediate contagion effects died away with approximately a week (Myers 1996). These repeated short-term bursts of activity are apparent when the frequency of riots is plotted over time (Figure 1).

| Figure 1 Here |

Movement from the adoption of an action orientation to actual behavior is not automatic, but rather conditional. That is, it depends on the degree of repression the prior actor experience and the success (or failure) of prior action in gaining concessions or policy reforms, or at least in influencing public opinion. Some theorists attempt to deal with these effects without dealing with them, i.e. to embed in the diffusion model some sort of automatic downturn which, it is argued, arises from repression or the declining marginal returns to action. A correctly specified model would explicitly represent these changes in these external factors and their dynamic effects on the diffusion of protest over time.

The Interaction of Protest with Repression and Facilitation

Our work in developing models for the interplay between actions is just beginning. To develop models which can generalize to multiple actions, we are working on sets of interdependent equations. This work is not done, but we can give a suggestion of its direction here and in the appendix. Very generally, we may express the contingent diffusion of a form of action a with the following expression:

$$a_t = D(a_{t-1}) \cdot \left(\prod_i I_i \right)_{t-1}$$

where D is a diffusion function for action a , and the product of the I_i is the inflation/deflation on the level of action that would otherwise be expected due to the effects of other processes. If a factor increases the probability of a by 10%, for example, the inflation factor would be 1.1; similarly, a factor that reduces the probability by 20% would have an inflation (i.e. deflation) factor of .8.

The simplest interaction of diffusion processes involves one action and its repression. This gives us two equations:

$$a_t = D_a(a_{t-1}) \cdot F_{ar}(r_{t-1})$$

$$r_t = D_r(r_{t-1}) \cdot F_{ra}(a_{t-1})$$

$$R_t = r_t / a_t$$

where the D 's are diffusion functions and the F 's capture the way in which changes in one term turn into inflation/deflation factors for the other. The rate of repression at any time is the ratio of acts of repression to protest actions. If there is more repression than action, this ratio could be

greater than 1. In general, we expect repression to have a direct effect of reducing action and action to have a direct effect of increasing repression.

The simplest model is mutually consistent response. If a constant proportion of all actions are repressed, and groups consistently reduce their action as a constant fraction of the level of repression, the amount of action is reduced but the total shape of the diffusion process remains the same. We may express these relations as

$$a_t = L_{a_0, a_\infty, s}(t) \bullet (1 - R)(I)$$

$$r_t = R \bullet a_t$$

$$R = r_t / a_t = \text{constant}$$

where L is the logistic function with parameters initial a_0 , maximum a_∞ , and slope s , R is the constant rate of repression, $1-R$ is the rate of not being repressed, and I is the inflation/deflation factor in actors' responses to repression. As Figure 1 suggests, as long as less than 100% of all actions are repressed, and actors respond with less than complete withdrawal to repression, there will be some continuing level of action. If actors respond to repression with an increased militancy or desire to act, then repression can increase the total amount of action in the system.

A standard argument concerning the diffusion of tactical innovations is that the authorities are initially unable to respond effectively, either over-reacting or under-reacting, with the effectiveness of their repression increasing over time. This requires a more complex model in which F_{ra} is a function of the total amount of action that has occurred. Figure 2 shows one such model, in which a second-order relationship leads repression first to be unresponsive to increasing action, and then to accelerate. Action initially rises just as fast as it would without repression, but then the repression catches up to it and pulls it down. The equations for this model are:

$$a_t = L_{a_0, a_\infty, s}(t) \bullet (1 - R_t)(I)$$

$$R_t = \left(b_1 \left(\frac{t-1}{1} a_i \right) + b_2 \left(\frac{t-1}{1} a_i \right)^2 \right)$$

$$r_t = R_t \bullet a_t$$

The general principle for the interrelation of diffusion processes can encompass many different mutually contingent actions, although the models obviously become very complex when more than two kinds of action are involved, and specifying the appropriate functional forms for the underlying diffusion equations and the functional dependence of one kind of action on another are difficult problems. But the general principle is straightforward. The appendix shows an example of a multi-equation system that is still in process and has not been tested or empirically verified. Although it is incomplete and therefore cannot be used to draw theoretical inferences, it gives an idea of the direction in which this work is progressing.

Discussion

We believe that creating formal models for the way different forms of action diffuse is an important contribution to understanding the dynamics of social movements. But there are important reasons why scholars of social movements should shift to an event-based diffusion perspective even if they are unconvinced of the value of formal models. Only an event-based conception captures the complexity, fluidity, and strategic interaction that characterize social movements. Both qualitative and quantitative research can be informed by focusing on the interrelations among events. Case studies repeatedly show us the ways in which actors within social movement organizations actively choose how to respond to the prior actions of others in the context of their particular political, economic, and organizational situations. Beyond this, diffusion theory is the best way to understand the wealth of new data that are being collected by protest events researchers. In this conception, protest events researchers are increasingly studying the joint coevolution of protest forms, social control responses, and political structures and practices. Between the 1950s and the 1990s, popular and academic conceptions of democratic institutions expanded to include extra-parliamentary and non-electoral actions as part of democracy, rather than as threats to it. In this process, police forces learned to use the velvet glove of intelligence and negotiation to dampen the disruptive power of demonstrations while simultaneously cooperating with demonstrators in staging their events. Protesters now find themselves in an environment in which, on the one hand, protest is relatively safe and popularly legitimate, but, on the other, protest is more symbolic than disruptive.

Thinking in terms of the interaction between kinds of events will also help us to resolve some of the important methodological questions we face in analyzing protest events data. Most such data must be obtained from newspaper records, as they are the most readily available data source that spans times and places. But the media do not perfectly capture all events that occur, nor are the events covered an unbiased sample of all events. If we think of the media as another actor in the coevolution of protest, we have a way of theorizing and potentially studying these interrelations. In this conception, there are four kinds of actors: protestors, politicians or other elites, social control agents, and the media. Each influences the actions of others over time. If we understand the way the media interact with the other actors, then we are in a better position to make adjustments on media data of protest events to estimate what the "true" level of protest is within a population.

In sum, an event-centered diffusion model of the coevolution of protest promises to be a theoretical approach that integrates a wide variety of theorizing about social movements and opens the door to new ways of understanding and studying important phenomena.

Appendix

NOTE: The work in this appendix is not complete and the models have not achieved empirical verification and are therefore certain to be revised. We are including them in this appendix to give the reader an idea of the direction the work is moving.

Evolving Repertoires in the New Social Movements of Europe: An Example

We are beginning our model development by analyzing Koopmans' (1993) data and arguments about two German cycles of protest. Koopmans' work is a useful starting point because he argues that similar patterns hold for other European countries and the US civil rights movement. His reported data are annual counts between 1965 and 1989 for four kinds of protests: confrontative, demonstrative, light violence, and heavy violence. Because of their low numbers, we combine light and heavy violence. Koopmans' basic argument is that the two German cycles he studied began with confrontative actions involving novel tactics sponsored by informal SMOs which initially were successful and not likely to be repressed. The successes of these actions led to a spontaneous diffusion of more confrontation and an escalation of confrontation to light violence as novelty and surprise wore off. These successes in turn led to both more effective repression of confrontation by the authorities, and to greater support for moderate demonstrative actions by larger more formal organizations, and greater facilitation of moderate demonstrations by the government. The demonstrative wave eventually declines as the movement institutionalizes. Radicals become increasingly isolated; as confrontation is being repressed, they take no greater risks of repression in engaging in increasingly heavy violence; their violence further isolates them from the general moderate population, thus increasing their radicalism and propensity to covert violence.

Turning these arguments into specific mathematical relationships requires detailed specifications that go beyond the original argument.

We may begin to specify Koopmans' theoretical arguments with the model shown below. This model does not yet incorporate the effects of changing levels of grievance, or of the success of actions in obtaining policy reforms.

Equations Specifying Relationships

Lower case letters indicate levels of action at time t : c , d , and v are levels of confrontation, demonstrations, and violence, respectively; m is the level of media coverage, and p the level of popular support, with subscripts distinguishing the coverage and popular support for each type of action; f and e are the levels of facilitation and extremism, respectively.

Repression is constant (and low, .2) for demonstrations and constant (and high, .75) for violence; it increases from low to high for confrontation as a function of the amount of prior confrontation, with this effect expected to be accelerating. The direct effect of repression is to multiply the level of action by $(1-R)$, and the functional dependence of R on action is scaled appropriately. In addition, the I term captures the possibility that repression encourages action indirectly; this possibility is not modeled initially.

Only demonstrations receive facilitation; extremism affects only violence. Facilitation and extremism are multipliers greater than 1 on the probability of action, and the functional forms of F and E are scaled appropriately. Facilitation is an increasing function of the total amount of all forms of action. Extremism increases with the amount of total amount of confrontation and violence and the repression of confrontation, and increases as the media coverage of confrontation decreases.

Popular support is specified to increase all forms of action, but the specified effect is strongest for demonstrations, which require popular participation. (It is possible that the effect of popular support on violence is zero or negative.) Popular support increases with media coverage of confrontation and demonstrations, but decreases with media coverage of violence.

The rate of media coverage of each event type is specified to first increase and then decrease with the total amount of a particular type of action.

Actions

$$c_t = D_c(t) \bullet \left| 1 - F_{rc} \left(\sum_{i=1}^{t-1} c_i \right) \right| \bullet I_c \bullet M_c(m_{c,t-1}) \bullet P_c(p_{c,t-1})$$

$$d_t = D_d(t) \bullet (1 - R_d) \bullet I_d \bullet M_d(m_{d,t-1}) \bullet P_d(p_{d,t-1}) \bullet F_d(f_{t-1})$$

$$v_t = D_v(t) \bullet (1 - R_v) \bullet I_v \bullet M_v(m_{v,t-1}) \bullet P_v(p_{v,t-1}) \bullet E_v(e_{t-1})$$

$$F_{rc} = \frac{r_t}{c_t} = b_{rc1} \bullet \sum_{i=1}^{t-1} c_i + b_{rc2} \left(\sum_{i=1}^{t-1} c_i \right)^2$$

The terms c , d , and v represent confrontative, demonstrative, and violent actions, respectively. Initially set the I terms for responsiveness to repression to 1.

All action forms are positive functions of public opinion p supporting that type of action, which is monotonic and may be plausibly initially specified as linear.

Demonstrations are affected by facilitation (f) with function F while violence is affected by extremism (e) with function E ; these are monotonic and may be plausibly initially specified as linear.

The function for the repression of confrontation is curvilinear as a function of the amount of prior confrontation and may be specified as quadratic.

Repression of facilitation and violence are specified as low and high constants, respectively.

Media effects. Media coverage is a curvilinear function of the amount of action, first rising and then falling.

$$m_{c,t} = F_{mc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} c_i \right) = b_{mc1} \bullet \begin{matrix} t-1 \\ 1 \end{matrix} c_i + b_{mc2} \left| \begin{matrix} t-1 \\ 1 \end{matrix} c_i \right|^2$$

$$m_{d,t} = F_{md} \left(\begin{matrix} t-1 \\ 1 \end{matrix} d_i \right) = b_{md1} \bullet \begin{matrix} t-1 \\ 1 \end{matrix} d_i + b_{md2} \left(\begin{matrix} t-1 \\ 1 \end{matrix} d_i \right)^2$$

$$m_{v,t} = F_{mv} \left(\begin{matrix} t-1 \\ 1 \end{matrix} v_i \right) = b_{mv1} \bullet \begin{matrix} t-1 \\ 1 \end{matrix} v_i + b_{mv2} \left(\begin{matrix} t-1 \\ 1 \end{matrix} v_i \right)^2$$

Public opinion is a response to the media coverage of events.

$$p_{c,t} = F_{pcmc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{c,i} \right) \bullet F_{pcmd} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{d,i} \right) \bullet F_{pcmv} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{v,i} \right)$$

$$p_{d,t} = F_{pdmc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{c,i} \right) \bullet F_{pdmd} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{d,i} \right) \bullet F_{pdmv} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{v,i} \right)$$

$$p_{v,t} = F_{pvmc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{c,i} \right) \bullet F_{pvmd} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{d,i} \right) \bullet F_{pvmv} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{v,i} \right)$$

Public opinion of any event type responds to the amount of media coverage of all event types, although most strongly to media coverage of the same event type. For demonstrations and confrontation, we may assume that coverage produces monotonically positive effects on public opinion about action, which may initially be assumed to be linear. Coverage of demonstrations and confrontation produces weak positive effects on support for violence.

Coverage of violence has negative effects on the public opinion about all forms of action, but especially violent action.

Facilitation and Extremism.

$$f_t = F_{fc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} c_i \right) \bullet F_{fd} \left(\begin{matrix} t-1 \\ 1 \end{matrix} d_i \right) \bullet F_{fv} \left(\begin{matrix} t-1 \\ 1 \end{matrix} v_i \right)$$

$$e_t = F_{ec} \left(\begin{matrix} t-1 \\ 1 \end{matrix} c_i \right) \bullet F_{ev} \left(\begin{matrix} t-1 \\ 1 \end{matrix} v_i \right) \bullet F_{erc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} r_{c,i} \right) \bullet F_{emc} \left(\begin{matrix} t-1 \\ 1 \end{matrix} m_{c,i} \right)$$

Facilitation is a monotonic positive function of the amount of all forms of action (but it benefits only demonstrations). Alternately, facilitation could be specified as a function of media

coverage.

Extremism is a function of how much confrontation and violence activists have been involved with, and the amount of media coverage and repression that confrontation has received.

Figure 1. A constant level of repression in response to action, and a constant level of responsiveness of action to repression lowers action over what it would be without repression, but leaves the basic diffusion process intact. The original action has a logistic diffusion curve. Repression is 20% of all actions, and there is 100% responsiveness to repression, so that the net action level is 80% of the original level from the logistic distribution. For the original logistic, $a_0=.1$, $a_\infty=.8$, $s=.3$, $R=.1$, $I=1$.

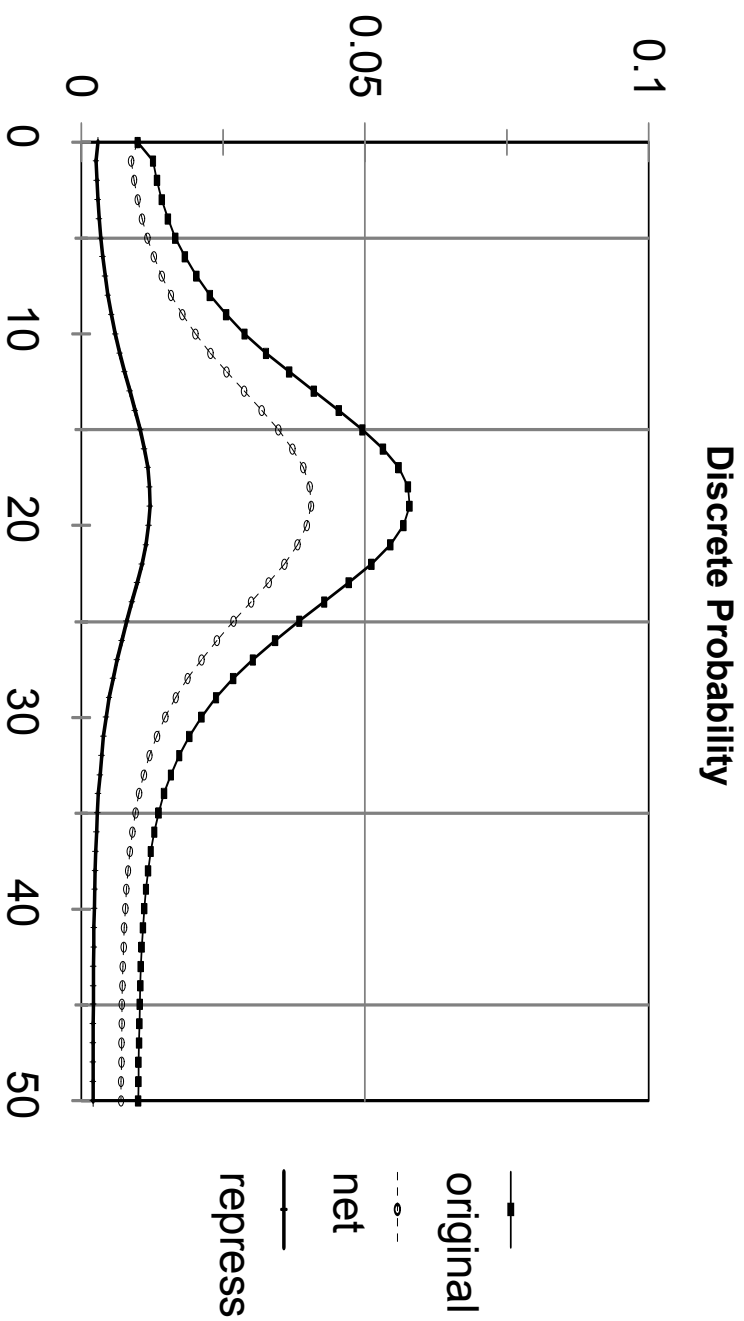
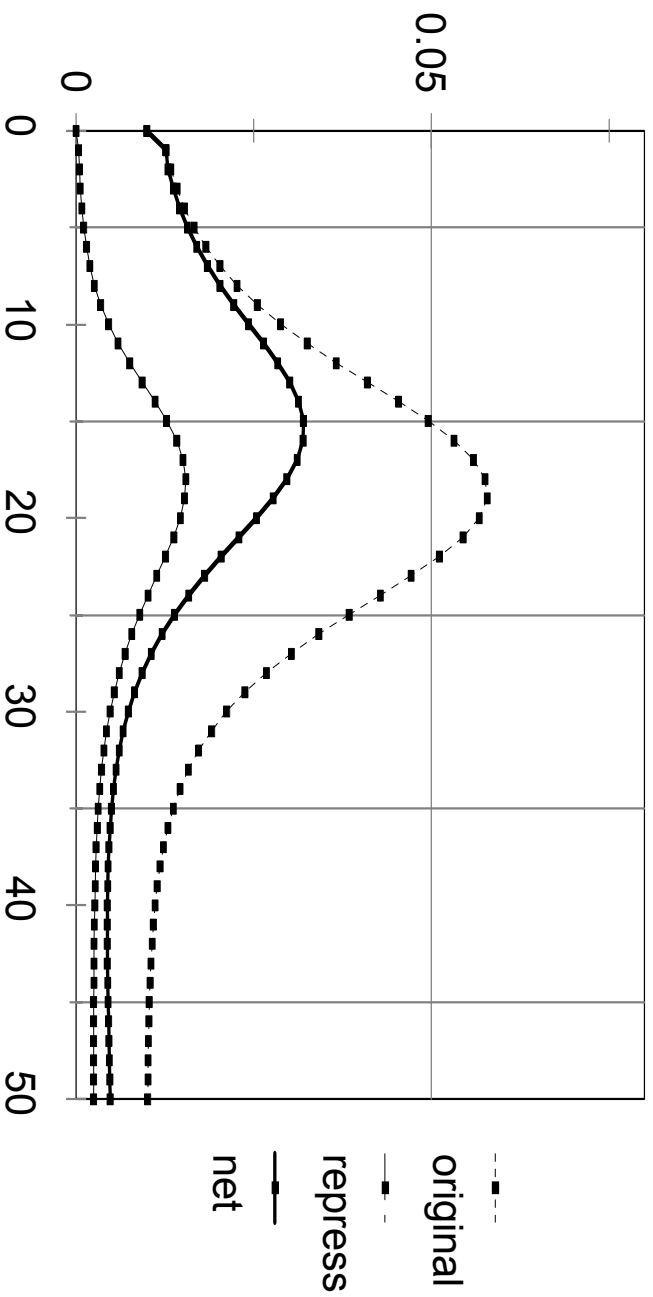


Figure 2. Repression at first lags action, then catches up to action. In this model, however, it is always lagging the action, and the action is already declining through the natural saturation of the diffusion process. The exact shape of this response depends on the relative responsiveness of repression to action and the natural decline of action due to diffusion. $F_{ra} = b_1 \sum a + b_2 (\sum a)^2$, where $b_1 = -3$ and $b_2 = 3$.



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