

Two-Group Dynamic Conflict Scenarios: “Toy Model” with a Severity Index

Sanda Kaufman¹ and Miron Kaufman²

1 Urban Studies, Levin College, Cleveland State University, Cleveland, OH, U.S.A.

2 Physics, Cleveland State University, Cleveland, OH, U.S.A.

Keywords

groups, political crisis, qualitative research.

Correspondence

Sanda Kaufman, Urban Studies, Levin College, Cleveland State University, 1717 Euclid Avenue, Cleveland, OH 44115, U.S.A.; e-mail: s.kaufman@csuohio.edu.

Abstract

This article draws on several research domains and disciplines—social psychology, models of complex systems, and planning scenario analysis—to propose a “toy” model of the dynamics of intergroup conflicts. The ingroup–outgroup conflict literature supports the notion that inside groups in conflict there are subgroups of intransigents seeking to “fight it out,” and flexibles seeking avenues for settlements. There is also support for the intransigents and flexibles in the two groups being susceptible to each other’s goading to escalate conflicts or entreaties to reach agreement. However, since two-group conflicts are embedded in complex systems with which they interact, it is difficult to predict outcomes and to assess the chances that intervention strategies might succeed or fail. We propose to use the model of two-group conflicts based on the mutual susceptibilities of flexibles and intransigents (Kaufman & Kaufman, 2013) to construct toy model scenarios of possible conflict trajectories. For each scenario, we compute a Severity Index for Conflicts (SIC) that captures the likelihood that it will end in confrontation (rather than agreement). We offer some examples of intranational and international conflicts and show how the scenarios can be analyzed qualitatively to explore the range of possible outcomes. Further developments will include sensitivity analyses for various assumptions and asking “what if” questions that can inform strategies of response and intervention.

In the United States, Democratic and Republican politicians no longer seem willing or able to conduct the country’s affairs by making necessary joint decisions; the relatively severe political polarization is expressed in words and acts. Media reports suggest that each side tends to view negotiation with the other as a sign of weakness or even treason to their group’s cause. In turn, the rare agreements are immediately parsed by the media to establish who won and who lost, which further contributes to polarization.

Elsewhere in the world, old feuds continue and new ones erupt. Some conflicts are intranational, between political, ethnic, religious, or linguistic groups, as in Ireland, Belgium, Italy, Spain, Ukraine, Kosovo, Cyprus, Syria, Iraq, Chechnya, Afghanistan, Thailand, China, Egypt, the Sudan, Mali, the Democratic Republic of Congo, the Central African Republic, Venezuela, and Peru. Others conflicts are international: between Russia and Ukraine, Greece and Turkey, Israel and Palestinians, Ethiopia and Eritrea, India and Pakistan, or China and Japan. Despite Pinker’s (2011) argument that ours are more peaceful

We thank an anonymous reviewer for detailed and constructive comments that improved this article.

times than ever in history—in the sense of causing fewer deaths as proportions of the feuding populations—most of these conflicts have caused and continue to cause serious suffering, large-scale population displacement, and death.

These examples share several key characteristics, three of which form underlying assumptions of the model we propose. The first is that they can be described as involving two groups. Some of the conflicts are considered intractable, or resistant to resolution, with deep roots in the past and often unlikely to be solved in our lifetime (e.g., Burgess & Burgess, 1996; Putnam, Burgess, & Royer, 2003). The second characteristic is that they are embedded in, connected to, and affect complexly intertwined social, geopolitical, economic, and ecological systems that in turn affect the conflict dynamics (e.g., Vallacher et al., 2013). Therefore, even those intimately acquainted with specific conflicts' histories and contexts find it difficult to predict outcomes (e.g., Kaufman, Honeyman, & Schneider, 2007). The third characteristic is that in almost all these examples, we can distinguish inside each of the two feuding entities an actively intransigent group that tends to favor continuing the fight by words or arms until eventual victory and a more moderate group that leans toward some kind of accommodation. Coleman et al. (2005) offered a comprehensive argument for the existence, within disputing groups, of subgroups clustered around differing levels along a range of hostility levels toward opponents. Deutsch (2000) labeled those at one end of this range *extremists*; those at the other end of the range are often called *doves*.

The media often attempt to predict conflict outcomes even when only days or hours separate us from learning the actual results. Others have more serious stakes in the ability to explore trajectories of conflicts, as well as outcomes and their likelihoods. They include the following: those directly affected by conflict; decision-makers responsible for devising strategies and for various kinds of preparedness in responding to emerging threats, politicians, armies, conflict professionals such as diplomats and interveners, and researchers. One obstacle to predicting outcomes is that the kinds of group conflicts mentioned are embedded in complex systems that challenge simple descriptions and predictions (e.g., Vallacher et al., 2013). We lack accurate knowledge of the cause–effect linkages in complex phenomena that would permit predictions or even a narrowing of the range of possible outcomes necessary for effective intervention.

Planners and ecosystem managers experience similar prediction difficulties. They face complexity, risks, and high uncertainty and need to devise response strategies to crises and threats while disposing of limited resources. In the absence of information reliably linking causes and effects, these professionals use scenario analysis as decision aids: They construct quantitative and qualitative models of the systems of interest and produce various alternative system states—scenarios. They pose “what if” questions regarding trends in specific variables assumed to drive these states as well as regarding sensitivity of outcomes to assumptions about the systems' functioning and known causal linkages. Rather than predicting what will happen to a complex system, exploring scenarios makes possible the plumbing of ranges of possibilities, anticipation of critical needs, and preparation of a range of *robust* responses—decisions that are wise for a broad range of futures. Scenarios can take advantage of experts' experience, implicit knowledge, and subjective probabilities in ways similar to the Delphi method. We propose that the scenario approach might also be useful to conflict management, by enabling decision-makers to make the best of both expert subjective probabilities and available information to prepare strategies that might lead to conflict resolution.

We illustrate here how scenarios can help explore possible outcomes in two-group conflicts in the same class as the examples above. The scenario construction draws on research of two-group conflicts and on dynamic modeling used in physics that has been applied to various social systems (e.g., Diep, forthcoming; Kumar, Bowen, & Kaufman, 2007; Vasarhelyi & Scheuring, 2013). Vallacher et al. (2013) applied dynamical systems theory specifically to modeling conflicts. Our approach belongs in the same family of nonlinear models describing complex physical systems processes (Bak, 1996; Goldenfeld &

Kadanoff, 1999; Kaufman & Diep, 2008; May, 1976). It uses a set of first-order difference equations to mimic the time evolution of group interactions; May (1976) observed that such equations “can exhibit a surprising array of dynamical behavior” (p. 459).

Our model describes the paths of conflict between two groups, each with an internal dichotomous split between flexibles and intransigents, who interact repeatedly in time—whether by voting, through diplomacy or even with recourse to violence (Kaufman & Kaufman, 2013). We show how the results of a small set of assumptions, parameters, and relationships can be used in the way that physicists use “toy models”¹ for qualitative testing of various conjectures (e.g., Marzuoli, 2009), in a manner similar to planners’ use of scenarios to mitigate future threats to social–ecological systems. We associate a severity index for conflicts (SIC) to specific scenarios. This index, based on a computation of the probability that a specific scenario will end in confrontation, can contribute added insights to conflict scenario analysis and to the design of response strategies.

A case in point: In an interview to the *New Yorker* magazine, “Obama put the odds of a final accord [with Iran] at less than even. . .” (Remnick, 2014). This exemplifies an expert’s SIC estimate, corresponding to a probability of about 0.5 of failing to reach an agreement in a momentous conflict that very likely informs his globally consequential decisions. The toy model we propose will allow us to represent this SIC value, test the conflict’s trajectory under various explicit assumptions, and explore effects of various mitigation means.

More generally, using past data, we could explore which toy model predictions resemble observed past outcomes (a common calibration technique for predictive models). We could also investigate extreme—unlikely but still possible—scenarios for either settlement or war, since, as Taleb (2010) argued, we ignore low-probability events at our peril. Results can help identify conflict management strategies that are robust, in the sense of being sound (with what we know now) for a range of scenarios, including the less likely ones.

We begin by describing the dynamic toy model with susceptibilities, and then, we present four illustrative scenarios with different SIC values and how they might be used to explore intranational and international conflicts. We conclude with suggestions for how the scenarios might inform preparedness and intervention in conflicts.

Two-Group Conflict Dynamics Model with Susceptibilities

To generate various conflict scenarios of two-group dynamics, we use a model described in Kaufman and Kaufman (2013). We explain the model components using the example of strife between Democrats and Republicans in the U.S. political arena. In both political camps, we find two subgroups, one tending to intransigence and another more amenable to compromise with those in the other party who are similarly inclined to make joint decisions. Among Democrats, we distinguish a subgroup the media call *the Hard Left*,² or progressive, which tends to uphold members’ values even at the cost of paralysis in joint decision situations. A second, more flexible subgroup has been designated at times using a 1980’s term: *Reagan Democrats*. The latter tend closer to the center, and even right of center on certain issues, and therefore, sometimes they are able to come to agreements with like-minded Republicans.

Republicans have an intransigent *Tea Party* subgroup whose support led their political representatives in Congress to opt for closing down government in 2013 rather than making decisions they framed as a

¹Toy models “are invented to make simpler the modeling of complex physical systems while preserving at least a few key features of the originals. . .” Such key features include “guiding principles that mimic those of ‘analog’ predictive theories,” and data that are “only reminiscent of reality, if not physically ‘unreasonable’” (Marzuoli, 2009, p. 13).

²We owe this term to 1980s British and Australian Labor Party subgroups.

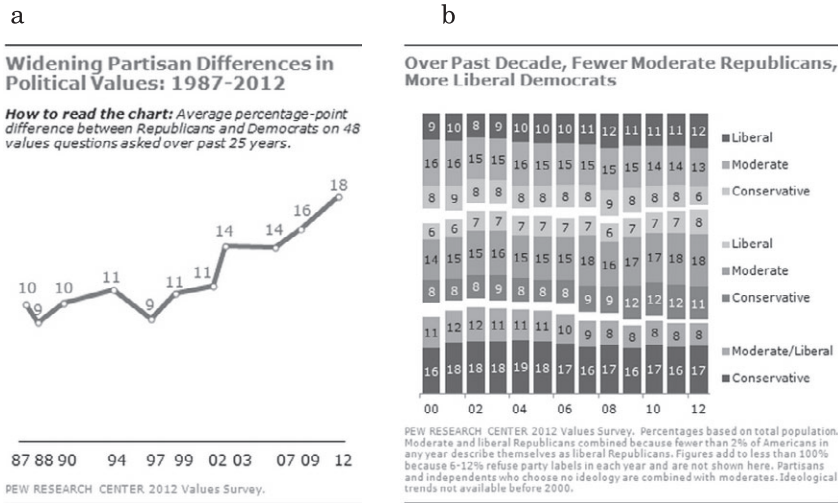


Figure 1. Pew survey trends in political polarization 1987–2012.

compromise on their core values.³ The flexible subgroup is sometimes derogatorily called RINO—Republican in name only—to signify its leaning toward the center and its openness to agreements with flexible Democrats. The relative proportions of the subgroups in each party fluctuate in time. Since the year 2000, the two parties seem increasingly dominated by their respective intransigents. This tendency has led to difficulties in reaching joint decisions in both Houses of Congress.

Figure 1 displays some trends in the American public’s perceptions of political polarization (Pew Research Center for the People & the Press, 2012a, 2012b). Note the widening of partisan differences over the 25 years of Pew Center surveys: The polarization trend is driven by intransigents who over time have claimed an increasing share of each of the two partisan groups.

The ingroup split into intransigents and flexibles and their respective susceptibilities to their adversary outgroup counterparts’ arguments or behaviors are central assumptions of the model. Therefore, we need to ask whether, beyond the examples we have offered, there is any evidence to support our conjectures.

Haidt (2012) observed that humans seem “hardwired” into both forming groups and distinctions between members of an ingroup and members of an outgroup. Haidt’s contention was preceded by several experimental and field findings on intra- and intergroup interactions that are also consistent with it. For example, Brewer (1979) found attitudes toward outgroups to be a function of *intergroup* relationships and of threats to belonging—a result supported with survey data by Smeekes and Verkuyten (2013). According to Crisp and Beck’s (2005) experiments, in groups with low and high identifiers (analogous to our flexibles and intransigents), encouraging subjects to think of the characteristics they share with an outgroup resulted in a larger reduction of favoritism for the lower identifiers (the flexibles).

³In 2012, the Pew Research Center for the People and Press found partisan polarization in the Bush and Obama years to have exceeded all values obtained in their polls in the preceding 25 years during which they have been conducting these opinion polls. Reflecting the increasing political polarization and growing proportion of inflexibles within both parties, a Pew Research Center for the People & the Press (2013) found that Democrats express highly positive views of their party across-the-board, while Republicans’ opinions about the Democratic Party are uniformly negative. Further, “the GOP is seen as principled but out of touch and too extreme” and “partisan views about whether the Republican Party is too extreme are mirror images: 78% of Republicans say the GOP is not too extreme, while 19% say it is; 78% of Democrats view the Republican Party as too extreme, while 19% disagree.”

Cairns, Kenworthy, Campbell, and Hewstone (2006) used random samples of the population of Northern Ireland in two consecutive years (2000 and 2001) to explore ingroup–outgroup effect as moderated by the subjects’ degree of religious identification. In their experiments, too, high identifiers (corresponding to our intransigents) displayed more ingroup bias than low identifiers. Similar results were obtained by Castano, Yzerbyt, Paladino, and Sacchi (2002), Fiske (2002), and Hall and Crisp (2008).

Our model relies on the notion that flexibles in one group are susceptible to persuasion by flexibles in the opposing group and similarly that intransigents are sensitive to their counterparts across group boundaries. Several experimental findings support both notions, which may differ in specific mechanisms. With respect to flexibles, Gaertner, Mann, Dovidio, Murrell, and Pomare (1990) described experimental evidence of the susceptibility to persuasion of some ingroup members to members of an outgroup. In Kessler and Hollbach’s (2005) experiments, a group member’s ingroup identification decreases with anger toward the ingroup and happiness toward the outgroup. Further, Gaertner et al. (2000) found that “when viewed over time, decategorization, recategorization, and mutual intergroup differentiation processes each can contribute to the reduction of intergroup bias and conflict” (p. 98) Kessler and Hollbach (2005) findings are relevant to intransigents: They offer evidence for the intensity of emotions strongly affecting the degree of change in identification. Thus, we would expect intransigents to be susceptible to the opposing group’s intransigents in the sense of increased resolve to continue fights. Tadmor, Hong, Chao, Wiruchnipawan, and Wang (2012) obtained experimental results consistent with both flexible and intransigent mechanisms for changing intergroup attitudes through exposure to members of an opponent group.

Together, these findings support our construct of intragroup division into intransigents and flexibles. They also support the mutual susceptibilities of each group’s intransigents and flexibles to the corresponding subgroups in the outgroup. There is also evidence for the possibility of attitude changes in time, which allows one subgroup or the other to grow under the influence of the corresponding subgroup in an outgroup.

We assume that the shares of each ingroup’s subgroup of flexibles and intransigents fluctuate in time as functions of their respective susceptibilities (μ and η in Figure 2) to the status of the subgroups in other (out)groups. Specifically, intransigents may see their proportion in their own group rise and fall together with the proportion of intransigents in the opposing group. The joint rise may represent a mutual escalatory reaction. The proportions of flexibles also rise together precisely because their attitudes are amenable to change and they are able to persuade each other.

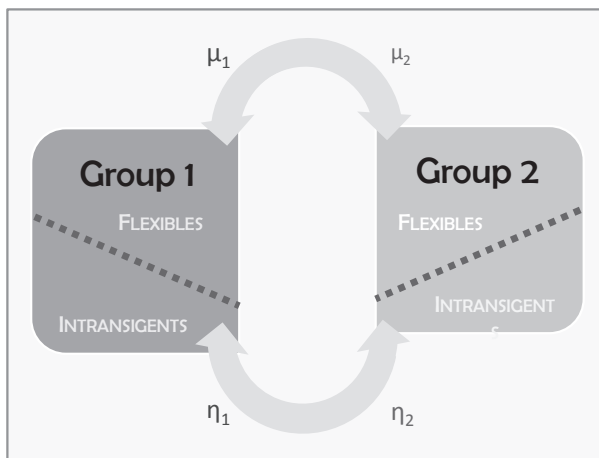


Figure 2. Interactions between subgroups of two in conflict.

In our example of American politics, an increase in the proportion of RINOs in the Republican camp is associated with an increase in the proportion Reagan Democrats in the Democratic camp. For instance, in 2012, political polarization had reached its highest point since 1987 as measured by the Pew Center (see Figure 1B). Nevertheless, at the end of 2013 (flexible) House Democrats and Republicans were able to pass a budget after several years during which the intransigents had successfully prevented a joint decision, often framing their objections in very strong value terms. The reason our model belongs to the toy models category is that although the kind of trend information displayed in Figure 1 is available (e.g., Pew Research Center for the People & the Press, 2012a, 2012b), it is difficult for now to translate it reliably into subgroups' susceptibilities.

In general, we consider the interaction dynamics between Group 1 and Group 2—whether conflicting countries or interest groups inside one country—where, in each group, some members are flexible (peace or accommodation oriented) and some are intransigent (confrontation or fight oriented). The groups encounter each other in numerous repeated decision rounds that may lead to agreement-peace, impasse, or outright confrontation or war.

- N_{11} and N_{21} represent the numbers of *flexible individuals* in Group 1 and Group 2, respectively; N_{12} and N_{22} are the numbers of *intransigent individuals* in Group 1 and Group 2, respectively. We denote by n_{11} the proportion of flexibles in Group 1, and n_{12} the proportion of intransigents in Group 1; similarly, n_{21} is the proportion of flexibles in Group 2, and n_{22} is the proportion of intransigents in Group 2:

$$(1) \quad n_{11} = \frac{N_{11}}{N_{11} + N_{12}}$$

$$(2) \quad n_{12} = \frac{N_{12}}{N_{11} + N_{12}}$$

$$(3) \quad n_{21} = \frac{N_{21}}{N_{21} + N_{22}}$$

$$(4) \quad n_{22} = \frac{N_{22}}{N_{21} + N_{22}}$$

- Let μ_1 and μ_2 be the susceptibilities of flexibles in each group to the peace openings of flexibles in the other group; η_1 and η_2 are the susceptibilities of the intransigents in each group to arguments of the intransigents in the other group. We assume that over a time interval Δt , the fractional change in the proportion of flexibles in each group is proportional to the fraction of flexibles in the other group; the fractional change in intransigents in Group 1 is proportional to the fraction of intransigents in Group 2:

$$(5) \quad \frac{N_{11}(t + \Delta t)}{N_{11}(t)} - 1 = \mu_1 n_{21}(t)$$

$$(6) \quad \frac{N_{12}(t + \Delta t)}{N_{12}(t)} - 1 = \eta_1 n_{22}(t)$$

$$(7) \quad \frac{N_{21}(t + \Delta t)}{N_{21}(t)} - 1 = \mu_2 n_{11}(t)$$

$$(8) \quad \frac{N_{22}(t + \Delta t)}{N_{22}(t)} - 1 = \eta_2 n_{12}(t)$$

- Equations (1) to (8) yield the two equations that describe the conflict dynamics between the two disputing groups in terms of the respective proportions of flexibles, where the four parameters μ_1 ,

μ_2 , η_1 , and η_2 are assumed to remain constant in time, whereas the respective proportions of flexibles (or intransigents) change in time:

$$(9) \quad \begin{aligned} n_{11}(t + \Delta t) &= \frac{n_{11}(t) + \mu_1 n_{21}(t) n_{11}(t)}{1 + \mu_1 n_{21}(t) n_{11}(t) + \eta_1 n_{22}(t) n_{12}(t)} \\ n_{21}(t + \Delta t) &= \frac{n_{21}(t) + \mu_2 n_{11}(t) n_{21}(t)}{1 + \mu_2 n_{11}(t) n_{21}(t) + \eta_2 n_{22}(t) n_{12}(t)} \end{aligned}$$

In Figure 3, the proportion of flexibles in one group is graphed against the proportion of flexibles in the second group. Any point in this space represents an *initial* (time 0) pair of proportions (n_{11}^0, n_{12}^0) of flexibles in each group. We distinguish two regions (left lower corner and right upper corner) separated by a *tipping line*. In the absence of any intervention or context change, any initial combination of proportions of flexibles situated in the lower left area, labeled *conflict region*, progresses in time to confrontation—the point (0, 0) denoting absence of flexibles and, therefore, complete domination of the groups by intransigents. Similarly, *caeteris paribus* any initial combination proportions of flexibles (n_{11}^0, n_{12}^0) in the upper right area, labeled *peace region*, progresses in time to an agreement—the point (1, 1) indicating that both groups have been overtaken by flexibles. The smaller this *peace region* in a specific situation, the more resistant to resolution is the conflict.

The tipping line separating the two regions is the locus of tipping points—initial pairs of proportions that lead in time to the tipping point. The *impasse* (1, 0) and (0, 1) are points where one of the groups becomes dominated by flexibles while the other is overtaken by intransigents. Although the impasse corners are unstable (in the sense that any small change in the proportion of flexibles in one or both groups can send the system on a path toward war or peace), there are conflicts, which we deem intractable, that linger there for prolonged time periods. Thus, the initial conditions (whether beginning in the *conflict* or in the *peace* region) play a key role in this model if the only changes in proportions of flexibles are to occur under each other’s influence. Then, agreements have a chance of emerging whenever the proportions of flexibles in both groups exceed the proportions of intransigents, as is the case for points in the *peace region*.

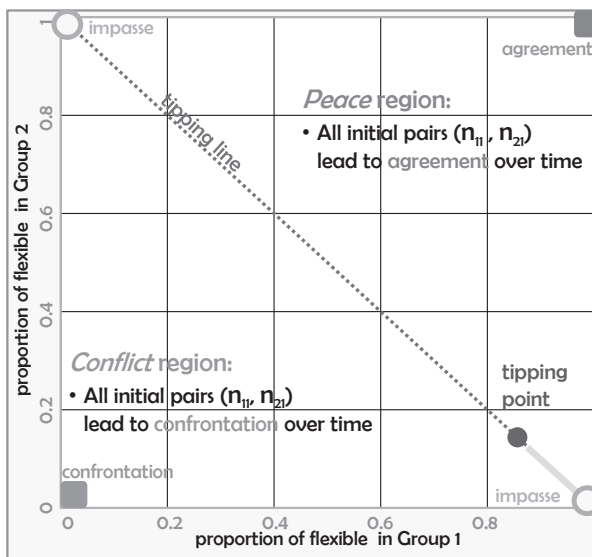


Figure 3. Generic diagram with terms used in the construction of scenarios (Kaufman & Kaufman, 2013).

However, conflicts of the kind we examine here do not occur in a vacuum. Rather, they often affect and are affected by external events. In the American politics example, the economic downturn of 2008 exacerbated the political polarization. Some have argued that a flare-up in the Japan–China relations is occurring because of the relatively recent discovery of natural gas deposits at their shared border, combined with other countries' inattention to this conflict due to contemporaneous widespread internal economic problems and more severe conflicts elsewhere. The 2004 negotiations between Israelis and Palestinians happened because of pressure by the United States through a recent initiative, rather than due to a gradual internal change in the attitudes of the parties.

In terms of Figure 3, these external events are equivalent to causing a sudden change in the proportions of flexibles in one or both groups that amounts to a switch across the tipping line from one region to another. In the American example, the two parties seem now more confrontation-bound as if an external force moved the current (n_{11}, n_{21}) deeper into the conflict region (thus making it more difficult for the groups to come to an agreement); the Japan–China relations, while not particularly amicable, were dormant and have now moved onto an active trajectory to confrontation. In terms of our model, before the discovery of natural gas deposits, the two countries were perhaps at an unstable point on the tipping line, although not engaged in active exchanges. The discovery of oil reserves amounted to pushing the point off the tipping line and into the conflict region, suddenly igniting hostile moves. In the Israeli–Palestinian case, we saw early in 2014 an intense intervention attempt to cause the parties to cross the tipping line into the peace region by engaging in moves aiming to increase the susceptibilities of the flexibles to each other. Even if these efforts might have had a chance of success, a violent incident in early summer amounted to moving the pair of proportions of flexibles deep into the conflict area, leading to armed confrontation. This model allows consideration of scenarios of both gradual changes in the proportions of flexibles and sudden changes under the influence of external events or interventions.

Scenario Generation and Analysis Using the Toy Model

The model described above can be used to explore various initial configurations and trajectories of change of the flexible–intransigent split within two conflicting groups, as in the examples we mentioned at the outset. Constructing a scenario for a specific conflict requires data or an expert guess of the six model parameters (four susceptibilities and two initial proportions of flexibles), a task which might be less daunting than it appears, at least in some cases. In studies aiming to understand specific conflicts and to explore strategies of response, we would need to estimate subgroup susceptibilities and flexibles' proportions using data such as (repeated) opinion polls. It is also possible to obtain subjective estimates from those closely involved in or studying the conflicts. A Delphi-like approach could be used to obtain a measure of consensus about possible ranges of estimates which can then be explored easily by running the model with various configurations. However, in this article, our purpose was to showcase the approach and its potential, rather than produce insights of the quality necessary for devising strategies and decisions in specific cases. Therefore, the susceptibilities we used in the following examples represent our guesses, based on current news stories about the stakeholders in the situations we attempted to depict, including the approximate degree of symmetry and polarization in their stances, the current status of hostilities or lack thereof, and historical facts.

In what follows, we illustrate through four examples how scenarios with different configurations and different corresponding SICs can be discussed in toy-modeling fashion, and the kinds of analyses to which these scenarios are amenable. We assume hereafter that we have obtained susceptibility estimates and show how they can be used to plumb the range of possible conflict outcomes in four specific situations. The configurations we obtained have not been validated, a step we plan to undertake in future research.

We have modeled below the intranational conflicts in Northern Ireland and between U.S. Democrats and Republicans (Figures 4 and 5), and the international disputes between Japan and China and between

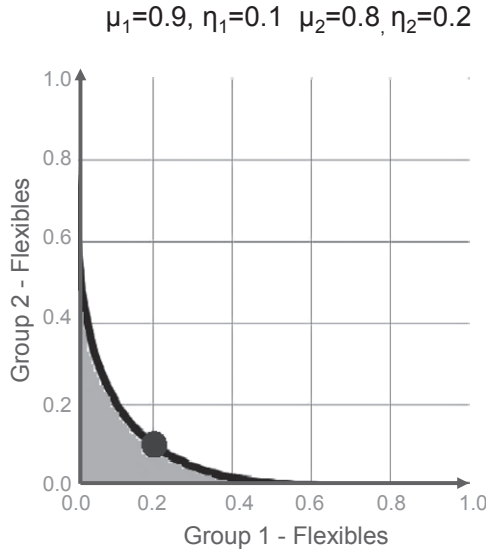


Figure 4. Northern Ireland Catholics vs. Protestant, SIC = 0.06.

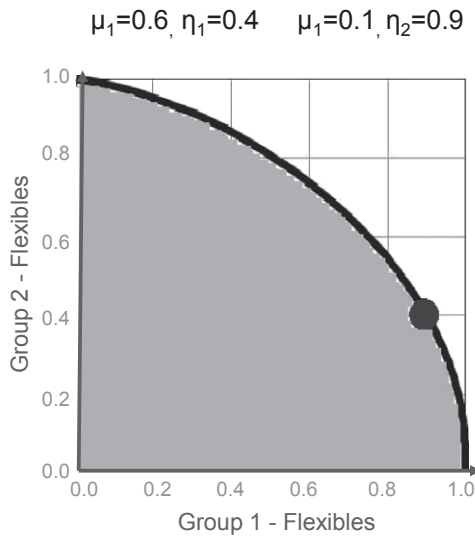


Figure 5. U.S. Democrats vs. Republicans, SIC = 0.75.

the Western Bloc and Iran (Figures 6 and 7). For each situation, we have computed a SIC that can be interpreted as the probability of moving toward persistent lack of agreement or even war (with 1—SIC being the likelihood of eventual agreement or peace). The value of the SIC is the area of the conflict region under the tipping line in Figure 3, that is, the area of the region of initial conditions that eventually end up at the conflict point (0, 0). The SIC can be used to discuss various conflict management strategies and to assess their effect in reducing it, thereby increasing the probability of reaching agreement. It is possible then to conduct sensitivity tests on scenarios to explore how vulnerable is the SIC for specific conflicts to our assumptions about the parties’ susceptibilities.

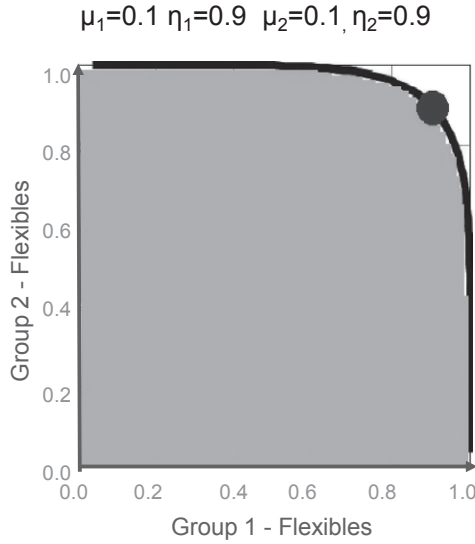


Figure 6. China vs. Japan, SIC = 0.97.

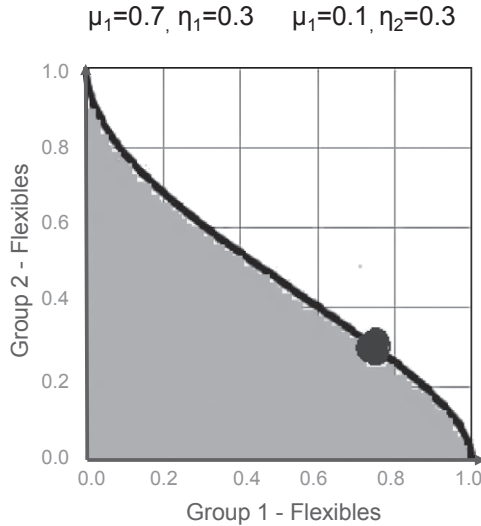


Figure 7. Western Bloc vs. Iran, SIC = 0.48.

Figure 4 corresponds to the current situation in Northern Ireland where, although Catholics and Protestants have concluded an agreement to end their hostilities, the reigning peace is rather cool, with occasional flare-ups, perhaps in part because the parties are aligned along religious lines and have strongly held values. Although a return to the violent status quo ante seems unlikely (the estimated SIC is very low), it is possible to see the conflict reignite perhaps due to a sudden crisis such as an act that might suddenly breach trust. It is likely that the parties to the Irish conflict as well as the numerous observers may have converging estimates of the flexibles' susceptibilities that can be substituted for our illustrative guess. Although the susceptibility values we used yielded a symmetrical configuration, it is possible for

the flexibles or intransigents in one group to have a higher susceptibility than the other; for example, the intransigents in one of the groups might be more belligerent. This information can be useful for an intervener, who may have to work more intensely with one side than with the other. Even after an agreement is concluded, there may be a need to maintain it by continuing to work with the group that seems more recalcitrant.

We use Figure 5 to explore qualitatively the second example of intranational conflict: the political standoff between Democrats and Republicans in the United States. Despite the strife that is often salient in the news, and despite the widespread public impression of the U.S. Congress as ineffectual, there seems to be a subgroup of flexibles on each side sufficiently susceptible to its counterpart to allow the system to move at times toward agreement, as when moderate House Democrats and Republicans approved a budget for 2014. This is the same House that in a moment of rather extreme polarization shut down the government in Fall 2013 by refusing to make a joint budget decision. As in many other situations, the susceptibilities may not be the only factors contributing to this conflict trajectory. The budget agreement does not mean mutual attitudes have changed. Rather, concern with a second extremely unpopular government shutdown for which both parties would be blamed—akin to an external threat—may have moved the conflict to the peace region—for this issue. A more durable change in the flexibles' susceptibilities may take more time and a combination of positive changes, such as an improvement in the economy, that would make it less politically perilous for Democrats and Republicans to make joint decisions.

Figure 6 corresponds to the situation prevailing between Japan and China, triggered by the discovery of oil reserves at Senkaku Islands, which are claimed by both countries. There existed a dormant historical enmity between the two countries, based on past wars and mutual unresolved grievances. Thus, the flexibles on one side, if they exist, may have very low susceptibility to the few flexibles on the other side. The recent focus on oil resources has reactivated the conflict. Japan is exploring ways to rebuild an army (which it was no longer allowed to have as part of the WWII aftermath); China has established an air defense identification zone (ADIZ) over a sizable portion of the East China Sea, requiring civilian airliners to undergo an identification procedure which is considered to contravene to international understandings. The SIC for this configuration is very high. Thus, both countries are taking unilateral escalatory actions, signaling preparation for a (possibly armed) conflict. We might expect the international community to intervene before this happens, hoping to enlarge the peace region and move the conflict trajectory to it. However, the conflict foci around the world are currently numerous, and since in this situation there has not yet been loss of life as in many others, international attention does not seem focused on East Asia.

Figure 7 illustrates an asymmetric situation, such as the one prevailing between Iran and the Western Bloc, with a SIC roughly reflecting President Obama's own subjective estimate (Remnick, 2014). After an extended impasse that lasted decades, there has been interaction at diplomatic levels, driven perhaps mainly by a change in the susceptibility of the Western Bloc flexibles. By many accounts, this has not been matched by a change of stance on Iran's part. According to declarations in the media, Iran claims not to have conceded anything in reaching the first stage of negotiations, in 2013, regarding its quest to build nuclear weapons; there have been several postponements of compliance mileposts. Meanwhile, the Western Bloc that had imposed strict sanctions hurtful to the Iranian economy has seemed almost more eager to lift them than the Iranians. Thus, media reports show that the Western flexibles interpret any statement in English by the newly elected Iranian president as a sign of willingness to negotiate an agreement (equivalent to a very high susceptibility), even while the latter issues statements (especially in his own language, for internal consumption) that show hardly any inclination to make concessions (equivalent to a very low susceptibility). This example is interesting beyond the relatively high susceptibility of the Western Bloc that has tired of military interventions. The sanctions have inflicted heavy economic losses on the Iranian population. As the internal economic pressure has reached a politically perilous boiling point for the Iranian leaders, the prospect of seeing the sanctions removed may move the conflict trajectory to the tipping line or even the peace area.

Discussion and Implications

The next step using the scenarios is to explore consequences of different kinds of intervention in conflicts and test whether such efforts can be expected to move the trajectory of conflicts from the war to the peace zone. The model can show two types of changes that accomplish this change. As some of our examples suggest, the first is through an increase in the flexible subgroups' susceptibilities in time (which we had assumed fixed), perhaps as a result of intervention or contextual changes. The result is a reduction in the SIC, enlarging the peace area of the resulting graph, and the likelihood of the system moving to the peace corner (Figure 3). For example, interveners work to increase mutual trust, bring information, convey threats, and, in general, help-pressure the parties to move into the *peace region*. In our model, the intervener's trust-building actions can affect flexibles' mutual susceptibilities, changing the shape of the curve to decrease the SIC value.

The second change is akin to picking up the current point (the pair of proportions of flexibles) and moving it across the tipping line from the war to the peace zone. While it does not reduce the SIC, it alters the conditions sufficiently to re-orient the system to the peace corner. Threats of military intervention or economic sanctions and other types of pressure, such as internal unrest, can result in moving the current position from the war to the peace area, without necessarily changing the SIC. It is also conceivable that intervention could result both in changing susceptibilities and in moving the trajectory to the peace zone.

Intervener actions intended to alter the susceptibilities of the flexible subgroups, such as through Track 2 diplomacy, may take time. They may be the choice in the absence of other alternatives, when time is no object or when the alternatives are costly or unpopular, for example, military intervention. Causing the conflict path to switch from the war to the peace region—equivalent to “carrying a big stick” such as sanctions or credible threats of military action—may be more expeditious but risky, since they do not necessarily reduce the hostility levels which may resume after the intervention. Thus, such external moves may have effects that are less durable than intervention that increases the susceptibilities of the flexibles. However, such measures may be necessary in the midst of crises threatening human life and shelter. Note that what may be construed by flexibles on one side as an act of betrayal by the other group may undo quickly any trust-building work. The scenarios provide qualitative assessments that can be used as seeds for alternative ideas to be explored in depth by other means.

The time consideration is interesting and can be studied with different scenarios. Depending on our estimates of susceptibilities, we might use the SIC to assess whether we can afford to wait for the flexibles' susceptibilities to change sufficiently or whether the road to an agreement using this strategy is so long and tenuous that we may need an external intervention to move the system into the peace area. In the Iran case, it seems the world could not afford to wait and opted for intervention. In the American politics example, it is difficult to imagine an intervention, so it might appear that we will have to wait for the flexibles subgroups to gain traction in each group.

Intervention, however, can be construed more broadly to include any event external to the two-group system. From this perspective, we can imagine economic, environmental, or geopolitical events that might cause Democrats and Republicans to rally around joint decisions (equivalent to moving the two-group system into the peace region, without changes in the flexibles' susceptibilities). This occurred in the past when politicians united across political lines in the face of threats to the nation, as happened after 9/11. More generally, events external to the two groups' conflicts can include loss of resources to wage the conflict, or the discovery of resources that might eliminate it. For example, newly found oil and gas reserves around the globe may have a greater effect on some long-standing conflicts than all the extensive efforts devoted so far to their resolution.

The model could yield more precise results if, rather than using educated guesses, the necessary susceptibilities are measured directly or estimated from data. For example, in the American politics case, the

Pew Research Center for the People & the Press survey data from 1987 to 2013 can be used to refine the estimates of the Democratic and Republican subgroups and track any changes. Similar time series of opinions reflecting susceptibilities are available for other conflicts. Scenarios built with such data could then be used to conduct sensitivity tests. For example, after obtaining a SIC value for the current state, we can investigate how large a change in susceptibilities would be required for a specific change in the SIC. We may find—in conflicts very resistant to resolution—that efforts required to reduce the SIC in order to increase chances of the system moving toward peace are extensive, so different actions may be necessary. On the other hand, we may also find in some situations that it would not take much to accomplish a susceptibility shift toward conflict resolution. This kind of analysis can contribute valuable insights into the design of conflict management strategies and interventions.

Conclusions

We have described a dynamic toy model of two-group conflict, and based on it, we have proposed the SIC as a measure of the probability that the conflict will eventually end in lack of agreement—whether political paralysis, continued hostilities, or war. We have shown how the model can be used for the qualitative analysis of intra- and international conflicts, through scenarios with which we can test different sets of assumptions and outcomes with or without intervention. This model's utility is not in predicting conflict outcomes but rather as a tool for exploring assumptions and for building consensus around robust decisions regarding conflict management.

Our examples are illustrative of one of the ways in which the scenarios can be used to help decision-makers think about various two-group conflicts with which they need to engage. The scenarios can generate discussion and elicit expert input to refine the descriptions, even if using subjective values for the susceptibilities. In fact, decision-makers do this anyway, but the scenarios may help them surface and re-examine their assumptions and test what might be the results of different sets of assumptions.

The media report widely divergent views—among the public, the politicians, and elected officials—of specific conflicts' trajectories, and of the consequences for the conflicts of different types of intervention. Typically, the differences in views are attributed to political affiliation or vested interests in particular remedies. However, it may be more useful to capture the underlying assumptions that account for the different predictions, to represent the entire range of these views with scenarios, and to seek robust decisions that might work for a broad portion of the spectrum rather than for one specific set of beliefs about reality.

The toy model we have proposed yields illustrative and qualitative results, from which valuable insights can be gained by exploring a range of possibilities rather than producing data-based predictions. Our purpose was to show several examples of how this tool can be used. However, for some conflicts, poll numbers are available and could inform more precise explorations (e.g., Coleman et al., 2005). We plan to focus on a current conflict for which data permit estimation of susceptibilities to mutual persuasion of flexible and intransigent subgroups. For example, the Pew reports of longitudinal data regarding attitudes of Democrats and Republicans can be used for producing susceptibility estimates. The next level of model refinement includes developing the SIC sensitivity testing that is necessary for strategic analyses. Another direction for future research is expanding the model to include more than two groups. We have developed conceptually a three-group model (Kaufman & Kaufman, 2011) that could also benefit from data-based estimates of the subgroup susceptibilities.

References

- Bak, P. (1996). *How nature works*. New York, NY: Springer Verlag.
- Brewer, M. B. (1979). Ingroup bias in the minimal intergroup situation: A cognitive motivational analysis. *Psychological Bulletin*, 86, 307–324. doi: 10.1037/0033-2909.86.2.307

- Brewer, M. B. (2007). The importance of being we. *American Psychologist*, *62*, 728–738. doi: 10.1037/0003-066X.62.8.728
- Burgess, H., & Burgess, G. (1996). Constructive confrontation: A transformative approach to intractable conflicts. *Mediation Quarterly*, *13*, 303–322. doi: 10.1002/crq.3900130407
- Cairns, E., Kenworthy, J., Campbell, A., & Hewstone, M. (2006). The role of in-group identification, religious group membership and intergroup conflict in moderating in-group and out-group affect. *British Journal of Social Psychology*, *45*, 701–716. doi:10.1348/014466605X69850
- Castano, E., Yzerbyt, V., Paladino, M., & Sacchi, S. (2002). I belong, therefore, I exist: Ingroup identification, ingroup entitativity, and ingroup bias. *Personality and Social Psychology Bulletin*, *28*, 135–143. doi:10.1177/0146167202282001
- Coleman, P. T., Schneider, A., James, C. C. F., Adams, D. S., Gameros, T. A., Hammons, L. R., et al. (2005). Intra-group subgroup attitude clustering, external intervention, and intergroup interaction patterns: Toward a dynamical model of protracted intergroup conflict. *Peace and Conflict Studies*, *12*(1), 55–70.
- Crisp, R. J., & Beck, S. R. (2005). Reducing intergroup bias: The moderating role of ingroup identification. *Group Processes & Intergroup Relations*, *8*, 173–185. doi:10.1177/1368430205051066
- Deutsch, M. (2000). Justice and conflict. In M. Deutsch & P. T. Coleman (Eds.), *The handbook of conflict resolution: Theory and practice* (pp. 41–64). San Francisco, CA: Jossey-Bass.
- Diep, H. T. (forthcoming). Ordre, désordre dans des systèmes frustrés: Complexité aux frontières des phases. In J. C. S. Lévy (Ed.), *Complexité et Désordre* Hal-01090082. Grenoble, France: EDP Sciences.
- Fiske, S. T. (2002). What we know now about bias and intergroup conflict, the problem of the century. *Current Directions in Psychological Science*, *11*, 123–128. doi:10.1111/1467-8721.00183
- Gaertner, S. L., Dovidio, J. F., Banker, B. S., Houlette, M., Johnson, K. M., & McGlynn, E. A. (2000). Reducing intergroup conflict. *Group Dynamics: Theory, Research, and Practice*, *4*(1), 98–114. doi:10.1037//1089-2699.4.1.98
- Gaertner, S. L., Mann, J. A., Dovidio, J. F., Murrell, A. J., & Pomare, M. (1990). How does cooperation reduce intergroup bias? *Journal of Personality and Social Psychology*, *59*, 692–704. doi:10.1037//0022-3514.59.4.692
- Goldenfeld, N., & Kadanoff, L. P. (1999). Simple lessons from complexity. *Science*, *284*, 87–89. doi:10.1126/science.284.5411.87
- Haidt, J. (2012). *The righteous mind*. New York, NY: Pantheon Books.
- Hall, N. R., & Crisp, R. J. (2008). Assimilation and contrast to group primes: The moderating role of ingroup identification. *Journal of Experimental Social Psychology*, *44*, 344–353. doi:10.1016/j.jesp.2007.07.007
- Kaufman, M., & Diep, H. T. (2008). Potts-percolation-Gauss model of a solid. *Journal of Physics: Condensed Matter*, *20*, 075222. doi:10.1088/0953-8984/20/7/07522
- Kaufman, S., Honeyman, C., & Schneider, A. (2007). The marginalization of negotiation wisdom. In C. Dupont (Ed.), *Negotiation and world transformations* (pp. 177–186). Paris, France: Publibook, Collection Négociation.
- Kaufman, S., & Kaufman, M. (2011). Modeling political conflict dynamics in a two-party system. SSRN-id1864151, retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1864151.
- Kaufman, S., & Kaufman, M. (2013). Tipping points in the dynamics of peace and war. In A. Colson, D. Druckman, & W. Donohue (Eds.), *International negotiation: Foundations, models and philosophies* (pp. 251–272). Dordrecht, The Netherlands: RoL.
- Kessler, T., & Hollbach, S. (2005). Group-based emotions as determinants of ingroup identification. *Journal of Experimental Social Psychology*, *41*, 677–685. doi:10.1016/j.jesp.2005.01.001
- Kumar, M., Bowen, W., & Kaufman, M. (2007). Urban spatial structures as self-organizing systems: An empirical evaluation of firm location decisions in Cleveland-Akron PMSA. *Annals of Regional Science*, *4*, 297–314. doi:10.1007/s00168-006-0097-z
- Marzuoli, A. (2009). Toy models in physics and the reasonable effectiveness of mathematics. *Scientifica Acta*, *3*(1), 13–24. doi:10.1007/978-88-470-0784-0_3
- May, R. M. (1976). Simple mathematical models with very complicated dynamics. *Nature*, *261*, 459. doi:10.1038/261459a0

- Pew Research Center for the People & the Press (2012a). *Partisan polarization surges in Bush, Obama years, section 9: Trends in party affiliation*. Retrieved from <http://www.people-press.org/2012/06/04/section-9-trends-in-party-affiliation>.
- Pew Research Center for the People & the Press (2012b). *Partisan polarization surges in Bush, Obama years. Trends in American values: 1987–2012*. Retrieved from <http://www.people-press.org/2012/06/04/partisan-polarization-surges-in-bush-obama-years>.
- Pew Research Center for the People & the Press (2013). *Political party affiliation*. Retrieved from <http://www.people-press.org/topics/political-party-affiliation>.
- Pinker, S. (2011). *The better angels of our nature*. New York, NY: Viking.
- Putnam, L. L., Burgess, G., & Royer, R. (2003). We can't go on like this: Frame changes in intractable conflicts. *Environmental Practice*, 5, 247–255. doi:10.1017/S1466046603035646
- Remnick, D. (2014, January 27). Going the distance: On and off the road with Barack Obama. *New Yorker*. Retrieved from http://www.newyorker.com/reporting/2014/01/27/140127fa_fact_remnick?currentPage=all.
- Smeeke, A., & Verkuyten, M. (2013). Collective self-continuity, group identification and in-group defense. *Journal of Experimental Social Psychology*, 49, 984–994. doi:10.1016/j.jesp.2013.06.004
- Tadmor, C. T., Hong, Y.-Y., Chao, M. M., Wiruchnipawan, F., & Wang, W. (2012). Multicultural experiences reduce intergroup bias through epistemic unfreezing. *Journal of Personality and Social Psychology*, 103, 750–772. doi:10.1037/a0029719
- Taleb, N. N. (2010). *The Black Swan: Second Edition: The Impact of the Highly Improbable*. Random House.
- Vallacher, R. R., Coleman, P. T., Nowak, A., Bui-Wrzosinska, L., Liebovitch, L., Kugler, K., et al. (2013). *Attracted to conflict: Dynamic foundations of destructive social relations*. New York, NY: Springer.
- Vasarhelyi, Z., & Scheuring, I. (2013). Invasion of cooperators in lattice populations: Linear and non-linear public good games. *BioSystems*, 113, 81–90. doi:10.1016/J.biosystems.2013.05.003

Sanda Kaufman is Professor of Planning, Public Policy, and Administration at Cleveland State University's Levin College of Urban Affairs, where she directs the Master of Environmental Studies Program. Her research spans negotiations and intervention in environmental and other (multistakeholder) public conflicts, social–environmental systems resilience, decision analysis, risk communication, program evaluation, and planning and negotiation pedagogy. Her articles have appeared in the *Journal for Conflict Resolution*, the *Negotiation Journal*, *Conflict Resolution Quarterly*, the *Journal of Architectural Planning and Research*, the *Journal of Planning Education and Research*, *Revue Négociations*, the *International Journal of Economic Development*, *Environmental Practice*, *Fractals*, and others.

Miron Kaufman is Professor of Physics and Urban Studies at Cleveland State University. He chaired the Physics Department from 2000 to 2012. His research in statistical physics covers topics in superconductivity, magnetism, liquids, polymers, and hierarchical and fractal lattices. Since 2000, he has collaborated on several National Science Foundation- and National Institute of Health-funded interdisciplinary research projects on complex systems in cognitive science, urban studies, and engineering.