

---

# Intractable Conflict as an Attractor

## A Dynamical Systems Approach to Conflict Escalation and Intractability

Peter T. Coleman  
*Columbia University*

Robin R. Vallacher  
*Florida Atlantic University*

Andrzej Nowak  
*University of Warsaw*

Lan Bui-Wrzosinska  
*Warsaw School for Social Psychology*

Decades of research on social conflict has contributed to researchers' understanding of a wide variety of psychological, social, and community-based aspects of conflict escalation and intractability. However, the field has yet to put forth a theoretical model that links these components to the basic underlying structures and dynamics that account for intractability and transformation. This article presents a dynamical systems approach to conceptualizing intractable conflict as a preliminary step toward developing a basic theory of intractability. The authors propose that it is particularly useful to conceptualize ongoing, destructive patterns of conflict as strong attractors, a particular form of self-organization of multiple elements of conflict systems. Their dynamical approach to conflict intractability is outlined, and some preliminary implications of this approach for conflict de-escalation are discussed.

**Keywords:** *intractable conflict; protracted conflict; dynamical systems*

**P**rotracted social conflicts, such as those in the communities of the Middle East, Cyprus, and the Congo, are profoundly disheartening. Opportunities and initiatives for peace and stability occasionally come and go in these settings, but their general patterns of malignancy remain steady. And although kindling a sense of hope, these opportunities, when they collapse, contribute to an increasing sense of futility among stakeholders, which fuels a conflict's intractability.

---

**Authors' Note:** All authors equally contributed to this article. Correspondence concerning this article should be addressed to Peter T. Coleman, Box 53, Teachers College, Columbia University, 525 W. 120th St., New York, NY 10027; phone: 212-678-3112; fax: 212-678-4048; e-mail: [pc84@columbia.edu](mailto:pc84@columbia.edu).

Inherent to this cycle of hope and hopelessness is a basic paradox of intractable conflicts: They are essentially stable despite tremendous volatility and change. If we consider the conflict in the Middle East, for example, it appears by most accounts intransigent, with a past, present, and future cloaked in hate, violence, and despair. Yet over the years we have also seen major changes in important aspects of the conflict such as in leadership, policy, regional circumstances, intensification, de-escalation of violence, intragroup divisions, popular sentiment, and international intervention strategies. In other words, we have seen extraordinary changes occur within a context of a pattern of stable destructive relations. This paradox of stability amid change is evident in intractable conflicts at all levels, from estranged siblings and neighbors to warring ethnopolitical factions. They are at once frozen, unyielding, often persisting in hostile states for generations, yet they are also some of the most volatile and dynamic social processes on earth. And oddly, it is often this dynamism itself, this mercurial shifting of role players, concerns, attitudes, and strategies, that makes these conflicts so difficult to contain and resolve.

The growing literature on protracted social conflicts presents a complicated picture of the phenomenon of intractability (see *Beyond Intractability*, 2006; Crocker, Hampson, & Aall, 2004, 2005; Lewicki, Gray, & Elliot, 2003), which poses several challenges to theory building in the area. First, these conflicts tend to be complex, with many sources of hostilities located at multiple levels (individual, group, communal, etc.) that often interact with each other to feed or sustain the conflict (P. T. Coleman, 2003; Sandole, 1999). Second, the sources of hostilities in these settings, be they the key issues, leaders, policies, attitudes, or political will of the masses, are continually changing and at any given time may be more or less determining of the conflict (Mitchell, 2005; Putnam & Peterson, 2003). Third, each case of intractable conflict is idiosyncratic; each has its own unique set of dynamic factors responsible for its persistence, which makes generalization from one case to another difficult. Although the field of conflict studies has moved away from a more essentialist discussion of the key variables that drive enduring conflicts to more complex models of intractability (see Lederach, 1997; Sandole, 1999), our theory has yet to account for this high level of complexity, dynamism, and distinctiveness.

In this article, we argue that the phenomenon of intractability can be fruitfully addressed from the perspective of dynamical systems. This perspective has been employed to conceptualize and investigate complex, dynamic phenomena in many areas of science (Johnson, 2001; Strogatz, 2003; Weisbuch, 1992) from cancerous cellular mutations to global climate shifts. This article builds on concepts from this approach that are inherent to all living systems: complexity, dimensionality, feedback, catastrophe, and attractors. It begins by describing the basic features of dynamical systems as they relate to the development and maintenance of malignant

conflict in social systems. Because dynamic properties are couched in formal terms, they are manifest in much the same way for different phenomena and at different levels of personal and social reality. Thus, intractability can be understood with recourse to the same basic mechanisms whether the focus is intraindividual dynamics, interpersonal relations, or intergroup contact. Moreover, the dynamic account specifies how the phenomena at these different levels are themselves dynamically interlinked, forming a larger dynamical system with nested components. Our approach to conflict intractability will be outlined, and some preliminary implications for conflict de-escalation and transformation will be discussed.

### **Conflict Intractability**

Intractable conflicts are essentially conflicts that persist because they seem impossible to resolve. Other scholars have used labels such as deeply rooted conflict (Burton, 1987), protracted social conflict (Azar, 1990), moral conflict (Pearce & Littlejohn, 1997), and enduring rivalries (Goertz & Diehl, 1993) to depict similar phenomena. Kriesberg (2005) stresses three dimensions that differentiate intractable from tractable conflicts: their persistence, destructiveness, and resistance to resolution. Most protracted conflicts do not begin as intractable, but they become so as escalation, hostile interactions, sentiment, and time change the quality of the conflict.<sup>1</sup> They can be triggered and emerge from a wide variety of factors and events, but they often involve important issues such as moral and identity differences, high-stakes resources, and/or struggles for power and self-determination (P. T. Coleman, 2003; Kriesberg, 1999; Putnam & Peterson, 2003). Intractable conflicts are typically associated with cycles of high and low intensity and destructiveness, are often costly in both social and economic terms, and can become pervasive, affecting even mundane aspects of disputants' lives (see P. T. Coleman, 2000; Deutsch, 1973; Fisher, 1990, 1997; Pruitt & Kim, 2004).

Theory and research on intractable conflict are still in their infancy. Although decades of research on social conflict has shed considerable light on a wide variety of psychological, social, and community-based aspects of conflict escalation and stalemate (see Deutsch, 1973; Kriesberg, 2003; Pruitt & Kim 2004), our understanding of intractability remains fragmented. In his metaframework on intractable conflict, P. T. Coleman (2003) identified more than 50 variables in the literature thought to be associated with the persistence of destructive conflicts. These include a variety of different aspects of their contexts, issues, relationships, processes, and outcomes. However, the field has yet to put forth a theoretical model that links this multitude of variables and processes to the basic underlying structures and dynamics that account for a conflict's resistance to resolution. In the following section, we introduce a new and promising approach.

## Dynamical Systems Theory

Dynamical systems theory is an increasingly influential paradigm in many areas of science (cf. Johnson, 2001; Nowak & Vallacher, 1998; Strogatz, 2003; Vallacher, Read, & Nowak, 2002; Weisbuch, 1992), and it offers an innovative set of ideas and methods for conceptualizing and addressing conflict. A dynamical system is defined as a set of interconnected elements (e.g., beliefs, feelings, and behaviors) that change and evolve in time. A change in each element depends on influences from other elements. Because of these mutual influences, the system as a whole evolves in time. Thus, changes in any element of a conflict (e.g., level of hostilities) depend on influences of various other elements (each person's motives, attitudes, actions, etc.) that evolve over time to affect the general pattern of interactions (positive or negative) of the disputants. The principles defining the evolution of dynamical systems have wide generality and have been employed to conceptualize and investigate a highly diverse set of conflict-related phenomena (emotion, stereotyping, attitude change, cooperation vs. competition in social dilemmas, etc.). This perspective acknowledges the multiplicity of factors relevant to enduring conflict and the potential for complex interactions among these factors. However, the goal is to build a relatively simple model of qualitative understanding that captures the essence of intractable conflict without sacrificing the complexity and idiosyncrasy of specific cases (Nowak, 2004).

### A Dynamical Systems Approach to Intractable Conflict

Although every conflict is unique in a number of respects (history, issues, context, etc.), all components of conflict function as interdependent elements of a larger system with dynamic properties. If a conflict becomes intractable, change in any specific issue—even resolution of the issue that initially instigated the conflict—is not likely to terminate or even lessen the conflict. What remains constant and perpetuates the conflict are the *dynamics* that define the relationships between psychological and social mechanisms within and between individuals and groups. Once the parties to conflict have developed a stable way of thinking about and behaving toward one another, in other words, the problem no longer revolves around issues per se but rather centers on the mental and behavioral patterns defining the relationships and institutions that form the context of the conflict.

### Intractable Conflict as an Attractor

The maintenance of a narrow range of thoughts, feelings, and actions despite the introduction of new ideas and actions suggests that intractable conflict can be described as an *attractor* for these mental and behavioral phenomena.<sup>2</sup> The concept of attractor is similar to the notion of equilibrium. Roughly speaking, it is a state or

a reliable pattern of changes (e.g., periodic oscillation) toward which a dynamical system evolves over time and to which the system returns after it has changed. A person or group may encounter a wide range of ideas and learn of alternative action scenarios, for example, but over time only those ideas and actions that are consistent with destructive conflict are embraced as relevant and credible. Attractors, in short, channel mental and behavioral experience into a narrow range of coherent (either positive or negative) states. Attempting to move the system out of its attractor triggers forces that reinstate the system within its attractor. This means that attempts to change a state of destructive relations that neglect the mechanisms that continually reinstate the conflict are likely to be futile, resulting only in short-term changes. To promote lasting change, it is necessary to change the attractor states of the system. This is no easy feat because it is tantamount to changing the mechanisms responsible for the system's dynamics.

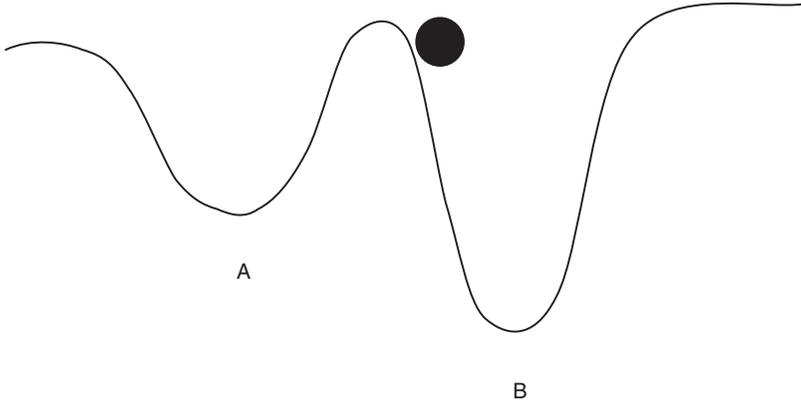
The dynamic depiction of conflict invokes intractability into the organization of elements rather than to the specific value or nature of individual factors. Multiple interlinked forces establish an equilibrium that pulls the respective parties into a state of contentious conflict. Building trust between groups, for example, is a noble goal and may be a necessary step for the resolution of intergroup conflict, but in light of our description, this step alone is unlikely to be successful. Even if trust is somehow established between members of conflicting groups, the influence of other interconnected features is likely to disrupt the trust and reinstate the conflict. Successful intervention, from this perspective, should aim not at pushing the person or group out of its equilibrium but rather at changing the social system in such a way that the equilibrium among forces is changed. Once an equilibrium corresponding to intractable conflict is weakened and a new equilibrium that maintains positive relations among groups is established, a permanent change in the structure, rather than simply a momentary diminution of the intensity of the conflict, is achieved.

A simple metaphor is useful in capturing the essence of the attractor concept and the relevance of attractors for intractable conflict. Imagine a ball on a hilly landscape, as portrayed in Figure 1. The ball, which represents the state of the system, will roll down a hill and come to rest at the bottom of a valley. The valley serves as an attractor for the system.

The figure illustrates that a system may have more than one attractor—in this case, two (e.g., one for positive interactions and one for negative)—and that the attractors can be described in terms of two basic properties. Each attractor, first of all, is associated with a basin of attraction—that is, a set of states that are attracted by (i.e., will evolve toward) the attractor. Note that the basin of attraction for Attractor A is somewhat wider than the basin of attraction for Attractor B. This simply means that a wider variety of states will evolve toward Attractor A than toward Attractor B. Second, attractors vary in their relative strength, which is portrayed as the relative depth of the two valleys in the figure. Attractor B is thus a stronger attractor than Attractor A. This means that once a system is at this attractor, it is difficult to dislodge it, even when

**Figure 1**  
**A Dynamical System With Two Attractors (A and B)**

---



---

disrupted by strong external influences. It would thus take a stronger force to dislodge the system from Attractor B than from Attractor A.

These two properties have clear relevance for the intractability of conflict. First, the wider the basin of attraction, the greater the range of ideas and actions that eventually connect to the dominant mental and behavioral patterns of the parties. Even positive information that contradicts the predominant negative view of another person or group is likely to be transformed by a variety of cognitive mechanisms until it fits the predominant view (Hoppman, 1996). Similarly, a peaceful overture or gesture that might initially be taken at face value will often subsequently become reframed until it provides evidence in support of, rather than in opposition to, the predominant response tendency of the person or group.

The depth of an attractor, meanwhile, provides an index of how difficult it is to transform the malignant tendencies of an intractable conflict. When destructive conflict is a deep attractor (as in Attractor B) for a person or group, an attempt to resolve the conflict is much like trying to push the ball uphill. As soon as the pushing force is relaxed, the ball will roll back to the attractor (the bottom of the valley). Logically and vigorously pointing out the nonproductive nature of a person's hostile attitudes toward someone else, for instance, may succeed in achieving a few temporary concessions—in effect, pushing the ball up the hill a little—but will eventually prove counterproductive as the forces restoring the attitude overwhelm the persuasive appeal, much like gravity eventually proves too much for muscle power. Note that if there is sufficient force to dislodge the system from its current attractor (e.g., B in Figure 1), the system will gravitate in short order to another attractor (e.g., A),

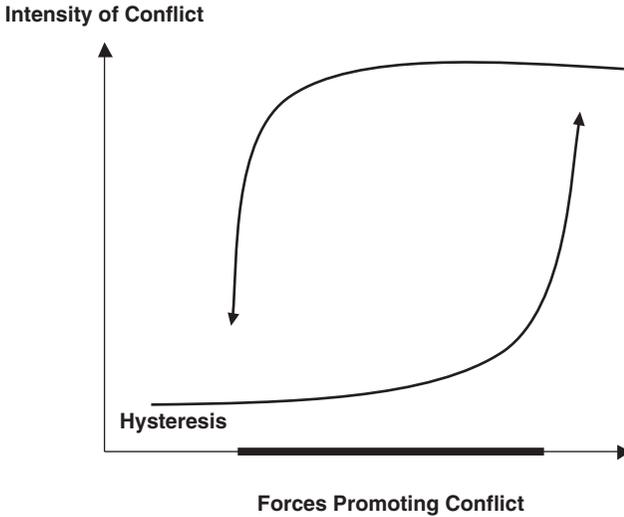
provided there is one available. In a system characterized by more than one attractor, then, the mental, affective, and behavioral states categorically sort themselves, so that if change does occur, it does so in a qualitative (nonlinear) rather than incremental (linear) fashion (cf. Latané & Nowak, 1994).

The behavior of a system with two fixed-point attractors characterizes catastrophe theory (cf. Thom, 1975).<sup>3</sup> The basic scenario centers on the relationship among three variables. One of them, the splitting factor, determines the form of the relationship between the other two. The other two factors correspond to the distinction between independent and dependent variables. In the dynamical model, the forces promoting the conflict (e.g., conflict of interest, aggravating circumstances) represent the independent variable, and the intensity of the conflict represents the dependent variable. The splitting factor corresponds to the degree to which the issues are linked by positive feedback loops. A positive feedback loop means that the activation of each element increases the activation of other elements. At low levels of the splitting factor (i.e., multidimensionality in issues; see below), there is a linear (e.g., monotonic) relationship between the independent and dependent variables (i.e., forces and intensity of conflict). At high levels of the splitting factor (i.e., high positive linkage among the issues), however, the relationship between the independent and dependent variables assumes the form depicted in Figure 2.

As the forces promoting conflict grow, the intensity of the conflict increases at a relatively slow rate until it reaches a threshold, after which the intensity shows a catastrophic change (i.e., moving to the top line). Once the conflict has reached a high level of intensity, decreasing the forces will not reduce the intensity to its original level, until another threshold that represents a considerably lower level of forces is reached. The region of hysteresis in Figure 2 shows that for some values of aggravating factors, there are two possible attractors for the conflict. Which level is observed depends on the history of the conflict. For a given level of aggravating tendencies, if the system has not yet achieved high conflict intensity, the nonconflict attractor will be stabilized. If, however, the system has already reached the high conflict level, this state will be stabilized. The concept of hysteresis explains why, for the same level of values influencing a conflict, the conflict may exist or not. Moreover, both states may be resistant to relatively weak outside influences.

The catastrophic nature of conflict escalation has been recently demonstrated in a school setting by Bui-Wrzosinska (2005). In conditions promoting weak linkage among cognitive and affective elements of a conflict (i.e., weak interpersonal ties that lead to few associations between beliefs and feelings regarding the other), there was a linear relationship between antagonistic behavior from another person and the person's antagonistic response. Thus, these participants responded in a proportional manner to antagonistic actions directed toward them, and the escalation and de-escalation of conflict intensity conformed to similar functional relationships. However, in conditions promoting positive feedback loops (i.e., strong interpersonal ties with strong links between thoughts and feelings regarding the other), a person experiencing

**Figure 2**  
**Catastrophe of Conflict**



antagonistic behavior from another person either chose to ignore the attack, responding instead in a relatively mild fashion or, after a critical threshold of antagonism was reached, responding in a highly confrontational manner. The transition from one type of response to the other was abrupt and did not involve a transition through intermediate levels.

### **Self-Organization and the Emergence of Attractors**

The key to intractable conflict is the formation and maintenance of an attractor that stabilizes malignant dynamics within and between individuals and groups. The solution to intractable conflict, then, involves disassembling the malignant attractor or moving the system into the basin of a different, more benign attractor (provided one exists or can be established). Before one can hope to achieve these goals, it is imperative to understand how attractors form in the first place. The general answer is that attractors develop in systems in which the state of each element depends on, and is influenced by, the state of other elements. As the links between elements become stronger, the system loses degrees of freedom because the state of each element can be predicted by the state of other elements. In such systems, the state of a single element cannot be adjusted independently of other elements. Even if an

external force changes the state of a given element so that it is no longer coherent with the state of other elements, the joint influence of the other elements will reinstate the original value of the changed element.

Multiple influences among elements may lead to the emergence of ordered structures on the global level. If order emerges because of the interactions among system elements rather than because of the intervention of higher-order agents, the process is referred to as *self-organization*. Consider, for example, the genesis of order in flocks of birds. If each bird simply maintains a particular angle with respect to the bird in front of it, an overall inverted V structure will form, without a leader dictating this formation. The emergence of order via self-organization has been observed in human groups as well. Nowak, Szamrej, and Latane (1990), for example, demonstrated that simple rules of social interaction with one's immediate neighbors promote the emergence of local clusters of like-minded individuals. Such clusters form even if the initial spatial configuration of opinions is random. Attractors for the system in this case conform to clustered solutions. If an individual within a cluster changes his or her opinion (e.g., because of outside influence), other members of the cluster will exert influence to bring him or her back into the fold.

From this perspective, conflict progresses toward intractability as the elements relevant to the conflict self-organize into a structure, such that the elements no longer independently function but rather are connected through positive feedback loops. Positive feedback loops are not limited to conflict.<sup>4</sup> To the contrary, positive feedback loops bind together elements that are necessary for efficient action and thus are critical for action initiation and maintenance. Negative feedback loops, however, are also critical for the regulation of biological and social systems. Negative feedback means that the activation of an element decreases the activation of other elements to which it is linked. Negative feedback loops dampen system dynamics and thus constrain or stop the actions engendered by the positive feedback loops. A balance between positive and negative feedback loops, then, is critical for effective self-regulation (cf. Carver & Scheier, 1999; Powers, 1973) and social regulation (Nowak & Vallacher, 2001).

With respect to conflict, positive feedback loops may be crucial for the construction of an efficient response to a perceived confrontation. Once a conflict is engaged, however, negative feedback loops are essential for de-escalation. Thus, as long as a system is characterized by negative feedback loops, control mechanisms are available for mitigating and terminating conflict, allowing conflict situations to be temporary and constructive rather than destructive. In most situations, there are limits to the escalation of conflict, and there is potential for de-escalation and healing. In physical confrontation, for example, signs of damage to one of the combatants may halt further violence by the other combatant. In protracted conflicts, *mutually hurting stalemates* provide a form of negative feedback sufficient to motivating de-escalation (see Zartman, 2000 **PLS PROVIDE REFERENCE**) and conciliatory initiatives.

## The Reduction of Multidimensionality

In everyday life, conflicts are often confined to specific issues, leaving a host of issues for which conflict does not exist. Each conflict may be solved independently of other issues, often in a constructive manner that contributes to relationship maintenance and growth. The mechanisms operating on different issues may even operate in a compensatory manner so that intensification of conflict on one issue may promote conciliation on other issues to maintain the overall relationship. In a healthy intimate relationship, for instance, when conflict arises with respect to one issue, the potential threat it poses for the relationship may be compensated by extra positive responses to other issues. Interpersonal and intergroup relations can thus be described as complex and multidimensional, with the various mechanisms operating at different points in time, in different contexts, with respect to different issues and often in a compensatory manner.

Conflict escalates with a potential to become intractable when features that are independent or normally work in opposition to one another become aligned and work in a mutually reinforcing manner. Relatively benign conflicts may become self-organized, leading to a reduction of multiple factors that produces a recalcitrant structure of intractable conflict. The collapse of multidimensionality has two basic forms. First, positive feedback loops that bind various elements—issues, features, individuals—into a simple structure may develop. Second, negative feedback loops may cease to exist or become reversed so that they function as positive feedback loops, fueling rather than inhibiting the potential for destructive conflict. When the tears of our enemy augment rather than inhibit aggression, the conflict between us may escalate out of control and become highly destructive.

The collapse of multidimensionality into a simple structure not only promotes the escalation of conflict but also provides a mechanism for stabilizing the conflict. Even if the original issue that generated the conflict loses its salience or is resolved, the conflict is likely to be sustained by positive feedback that involves the other issues. In fact, the expression of agreement by one party with respect to a single issue might result in compensatory conflict on other issues to maintain coherence in the conflict. Imagine, for example, learning that an enemy has similar political views or has provided assistance to a family member. Prior to forming conflict across multiple issues, this sort of event is precisely the situation that could alleviate the potential conflict. Once the conflict has crossed a certain threshold that entails correlated issues, however, such information violates one's sense of coherence and is likely to be either rejected, redefined in cynical terms, or compensated for by enhancing conflict with respect to other issues. The signature characteristic of a conflict that has become organized across issues is the negative reaction to what would otherwise be a conflict-reducing development. In this stage, the motives have transformed in that conflict no longer centers on the issues but rather focuses on protecting oneself and harming the other party.

The collapse of the multidimensional nature of conflict applies to the interconnections within an issue, especially when a party has different cognitive and affective reactions to the issue. Normally, people can use one reaction to mitigate the influence of the other. Experiencing harm to a family member at the hands of someone else, for example, promotes negative affect toward the perpetrator, but the cognitive system may center on the perpetrator's lack of bad intentions. Likewise, a rational decision to punish someone may be at odds with one's empathy for the transgressor. When cognitive and affective mechanisms develop a reinforcing rather than compensatory relation, however, escalation can intensify a conflict. Such escalation may result in a shift in behavioral tactics, from relatively benign or conciliatory actions to far more hard-line and aggressive actions. Harm to a family member could lead to a strong retaliatory response, for example, when cognition and affect are linked only by a positive feedback loop. In the extreme, this process could promote dehumanization of one's opponent, such that moral norms no longer apply to one's behavior directed to him or her (Bandura, 1982; Opatow, 2001). Accordingly, emotions such as empathy and guilt may be diminished, whereas feelings of humiliation, anger, hate, and fear may be enhanced.

### **Feedback Among Levels of Social Reality**

The escalation and maintenance of conflict are manifested at different levels of psychological and social reality: the thoughts, feelings, and actions of specific individuals, the dynamics of interpersonal relations, and the relations within and between social groups and nations. In intractable conflict, these levels tend to become interlinked, so that mechanisms at one level stimulate conflict at other levels. The structure of conflict is thus maintained not only by positive feedback loops among features at a given level but also by positive feedback between levels. This interdependence means that conflict launched at one level is likely to stimulate other levels as well. Conflict initiated at an intergroup level, for instance, is likely to spawn and reinforce the beliefs, emotions, and actions of individuals in their interpersonal relations. The reciprocal feedback loops among levels contribute to the intractability of conflict. Even if the conflict at one level is fully understood and resolvable in principle, the links to other levels can reinstate the conflict.

Conflict on a group level tends to be more intense than the sum of individual conflicts between members of the respective groups (Azar, 1990). Through social interaction, a shared reality develops in the in-group that involves a social definition of conflict with the out-group (J. S. Coleman, 1957). Even individuals who were not directly involved in the conflict are likely to develop the sense of conflict by virtue of the in-group's shared reality. Such conflicts may be difficult to control because the behavior of a single in-group member is likely to lead to the escalation of conflict between the groups. Imagine, for example, a negotiated ceasefire between two conflicting groups. An isolated violation of the ceasefire by a single individual is likely

to promote the perception by the other side that the entire group is responsible and accordingly lead to a strong retaliatory response. In like manner, an isolated act of brutality committed by one person against another person is likely to undermine the efforts to resolve a long-standing conflict.

### **Factors Promoting the Escalation to Intractability**

The alignment of different conflict elements between and across levels reflects a tendency toward coherence in psychological and social systems (cf. Thagard, 2000; Vallacher & Nowak, in press). It is natural for negative moods to enhance the recall of negatively valenced memories, for example, or for an aversive encounter with someone to generate negative inferences about his or her character. This drive for coherence is as a primary feature of a wide variety of social phenomena (see Festinger, 1957; Heider, 1958), including emotion (e.g., Thagard & Nerb, 2002), social judgment (e.g., Read & Miller, 1998; Vallacher, Nowak, & Kaufman, 1994), self-concept (cf. Nowak & Vallacher, 2001; Vallacher, Nowak, Froelich, & Rockloff, 2002), and social influence processes (Osgood, 1983). In situations characterized by conflict, then, there is an intrinsic bias toward escalation that results from the progressive integration of cognitive and affective elements. In many instances, the operation of negative feedback mechanisms and the separation of issues effectively stall the tendency toward increased coherence. A variety of factors, however, can undermine or reverse the operation of negative feedback loops and promote the linkage of separate issues and elements. Such factors are responsible for escalation of benign conflict to intractable conflict.

Personal experiences can reinforce the press for coherence and thus facilitate the collapse in the multidimensionality of a conflict situation. The repeated experience of co-occurring factors, for example, can bind these elements into an ensemble that becomes activated in its entirety as a result of the instigation of a single factor. If conflict over lab space and other resources, for example, repeatedly escalated into harsh words, negative moods, and protective actions concerning the space, the presence of any single element in the future may be functionally equivalent to the presence of all the elements. In effect, the binding of elements into a single structure through repeated co-occurrence transforms conflict intensity from a continuous variable into an essentially binary variable, such that the conflict is either absent or present in full form. Once transformed in this fashion, it is difficult to de-escalate the conflict by alleviating the effect of any one element—even the element that may have precipitated the current conflict—because the remaining elements continue to operate and fuel the conflict.

In an interpersonal conflict, if one party defines the conflict in relational terms, the issues can undergo such binding. As soon as one party broadens the scope of the conflict from a single issue to the relational level, it is difficult for the other party not to respond in kind. The escalation of the interpersonal conflict, then, is likely to be dictated by the party with the most intense view of the conflict. This pattern is

reminiscent of seminal research by Kelley and Stahelski (1970) showing that cooperation in a mixed-motive game is highly unlikely if one of the participants has a strong competitive orientation. Even if the other participant is predisposed toward cooperation, he or she is likely to adopt the stance of the competitive interactant. Here, the competitive tactics of Party A moves Party B into the process of latent attractor for competitive conflict. Although intensity and competitiveness are distinct, the process of one party drawing the other into a stronger attractor is similar.

A similar scenario operates at the intergroup level. Whenever a number of people spend time together, a number of conflicts are likely to arise. As long as each conflict is separately treated, it is fueled only by the specific interaction that may deescalate if the contributing instigations are reduced or resolved. But if the people sort themselves into different groups, each with a shared identity, the press for in-group coherence is likely to promote escalation of any single conflict. If a member of Group A (John) insults a member of Group B (Jim), for example, another member of Group B (Jack) may retaliate and behave aggressively toward another member of Group A (Steve), who had nothing to do with the original insult. In turn, this will provoke retaliation against yet another person in the original group. In this process, individual acts of hostile behavior generalize to other group members, and the amount of hostility gets accordingly amplified (Labianca, Brass, & Gray, 1998).

The binding of elements may also occur in a prepackaged manner through the social transmission of ready-made patterns. Informal communication with other people can reinforce the links among separate issues, as can cultural assumptions and beliefs transmitted in educational settings, religious contexts, or the mass media. Even if a person has never experienced a conflict encounter personally—or any encounter, for that matter—with the out-group or any of its members, the social transmission of information can have a profound effect on shaping one's views and predisposing one to hostile action when an opportunity for contact with the person or group arises (see Bar-Tal, 2000). The conflict may have an autistic quality to it (cf. Newcomb, 1953), but one's belief in the veridicality of the information can prove self-fulfilling (cf. Merton, 1948).

Even if the parties to the conflict cease to exist, cultural transmission mechanisms may maintain the conflict with a different cast of characters and different issues. If nations, social groups, or religions are locked in a protracted conflict, the binding between conflict elements may be incorporated into the culture and provide a larger structure that encompasses the elements and the links between levels. Such culturally maintained structures may be passed from generation to generation and drive into conflict individuals who have never experienced any of the issues that initially launched the conflict (see Agger, 2001).

The effects of personal experience, social interactions, and cultural transmission can be magnified by strong emotion. Heightened emotion tends to promote a correspondingly heightened press for coherence (Lewis, 2005). It is difficult to appreciate nuance and complexity when a party has strong feelings about an issue, person, or group. Intuitively, positive feelings would seem to temper the collapse of

multidimensional factors and thus inhibit the escalation to intractable conflict. Under some conditions, however, even positive moods can simplify an individual's thoughts and generate stereotypical judgments of out-group members (e.g., Isen, 1987). For instance, conflict is often preceded by celebratory dances and rituals designed to generate a positive state that everyone in the group shares. Of course, the enhancement of positive feelings in such contexts is often directly proportional to the intensification of negative feelings toward the out-group. In effect, enhanced emotional intensity promotes coherence within the group (positive emotion) and compensatory coherence in thoughts and feelings concerning the out-group (negative emotion; see Brewer & Brown, 1998).

Strong emotion can also intensify the positive feedback loops between levels. The negative emotion associated with an interpersonal conflict not only simplifies interactants' views of one another but also promotes stereotypical thinking about the other party's social group. Conversely, the development of an out-group stereotype can, under strong emotion, magnify the conflict at an interpersonal level. The role of emotion in connecting levels may be understood in terms of threshold phenomena. Up to a point, increasing emotional intensity may simply magnify the conflict associated with a specific issue or individual member of the out-group. Beyond this point, however, even a slight increase in emotional intensity may generate an enhanced press for coherence that promotes stereotypical thinking about the out-group as a whole. In effect, the press for coherence transcends content-related components of the conflict per se, so that a party develops a highly valenced and global feeling toward the other person, one that no longer allows for subtle differentiation among the issues that generated the conflict (Lewis, 2005).

## **Toward De-Escalation of Intractable Conflict**

The depiction of conflict through this dynamic approach reinforces the pessimism that many people feel about the resolution of intense and long-standing conflicts. After all, when specific issues and individuals become connected by positive feedback loops, the flexibility and variety of responses is effectively lost. The existence of multiple positive feedback loops makes it likely that parties will respond to any single issue or person as if all the features of the conflict system were present. Although not relevant, these missing features are brought to the situation by virtue of the positive feedback loops. Even an action that is perceived as a slight provocation may result in a full retaliation. If a state of destructive conflict represents a strong attractor for an interpersonal or social system, then, any deviation from this state will result in the system activating its mechanisms to return to the attractor. This situation is particularly likely if the system lacks or has lost an attractor for positive interaction. So although the severity of a conflict may be related to the amount of violence between groups, the intractability of conflict may stem from the elimination of

sustainable positive interactions. In dynamic terms, an intractable conflict lacks attractors for positive states.

The pessimism that is seemingly inherent in this account, however, may be misplaced. We suggest, in fact, that the insight about intractability provided by viewing conflict in dynamic terms provides a fresh perspective on how de-escalation of conflict might occur. Even though this dynamic approach to conflict is in its early stages of development, its potential application to de-escalation is possible but is also contingent on research involving empirical methods, computer simulations, and theory-based implementation in real-world settings. Nonetheless, because the ultimate utility of this perspective centers on its relevance to conflict resolution, we feel it is appropriate to consider how the dynamics associated with the formation and maintenance of intractable conflict might be reversed to establish nonmalignant relations among parties who seem locked in an inescapable cycle of negative sentiment and engagement.

### **Restoration of Multidimensionality**

Finding and implementing a solution to intractable conflict is tantamount to changing the system's dynamics. Because such conflicts are associated with a loss of complexity and an imbalance between positive and negative feedback loops, attempts at de-escalation should focus on restoring multidimensional factors and enhancing the availability of negative feedback mechanisms. Of course, translating these general recommendations into practice is hardly a trivial matter.

The first step is to identify the relevant elements and the nature of their linkages. With this information, one is in a position to disrupt the most important linkages and thereby decouple the elements and issues. The complexity of all the elements and the mechanisms by which they influence each other are likely to vary a great deal from one instance to another and thus require a careful case study. This is often what occurs in mediations and problem-solving workshops, although typically with a narrow focus on issues. Similarly, it is essential to understand the group culture to develop an intervention for decoupling the issues and addressing them in a manner informed by local convention. By itself, decoupling does not guarantee the solution to the conflict, but it does pave the way for disassembling the conflict structure so that the issues can be separately addressed.

Depending on the nature of the conflict, disassembling the structure of the conflict may take different forms. If the structure of conflict binds together perception of all the out-group members, showing positive examples of specific out-group members can increase complexity because a single judgment cannot accommodate all the out-group members. Another tack is to find an important (e.g., high status, charismatic) in-group member who does not share the in-group's view of the conflict. If this person is sufficiently central that he or she cannot be marginalized within the group, the homogeneity of the in-group's perspective will be destabilized. Yet

another tack is to identify a set of issues for which the structure of self-interest is shared by the in-group and out-group. Acceptance of a cooperative structure of interests is not consistent with the simplified assumption of overall incompatibility (see Deutsch, 1973; Sherif, Harvey, White, Hood, & Sherif, 1961).

The overall nature of intergroup relations may be established and stabilized by a specific culture. Disassembling such a stereotype may prove difficult. In this case, the focus should be on strengthening identities that are not involved in the conflict and avoiding identities that are connected to the culture of conflict (see Kelman, 1999). For example, one might emphasize individuals' age or professional roles, or even common geographic identities, rather than national or ethnic identities. In such instances, however, the conflict may still be present in latent form, ready to assume potency when the original identities are made salient. This scenario corresponds to a more general scheme in which the attractor of destructive conflict coexists with an attractor for positive interactions. A strong external intervention in the direction of de-escalation may result in movement of the system to another attractor. The system will stay at this attractor as long as subsequent events do not move the system back to the original attractor.

### **Creating and Activating Latent Attractors**

The concept of latent attractors provides an important new perspective on conflict de-escalation. In this view, the malignant thoughts, feelings, and actions characterizing a group's dynamics may represent only the most salient and visible attractor for the group. Particularly if there is a long history of interaction with the out-group, there may be other potential patterns of mental, affective, and behavioral engagement vis-à-vis members of the out-group, including those that foster positive intergroup relations. With this in mind, identifying and reinforcing latent (positive) attractors, not simply disassembling the manifest (negative) attractors, should be the aim of both conflict prevention and intervention.

The existence of latent attractors serves as a reminder that change often conforms to a nonlinear scenario. What appears to be sustained antagonism between two groups can suddenly give way to relatively benign or even positive relations if an event—even a seemingly insignificant one—pushes the group out of its current basin of attraction into the basin of a previously latent attractor. Thus, even if peacekeeping missions, reconciliation processes, trust-building activities, and conflict-resolution initiatives appear to be largely ineffective in situations locked in an ongoing protracted struggle, they may very well be acting to establish a sufficiently wide and deep attractor basin for moral, humane forms of intergroup interactions that provide the foundation for a stable, peaceful future. The gradual and long-term construction of a positive attractor may be imperceptible, but it prepares the ground for a positive state that would be impossible without these actions. Of course, short-term or emergency programs should focus on the elimination of the triggers that fuel catastrophic changes in the state of the system. These initiatives will be insufficient

and ultimately ineffective if they are not supported by long-term, incremental work on latent attractors (for a related discussion, see Lederach, 1997).

In sum, from the dynamical systems perspective on conflict, one can distinguish between the current state of the system and possible states (i.e., attractors) of the system. Intervention can be aimed either at moving the system between its attractors or at changing the attractor landscape itself. Even if groups are locked in a cycle of conflict, analyzing the situation from a dynamical perspective may reveal the presence of latent positive attractors into which the system may fall. Intervention thus should not be limited to changing the current state of the system but rather should focus on shaping or reinforcing latent attractors.

### **Summary: Key Propositions of the Dynamical Perspective**

1. *Intractable conflict can be conceptualized and investigated through the perspective of fixed-point attractors.* In an intractable conflict, each party's thoughts, feelings, and actions regarding the other party converge over time into a narrow range of states, despite the existence of a wide range of plausible states. The respective attractors associated with conflicting parties may differ regarding specific patterns of thought, feeling, and action, but because intractable conflict involves mutual dislike, distrust, and antagonism, the attractors of both parties are likely to be highly similar with respect to valence (i.e., negative in each case).
2. *Each party's attractor is maintained by dynamic processes.* Apparent stability in people's opinions, emotions, and readiness for action belie underlying volatility in mental, affective, and behavioral phenomena. Principles of mental dynamics (e.g., discounting, selective perception, confirmatory bias) and social dynamics (e.g., social comparison, influence, and coordination) are relevant to the maintenance of attractors.
3. *An attractor associated with intractable conflict can be characterized with respect to its basin of attraction.* The width of the basin reflects the range of thoughts, feelings, and actions that converge on a common state. An attractor with a wide basin can transform benign or even positive observations of the opposing group into sentiments and assessments that are consistent with the valence of the attractor.
4. *An attractor associated with intractable conflict can be characterized with respect to its depth.* The depth of an attractor reflects the inertia of a system when its current state is at the attractor. The deeper the attractor, the greater the resistance to forces that would otherwise change the state and the greater the tendency of the system to return its attractor if the state is temporarily perturbed. In an intractable conflict, each party resists forces (e.g., new information, peaceful overtures) that provide alternative ways of thinking about, assessing, and engaging the other party. Such forces may be successful in the short run, but over time each party is likely converge on its attractor.
5. *Attractors for intractable conflict are formed when the cognitive, affective, and behavioral patterns characterizing a party's conflict-relevant dynamics lose their*

- complexity*. Complexity represents the degree to which the system is multidimensional in its perception of issues, judgment of out-group members, and action tendencies. A party with low dimensionality perceives all relevant issues as positively correlated, evaluates the out-group in global (negative) terms, and is inclined to act in a uniform (negative) manner toward members of the out-group.
6. *The loss of complexity in each party's attractor is maintained by positive feedback loops among the lower-level elements composing the party's pattern of thought, feeling, and action.* The salience of a single issue brings to mind a wide variety of other issues, the salience of a single dimension for evaluating out-group members activates other evaluatively consistent judgments that collectively constitute a stereotypical judgment that applies to all out-group members, and any negative action toward the out-group is likely to lower the threshold for other negative actions despite their lack of relevance or appropriateness with respect to the triggering circumstances.
  7. *The parties to intractable conflict are likely to have more than one attractor for their respective mental, affective, and behavioral dynamics.* Especially for conflicting parties with a long history of interaction, there are likely to be alternative patterns of thought, emotion, and patterns of engagement. Because of the dynamics promoting maintenance of the current attractor, these alternative attractors may remain latent and thus invisible to the parties or to outside observers.
  8. *Each party's dynamics can be captured by a latent attractor, promoting a qualitative (as opposed to incremental) change in relationships between the parties.* Even a single, seemingly inconsequential event can move the system out of its current (negative) attractor and into the basin of an alternative (positive) attractor. Such nonlinearity between instigation and outcome is possible when the current state of the system is at the edge of its basin of attraction, so that a slight change in conditions is sufficient to push the system's state over the energy barrier separating the manifest (positive) and latent (negative) attractors.
  9. *The change in state associated with movement to a latent attractor may be transitory if the original attractor continues to exist.* A change in conditions can reactivate the pattern of thought, feeling, and action that had promoted intractability and malignancy in relations between the parties.
  10. *An attractor can lose its power to constrain a party's mental, affective, and behavior processes if it is deconstructed.* Deconstruction occurs when there is a restoration of complexity in the relationship among issues, judgments of out-group members, and action tendencies. A negative attractor loses its power to constrain and shape dynamics if each party differentiates the set of issues associated with the conflict, assesses out-group members with respect to separate dimensions (thereby allowing for individuation of these people), and distinguishes the appropriateness or morality of various action tendencies.
  11. *The deconstruction of an attractor for intractable conflict involves introducing negative feedback loops into the relationships among issues, among dimensions of social judgment, and among action tendencies.* If the salience of one issue or dimension of judgment makes other issues less (as opposed to more) salient, the lower-level dynamism associated with thought, emotion, and action is correspondingly less likely to be experienced in an integrated (higher-level) manner corresponding to the attractor.

12. *Because of the press for coherence in dynamical systems, the lower-level elements composing a deconstructed attractor are likely to become integrated with respect to another higher-level pattern of thought, feeling, and behavior.* Depending on the conditions salient at this time, the self-organization of lower-level elements may lead to the emergence of a stable attractor that promotes positive rather than negative relations between the conflicting parties.

## Conclusion

Although the emerging framework outlined in this article is preliminary, we see the dynamical systems approach for the study of intractability promising on three fronts. First, the formality and generalizability of its basic constructs (attractors, hysteresis, etc.) across different phenomena and levels of analysis suggest that it offers an integrative platform for the field of conflict studies to find coherence and parsimony in the currently fragmented sea of political, economic, psychological, social, religious, and cultural factors that are thought to account for enduring conflicts around the globe. Second, it provides insight into the paradox of intractability as a dynamic process, shedding light on the underlying dynamics that can maintain stable, hostile relations. And third, by offering an improved understanding of the basic structure and dynamics of intractability, it offers new insights into pathways for transformation of such conflicts into systems of sustainable peace.

## Notes

1. Some issues, however, such as the abortion conflict in the United States, are considered irresolvable in the conventional sense (see P. T. Coleman, 2003; Pearce & Littlejohn, 1997). Nevertheless, issues will differ by person and situation in their degree of intractability.
2. Schrodt and Gerner (2000) use the term *cluster* to characterize a related notion in which actors in a system respond to each other in a consistent fashion during an extended period.
3. Catastrophe theory has been successfully employed to model qualitative changes in international relations (e.g., Phillips & Rimkunas, 1983; Rummel, 1987).
4. Weick (1979) has shown how positive feedback loops function for constructive and nonconstructive ends in organizations.

## References

- Agger, I. (2001). Psychosocial assistance during ethnopolitical warfare in the former Yugoslavia. In D. Chirof & M. E. P. Seligman (Eds.), *Ethnopolitical warfare: Causes, consequences, and possible solutions* (pp. 305-318). Washington, DC: American Psychological Association.
- Azar, E. E. (1990). *The management of protracted social conflict: Theory and Cases*. Hampshire, UK: Dartmouth.
- Bandura, A. (1982). *The self and mechanisms of agency. Psychological perspectives on the self*. Mahwah, NJ: Lawrence Erlbaum.

- Bar-Tal, D. (2000). From intractable conflict through conflict resolution to reconciliation: Psychological analysis. *Political Psychology*, 21(2), 351-366.
- Beyond Intractability. (2006, January). **PLS PROVIDE TITLE OF DOCUMENT**. Retrieved **PLS PROVIDE DATE** from <http://www.beyondintractability.org>
- Brewer, M. B., & Brown, R. J. (1998). Intergroup relations. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (Vol. 2, 4th ed., pp. 554-594). New York: McGraw-Hill.
- Bui-Wrzosinska, L. (2005). *The dynamics of conflict in a school setting*. Unpublished master's thesis, Warsaw School for Social Psychology, Warsaw, Poland.
- Burton, J. (1987). *Resolving deep-rooted conflict: A handbook*. Lanham, MD: University Press of America.
- Carver, C. S., & Scheier, M. F. (1999). Themes and issues in the self-regulation of behavior. In R. S. Wyer, Jr. (Ed.), *Advances in social cognition* (Vol. 12, pp. 1-105). Mahwah, NJ: Lawrence Erlbaum.
- Coleman, J. S. (1957). *Community conflict*. New York: Free Press.
- Coleman, P. T. (2000). Intractable conflict. In M. Deutsch & P. T. Coleman (Eds.), *The handbook of conflict resolution: Theory and practice* (pp. 428-450). San Francisco: Jossey-Bass.
- Coleman, P. T. (2003). Characteristics of protracted, intractable conflict: Towards the development of a meta-framework—I. *Peace and Conflict: Journal of Peace Psychology*, 9(1), 1-37.
- Crocker, C. A., Hampson, F. O., & Aall, P. (2004). *Taming intractable conflicts: Mediation in the hardest cases*. Washington, DC: United States Institute of Peace.
- Crocker, C. A., Hampson, F. O., & Aall, P. (2005). *Grasping the nettle: Analyzing cases of intractable conflict*. Washington, DC: United States Institute of Peace.
- Deutsch, M. (1973). *The resolution of conflict: Constructive and destructive processes*. New Haven, CT: Yale University Press.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row, Peterson.
- Fisher, R. J. (1990). *The social psychology of intergroup and international conflict resolution*. New York: Springer-Verlag.
- Fisher, R. J. (1997). *Interactive conflict resolution*. Syracuse, NY: Syracuse University Press.
- Goertz, G., & Diehl, P. F. (1993). Enduring rivalries: Theoretical constructs and empirical patterns. *International Studies Quarterly*, 37, 147-171.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: John Wiley.
- Hoppman, P. T. (1996). *The negotiation process and the resolution of international conflict*. Columbia: University of South Carolina Press.
- Isen, A. M. (1987). Positive affect, cognitive processes, and social behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 203-253). New York: Academic Press.
- Johnson, S. (2001). *Emergence: The connected lives of ants, brains, cities, and software*. New York: Scribner.
- Kelley, H. H., & Stahelski, A. J. (1970). The social interaction basis of cooperators' and competitors' beliefs about others. *Journal of Personality and Social Psychology*, 16, 66-91.
- Kelman, H. (1999). *The role of social identity in conflict resolution: Experiences from Israeli-Palestinian problem-solving workshops*. Presented at the Third Biennial Rutgers Symposium on Self and Social Identity, Piscataway, NJ.
- Kriesberg, L. (1999). Intractable conflict. In E. Weiner (Ed.), *The handbook of interethnic coexistence* (pp. 332-342). New York: Continuum.
- Kriesberg, L. (2003). *Constructive conflicts: From escalation to resolution* (2nd ed.). Lanham, MD: Rowman and Littlefield.
- Kriesberg, L. (2005). Nature, dynamics, and phases of intractability. In C. A. Crocker, F. O. Hampson, & P. Aall (Eds.), *Grasping the nettle: Analyzing cases of intractable conflict* (pp. 65-98). Washington, DC: United States Institute of Peace.
- Labianca, G., Brass, D. J., & Gray, B. (1998). Social networks and perceptions of intergroup conflict: The role of negative relationships and third parties. *Academy of Management Journal*, 41, 55-67.

- Latané, B., & Nowak, A. (1994). Attitudes as catastrophes: From dimensions to categories with increasing involvement. In R. R. Vallacher & A. Nowak (Eds.), *Dynamical systems in social psychology* (pp. 219-249). San Diego, CA: Academic Press.
- Lederach, J. P. (1997). *Building peace: Sustainable reconciliation in divided societies*. Washington, DC: United States Institute of Peace.
- Lewicki, R. J., Gray, B., & Elliot, M. (2003). *Making sense of intractable environmental conflicts: Concepts and cases*. Washington, DC: Island Press.
- Lewis, M. D. (2005). Bridging emotion theory and neurobiology through dynamic systems modeling. *Behavioral and Brain Sciences*, *43*, 22-40.
- Merton, R. K. (1948). The self-fulfilling prophecy. *Antioch Review*, *8*, 193-210.
- Mitchell, C. R. (2005). *Conflict, social change, and conflict resolution: An inquiry*. Retrieved **PLS PROVIDE DATE** from <http://www.burghof/handbook.net>
- Newcomb, T. M. (1953). An approach to the study of communicative acts. *Psychological Review*, *60*, 393-404.
- Nowak, A. (2004). Dynamical minimalism. *Personality and Social Psychology Review*, *8*, 138-145.
- Nowak, A., Szamrej, J., & Latane, B. (1990). From private attitude to public opinion: A dynamic theory of social impact. *Psychological Review*, *97*, 362-376.
- Nowak, A., & Vallacher, R. R. (1998). *Dynamical social psychology*. New York: Guilford.
- Nowak, A., & Vallacher, R. R. (2001). Societal transition: Toward a dynamical model of social change. In W. Wosinska, R. B. Cialdini, D. W. Barrett, & J. Reykowski (Eds.), *The practice of social influence in multiple cultures* (pp. 151-171). Mahwah, NJ: Lawrence Erlbaum.
- Opatow, S. (2001). Social injustice. In D. J. Christie, R. V. Wagner, & D. D. Winter (Eds.), *Peace, conflict and violence: Peace psychology for the 21st century* (pp. 102-109). Upper Saddle River, NJ: Prentice Hall.
- Osgood, C. E. (1983). *Psycho-social dynamics and the prospects for mankind*. Urbana: University of Illinois.
- Pearce, W. B., & Littlejohn, S. W. (1997). *Moral conflict: When social worlds collide*. Thousand Oaks, CA: Sage.
- Phillips, W. R., & Rimkunas, R. (1983). *Crisis warning*. New York: Gordon & Breach.
- Powers, W. T. (1973). *Behavior: The control of perception*. Chicago: Aldine.
- Pruitt, D., & Kim, S. H. (2004). *Social conflict: Escalation, stalemate, and settlement*. New York, McGraw-Hill.
- Putnam, L. L., & Peterson, T. (2003). The Edwards Aquifer dispute: Shifting frames in a protracted conflict. In R. J. Lewicki, B. Gray, & M. Elliot (Eds.), *Making sense of intractable environmental conflicts: Concepts and cases* (pp. 127-158). Washington, DC: Island Press.
- Read, S. J., & Miller, L. C. (Eds.). (1998). *Connectionist models of social reasoning and social behavior*. Mahwah, NJ: Lawrence Erlbaum.
- Rummel, R. J. (1987). A catastrophe theory model of the conflict helix, with tests. *Behavioral Science*, *32*, 241-266.
- Sandole, D. J. D. (1999). *Capturing the complexity of conflict: Dealing with violent ethnic conflicts in the post-cold war era*. London: Pinter.
- Schrodt, P. A., & Gerner, D. J. (2000). Cluster-based early warning indicators for political change in the contemporary Levant. *American Political Science Review*, *94*, 803-817.
- Sherif, M., Harvey, O. J., White, B. J., Hood, W. R., & Sherif, C. W. (1961). *Intergroup cooperation and competition: The Robber's Cave experiment*. Norman, OK: University Book Exchange.
- Strogatz, S. (2003). *Sync: The emerging science of spontaneous order*. New York: Hyperion.
- Thagard, P. (2000). *Coherence in thought and action*. Cambridge, MA: MIT Press.
- Thagard, P., & Nerb, J. (2002). Emotional gestalts: Appraisal, change, and the dynamics of affect. *Personality and Social Psychology Review*, *6*, 274-282.
- Thom, R. (1975). *Structural stability and morphogenesis*. New York: Addison-Wesley.

- Vallacher, R. R., & Nowak, A. (in press). Dynamical social psychology: Toward coherence in human experience and scientific theory. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles*. New York: Guilford.
- Vallacher, R. R., Nowak, A., Froelich, M., & Rockloff, M. (2002). The dynamics of self evaluation. *Personality and Social Psychology Review*, 6, 370-379.
- Vallacher, R. R., Nowak, A., & Kaufman, J. (1994). Intrinsic dynamics of social judgment. *Journal of Personality and Social Psychology*, 66, 20-34.
- Vallacher, R. R., Read, S. J., & Nowak, A. (2002). Special issue: The dynamical perspective in personality and social psychology. *Personality and Social Psychology Review*, 6(4), 264-388.
- Weick, K. (1979). *The social psychology of organizing*. Reading, MA: Addison-Wesley.
- Weisbuch, G. (1992). *Complex systems dynamics*. Redwood City, CA: Addison-Wesley.

**Peter T. Coleman** holds a PhD in social/organizational psychology from Teachers College, Columbia University. He is associate professor of psychology and education at Teachers College, Columbia University and is director of the International Center for Cooperation and Conflict Resolution. In 2003, he became the first recipient of the Early Career Award from the American Psychological Association, Division 48: Society for the Study of Peace, Conflict, and Violence. He coedited *The Handbook of Conflict Resolution: Theory and Practice* (2000; 2nd edition in press) and has also authored more than 40 journal articles and chapters.

**Robin R. Vallacher** is professor of psychology, Florida Atlantic University, and research affiliate at the Center for Complex Systems, Warsaw University. He has interests in a wide variety of topics in social psychology, from basic principles of social cognition, action identification, and self-concept to issues in social justice and social change. In recent years, his work has centered on identifying the invariant properties underlying these otherwise diverse phenomena. Using experimentation and computer simulations (cellular automata, attractor neural networks, coupled dynamical systems), he and his colleagues are investigating the dynamism and complexity associated with such phenomena as self-regulation, social judgment, close relations, intergroup conflict, and the emergence of personality from social interaction. He has published five books, including two with Andrzej Nowak that develop the implications of dynamical systems for social psychology.

**Andrzej Nowak** is professor of psychology at the Warsaw School for Social Psychology, where he is director of the Institute of Social Psychology of Informatics and Communications. He is also professor of psychology at University of Warsaw, where he directs the Center for Complex Systems at Institute for Social Studies, and associate professor of psychology, Florida Atlantic University. His primary focus is on the dynamical approach to social psychology. He has done research concerning social influence, social transitions, social dilemmas, emotions, and the self. His current research includes the use of coupled dynamical systems to simulate the emergence of personality through social coordination, attractor neural networks to model interpersonal and group dynamics, and cellular automata to simulate societal change. He has published five books, including two with Robin Vallacher concerning dynamical social psychology.

**Lan Bui-Wrzosinska** is a faculty member at the Warsaw School for Social Psychology and a fellow at Teachers College, Columbia University. Her interests are focused on the dynamical systems approach to intractable conflicts. She has cotaught courses in Poland, at Teachers College, Columbia University, and at Florida Atlantic University. She is developing a dynamical model of intractable conflicts and conducting experimental and qualitative studies on the dynamics of change in intractable conflicts. She is also implementing conflict resolution programs in educational settings in Warsaw and in New York City.