



Studying Complex Systems: 2006 Research Awards

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Principal Investigator: Peter T. Coleman, \$443,500 over three years.

Intractable conflict as a dynamical system

Intractable conflict is a serious problem in today's world. In 2005, twenty major armed conflicts were waged around the globe, with 40% of intrastate armed conflicts lasting for 10 years or more and 25% of wars lasting for more than 25 years (see Marshall & Gurr, 2005). Decades of research have contributed to our understanding of the many factors that can contribute to the intractability of conflict. In his meta-framework on intractable conflict, Coleman (2003) identified over fifty variables associated with the persistence of destructive conflicts. These include a variety of different dimensions of the contexts, issues, relationships, processes, and the outcomes of such conflicts. The multiplicity of factors makes each instance of intractable conflict unique, so perhaps it is not surprising that scholars have yet to articulate a coherent and testable theoretical model that links the component parts to underlying structures and basic dynamic properties.

We propose that the approach of dynamical systems provides a comprehensive and heuristic theoretical foundation for analyzing and understanding intractable conflicts and that this foundation generates fresh insights into possible modes of conflict resolution (Coleman et al., in press). An explicit attempt to investigate the nature and resolution of intractable conflict in dynamical terms has not heretofore been undertaken. The outcome of the proposed research, then, may serve two important purposes. First, it may provide new and hopeful insight into the fundamental features of intractable conflict, a pervasive problem of societal and international significance. Second, the proposed research program may provide further evidence that dynamical systems can function as a unifying paradigm in social science, as it does in other areas of scientific inquiry.

From a dynamical perspective, the escalation toward intractable conflict can be understood in terms of the inherent tendency toward self-organization among the elements comprising a complex system. In social systems, self-organization occurs when different attitudes, norms, values, symbols, and action tendencies tend to become interlinked by means of positive feedback loops and thus mutually reinforcing. The activation of a specific attitude, for example, may bring to mind a wide variety of norms and values that are consistent with the attitude. These selforganized ensembles function as attractors for the system, so that despite the potential for divergent information and contradictory external influences, the system's behavior consistently converges on—is "attracted to"—the same pattern of thought, affect, and action.

The development of attractors through the progressive self-organization of individual elements is responsible for the emergence of higher-order properties that enable integrative functioning and coordinated action of the system. Normally, however, positive feedback loops are balanced by negative feedback loops, a self-regulatory process that prevents a system from spiraling to an extreme state. The balance between positive and negative feedback loops is the essence of self-

regulation. If a person acts aggressively toward someone, for example, his or her next thought or action is likely to be less aggressive, perhaps even conciliatory. Under positive feedback, however, the aggressive act would promote further aggression, leading to an escalating sequence of uninhibited aggression.

The loss of negative feedback can be manifest at different levels of personal and social reality. With respect to individual dynamics, positive feedback among thoughts and feelings can produce global (undifferentiated) judgments, stereotypes, and intense affect, setting the stage for extreme action. With respect to social dynamics, positive feedback means that individuals reinforce rather than inhibit the extreme thoughts and actions of one another. Groupthink and deindividuation represent well-documented instances of the loss of balance between positive and negative feedback in groups. Coherent and extreme action can be the consequence of this breakdown in social self-regulation. In the dynamical framework, the loss of negative feedback is central to intractable conflict.

From this perspective, there are two approaches to resolving intractable conflict. The first reflects the fact that a complex system is likely to have more than one attractor for its dynamics. The potential for multiple attractors in social systems suggests that conflicts do not necessarily show a spiral of escalation, but rather may be open to resolution, provided that one of the attractors is associated with thoughts and actions of a benign or positive nature. In such an attractor landscape, the resolution of conflict may appear suddenly and catastrophically, as thoughts and actions move from the basin of one (negative) attractor to the basin of another (benign or positive) attractor. Such an attractor may be latent rather than manifest under a set of conditions, however, and thus invisible to observers as well as the parties themselves. The challenge is to identify latent attractors that can transform the relations among the conflicting parties.

The second approach is to disassemble a negative attractor and provide for reconfiguration of the system's elements. This involves decoupling the thoughts, perceptions, issues, and action tendencies that have become linked through positive feedback. Once decoupled, the natural tendency toward self-organization might generate a qualitatively different attractor for the parties' respective mental, affective, and behavioral dynamics regarding one another. The challenge in this case is how to recapture the complexity of thought and action that is lost when there is an imbalance between positive and negative feedback loops. Recent research in dynamical social psychology (Nowak & Vallacher, 1998) suggests means by which an attractor can be disassembled and reconfigured.

To date, the basic features of the framework have been subjected to preliminary testing in computer simulations and have been used for training individuals professionally concerned with conflict resolution. These efforts need to be substantially expanded and validated with data from real and simulated conflicts. The transformation from such a framework to a fully developed theory requires an interdisciplinary approach designed to capture the structure and dynamics of conflict in different domains and to test and validate specific hypotheses with experimental data. Toward that end, the proposed research plan will be implemented by a multidisciplinary research team consisting of 1) a specialist in the study of intractable conflict (Peter T. Coleman); 2) two social psychologists with expertise in the application of dynamical systems to cognitive, interpersonal, group, and societal phenomena (Andrzej Nowak and Robin Vallacher); 2) a physicist with expertise in formal descriptions and the modeling of system dynamics (Larry Liebovitch); and 3) a social anthropologist (and practitioner) who specializes in international conflict and genocide prevention (Andrea Bartoli). The research team will communicate by electronic means and meet semi-annually over three years to synthesize insights from these diverse lines of research and practice to transform the preliminary framework into an integrative dynamical theory.

The theoretical framework will be tested, validated, and revised from the results of the case studies, laboratory experiments, and computer simulations described in the Research Plan. The usefulness of the resultant theory will be continuously monitored and refined by frequent educational and training implementations for various groups of practitioners in the area of

conflict resolution. Ultimately, the theory will be used for training individuals involved in conflict resolution and disseminated for broader educational purposes. This emergent dynamical theory, suitably validated and refined by experimental data, is anticipated to provide understanding of the progression of conflict that leads to intractability, enable analysis of existing intractable conflicts, and offer practical scenarios for the resolution of seemingly intractable conflicts. The theory will be written in the language of the social sciences, but the concepts will have counterparts in the mathematical descriptions of attractors from the physical sciences that are sufficiently precise to provide the basis for computer simulation testing of the model.

This project will have a very broad impact and intellectual merit by providing a robust theoretical model validated through case studies, laboratory experiments, and computer simulations that has utility for scholars, policy-makers, and conflict-practitioners in preventing and addressing protracted social conflict. Too often, those people most affected by such conflicts, or best situated to address them, come to feel hopelessly overwhelmed by their complexity. Our work will provide a way to translate the insights and intuitions of stakeholders and conflict resolution practitioners into a theory that contributes to the reduction of human suffering worldwide. The broad range of ethnic, racial, and geographic diversity in the field case studies, and the investigators themselves, ensures the diversity of the project. The results of our project will be disseminated through published papers, conference presentations, educational offerings and educational curricula made widely available through the project's website.

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