Conflict Theory, Complexity
and Systems Approach

di **Giorgio Gallo**

Research Papers

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ABSTRACT - Since the end of the Cold War we are witnessing the emergence of new types of conflicts. Conflicts appear to be more and more complex, and still too often they are approached in a simplistic way, using a linear type of reasoning. Complexity is disregarded, and the need for systemic thinking is underestimated, not rarely leading to disastrous results. Feedback are most often ignored, but, most important, the complex dynamics which make a conflict to change over time, following paths difficult to predict, are rarely taken into account. A shift from a pre-complexity mindset to a complexity one is necessary. In the paper, also by means of concrete examples, we will try to show how a Systems Thinking approach is essential to analyze today's conflict, to prevent them and to act so to make them to develop along non violent constructive paths rather than along violent destructive ones.

1. Introduction

A conflict is a special kind of complex problem, where complexity stems from many different and sometimes unrelated elements. On the one side there are the parties involved in the conflict. If it is true that there are cases in which the parties are just two, or even one in the case of a dilemma, most often the parties are many, with complex relations between them, and, more important, with multiple and diverse objectives, some even hidden. This is almost always the case in conflicts arising between different groups within a country or in international conflicts. These are the types of conflicts we will be dealing with in this paper. On the other side each conflict does not arise in a vacuum but in a context, local, regional, or international, a context which may be changing over time and which has often unforeseen effects on the conflict structure and on the conflict parties. Complexity stems also from the fact that a conflict does not end simply when violence is stopped or when a satisfactory compromise between the parties is signed. Ending a conflict in a real and stable way implies the construction of a lasting peace, which is in

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itself something daunting and particularly complex (Bartolucci & Gallo, 2010).

In spite of this complexity, too often when a conflict is analyzed or when decisions about a actual or potential conflict are taken the kind of reasoning which is followed is simplistic, linear, to say the least. Complexity is disregarded, let alone the need for systemic thinking. To make clear the point we present next two cases which can be considered as typical. One has to do with the 2003 Iraq war, the second with an older conflict, operation "Peace for Galilee", that is the Israeli invasion of Lebanon in 1982.

Iraqi War - In 2003, the US and British forces invaded Iraq and over a three weeks period succeeded in overthrowing the regime of Saddam Hussein and occupy the whole Country. Triumphantly President Bush claimed that the invasion of Iraq had marked the arrival of a new era. The feeling of novelty brought by the american victory is well expressed by the emphatic words of Boot (2003), an american political analyst. Shortly after the end of the military operations, he wrote in Foreign Affairs: "That the United States and its allies won anyway and won so quickly must rank as one of the single achievements in military history. This three-week campaign will be studied and debated by historians and military analysts for years to come". Actually not everybody shared such a feeling of enthusiasm. Kenneth N. Waltz, in a letter to the editor of *Foreign Affairs*, published on the September/October issue of the same Year, is sharp in his judgement: "Iraq entered its most recent war with its military strength at less than half of its 1991 level. Why then does Boot find it impressive that the United States and the United Kingdom won with about half the troops, in about half the time, and with about half the casualties of the first Gulf War? In 2001, Iraq's GDP was about $15 billion, and its defense expenditure $1.5 billion. U.S. GDP was about $10.2 trillion, and its defense expenditure $322 billion. For a giant to defeat a pygmy hardly tests a country's military prowess or validates a "new way of war"". It should noted that Waltz challenged the idea that the victory was something extraordinary and of great significance. He did not contest the fact that a victory had been obtained. Now after more than 8 years we are in better position to see how elusive that victory had been.

In **figure 1** the monthly coalition military casualties are plotted from the beginning of the war to February 2011. It can be observed that, in spite of the early victory proclamation, casualties have started to grow, hitting quite high values for several years. Only in December 2007 the casualties dropped below the level of 40 per month. And in the last Year we still have between 4 and 5 casualties per month. In **figure 2** the average monthly civilian deaths in Iraq for the same period are reported. The behavior is similar of that of

military casualties, but the figures are scaled up by one order of magnitude. In the last Year there have been near to 90 deaths per month.
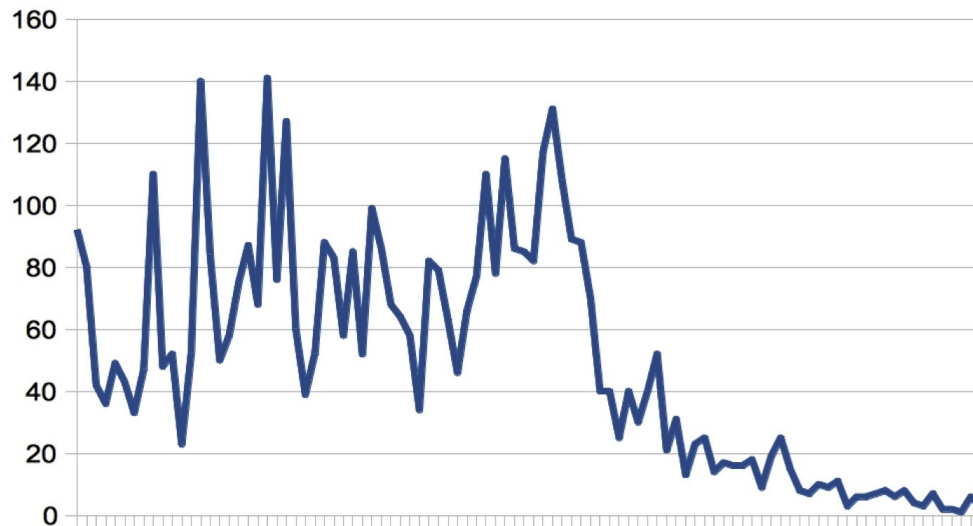

Figure 1 – Monthly coalition military casualties
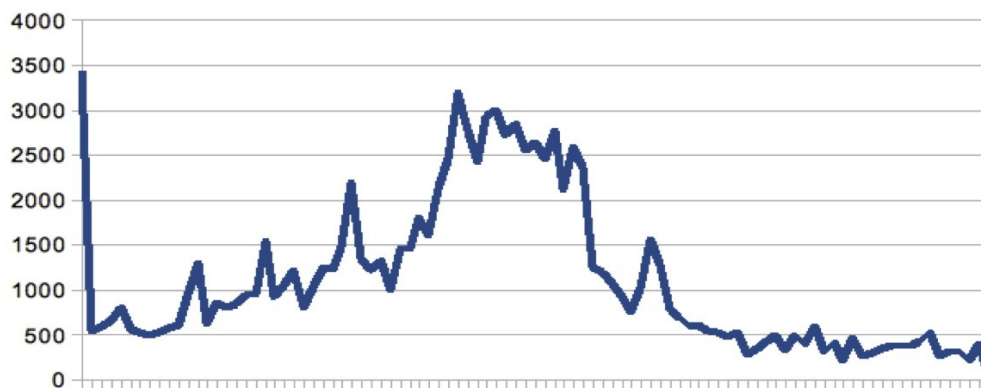from the beginning of the Iraqi war to February 2011

Figure 2 – Average monthly civilian deaths
from the beginning of the Iraqi war to February 2011

Peace for Galilee - In 1982, the Israeli government wanted to get rid of the Palestinian Liberation Organization (PLO), whose headquarters were then in Lebanon. The main aim

of Sharon, at the time Defense Minister of Israel, in launching the so called operation 'Peace for Galilee', a full scale invasion of Lebanon, was to destroy the PLO's military infrastructure in Lebanon and to undermine it as a political organization, so to weaken its influence on the West Bank Palestinians.[1] The war was harsh, with heavy losses on both sides. At the end, it "had cost Israel 660 dead, had exacerbated its economic difficulties, subverted the national consensus on security, and tarnished Israel's image abroad" (Shlaim, 2001). Actually the PLO was dislodged from Beirut, but it did not took too much for it to reorganize in Tunis, and it was only a matter of a few years for the Palestinian front to become hot again with the start of the first intifada. Furthermore, a completely unforeseen effect materialized: the birth of a new nationalistic islamist movement, *Hizbullah* (Party of God), who, with Iranian and Syrian support, engaged Israel first in a long attrition war and later, in 2006, in a full scale one. This last one has been the only war waged by Israel, after the independence one, in which the enemy, through the launch of rockets, had the capability to hit deep inside the country. In addition to the 121 soldiers killed, 43 Israeli civilians died as a consequence of *Hizbullah* rocket attacks. 1200, mainly civilians, had been the casualties on the Lebanese side. Still today *Hizbullah* remains the main security threat on the northern border of Israel. The shortcomings that have characterized Israel's counterterrorism operations, including a disregard for long-term planning and a failure to recognize the long-term political repercussions of counterterrorism tactics, are analyzed by Byman (2011).

2. Conflict as a complex system

The two cases presented in the preceding section are typical examples of linear and mechanistic thinking. Conflict, instead, is a very complex system, with adaptive structures and evolutive mechanisms. It is a system composed of interconnected parts that, as a whole, exhibits properties which cannot easily understood only by analyzing the properties of the individual parts. A systematic understanding of conflicts requires on the one side a system thinking approach, and on the other the confluence of many social and scientific disciplines.

Key elements in System Thinking, which make it very different from a linear type of reasoning, are:

- Boundaries Definition

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1   A second objective was to help Bashir Gemayel, the chief of the Phalange, one of the Maronite militias, to become Lebanon's President, so to arrive to a peace treaty with Lebanon.

- State and Activity Variables
- Causal Loops & Feedbacks
- Multiple Interconnected Subsystems
- Delays

All these elements, which are typical features of a system structure, are present in conflicts, and make them so elusive and difficult not only to solve but also to analyze. All these elements will be presented in detail, with reference to conflict modeling, in the following of this section. Instead, the next two sections will deal with two characteristics of a system which derive from the structural elements described here.

System's Boundaries - First we should remember that systems cannot be found in nature: they are not the reality. Instead, they are social constructs, logical conceptual constructions, which depend on our culture and perspectives. A model, and hence a system is neither true nor false, it is rather either useful or useless. It is us who define the system and its boundaries. "The boundary concept lies at heart of system thinking: because of the fact that everything in the Universe is directly or indirectly connected to everything else, where the boundaries are placed in any analysis becomes crucial" (Midgley, 2000, pp. 128–29). Considering explicitly the boundaries is a way to bring the context into the analysis, which is essential if we are to devise successful resolution strategies of a conflict. Unfortunately this is rarely done, as pointed out by Monty Marshall (1999, p. 5): "Most conflict research and conflict management techniques assume some form of systemic closure in order to simplify the inquiry and isolate the problem events or processes from their general systemic context (i.e., focus on the opposition and discount external influences)".

The Peace for Galilee case is a typical example of poorly chosen boundaries. The boundaries drawn by Ariel Sharon included only the Israeli army/government and the Palestinian leadership, that is the main institutional actors. He did not fully appreciate how strongly rooted in the Palestinian population were the nationalist feelings and the consensus toward the PLO, and how articulated and strong was the Palestinian resistance. Moreover the complexity and the extreme fragmentation of the Lebanese society were completely disregarded. So were the subtleties of its politics. But also the full implications of the war on the Israeli society were underestimated.[2]

The choice of the boundaries shapes a conflict and has deep effect in how we tackle it.

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2   The deep scars left in it by the war are the object of the film "Waltz with Bashir".

Boundaries have many dimensions:

- *Physical* - Land is the most typical case, but there are also different kinds of resources, such as oil, water, minerals, access to the sea, etc.
- *Temporal* - This dimension is for example linked to the question: how far we have to go back in defining the conflict? The answer to such a question may be crucial to the way the conflict is shaped. For instance in the Israeli-Palestinian conflict we may consider the conflict as started with the independence declaration of Israel (May 15, 1948) or with the six days war (1967). The choice has deep consequences, among other, with respect to the refugee issue.
- *Symbolic* - An example is the symbolic value of Kosovo for Serbians. Kosovo region has been at the center of the Serbian empire until the mid-14th century, and still Serbians regard it as the birthplace of their nation. Without reference to the symbolic aspects it is impossible to fully understand the Kosovo conflict between 1998 and 1999.
- *Ethical* - Some aspects in a conflict have ethical implications that cannot be disregarded. One example is the right to return or to compensation of the Palestinian 1948 refugees.

State and Activity Variables - It is well known that after the end of the cold war there has been an increase in the number of ethnopolitical conflicts. The *Minorities at Risk* (MAR) project, initiated by Ted Robert Gurr in 1986 (Gurr, 1994, 2000), examines and documents the status of ethnic and religious minority groups in all the countries of the world over the contemporary period, since 1946. The number of minority groups that the project has studied has been growing during the years: from 227 in the 1990 to 284 in 2003. One of the objectives of this analysis has been to develop a theoretical framework of the causes of ethnopolitical conflicts so to be able to explain these social phenomena through causal mechanism. A system dynamics model based on Gurr's work (Ackam & Asal, 2005) is given in **figure 3**.

Analyzing this model we see that there is a difference between a variable such as "rebellion" and a variable such as "economic differences". The former has to do with an activity which can be performed or not, while the latter has to do with a structural aspect of the situation, something that does not correspond to a specific action performed by one of the actors, and hence something that cannot be set to zero just by a decision. A decision instead, at least in principle, can be taken to stop a rebellion. The former is what we call

an *activity variable*, while the latter is a *state variable*.[3] Another example of state variable in the ethno-terrorism model is the "salience of ethnic identity": although it is a state variable, it is different from "economic differences", in the sense that it does not represent something concrete and easily measurable like this latter, but rather something which refers to the attitudes and the deep feeling of the people involved. State variables are those which define the structural aspects of the conflict. Analyzing such structure we can understand which state variables need change in order to get to a sustainable solution of the conflict, and in which direction the change is needed. But the only way to obtain the change is through the activity variables.
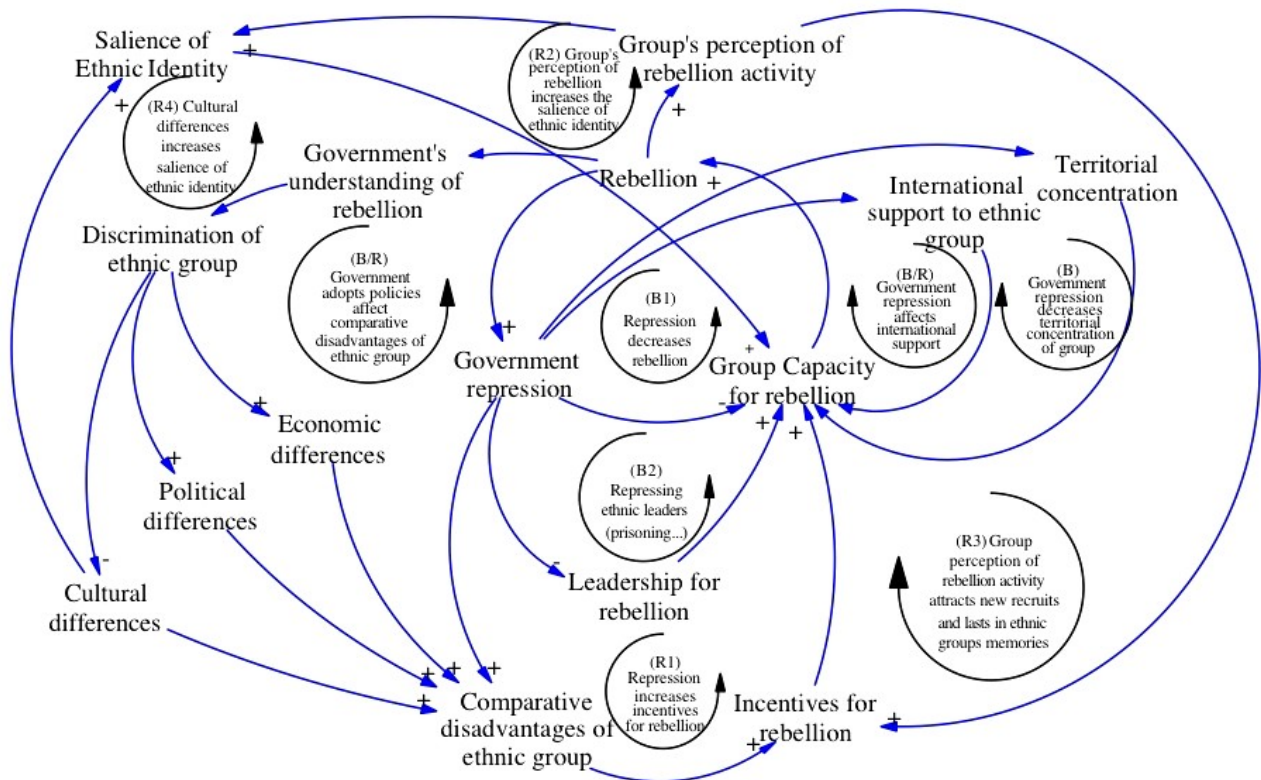

Figure 3 – The dynamics of ethnoterrorism

Interesting the analogies with one of the classical and most known conflict models, that is Galtung's *ABC* model, depicted in **figure 4**, where *I* stands for *Attitudes*, *B* for *Behavior* and *C* for *Contradiction* (Galtung, 1996). The idea of this model is that a conflict is defined by three main elements, the contradiction, which is the concrete object of the conflict, the

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3   Sometime activity variables are called *flows*, and state variables are called *stocks* or *levels*.

behavior of the different actors, and their deep feelings, the attitudes. A conflict cannot be solved, or better transformed so to become constructive instead of destructive, unless we tackle all the three components at the same time. It is interesting to see that, in our systemic paradigm, attitudes are essentially state variables (*e.g.* "salience of ethnic identity" in our example), while behaviors are essentially activities (*e.g.* "rebellion"). Less direct is the interpretation of the third component, contradiction; usually it refers to something that can be represented as a set of state variables ("economic differences" in our example is one of the components of the contradiction).
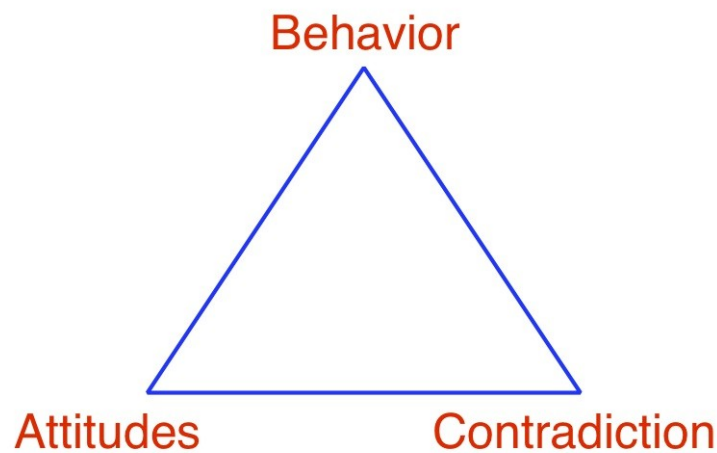

Figure 4 – Galtung's ABC Paradigm

Causal Loops and Feedbacks - Causal loops and feedback are typical of complex systems and are at the basis of the difficulty to devise the right actions to bring to a solution a conflict. For instance, in the model of **figure 3** we can find different such loops. As an example "rebellion" of ethnic groups brings the government to respond with repressive actions, but those same repressive actions have the effect to exacerbate the "comparative disadvantage of ethnic groups", which in turn props up the "incentives for rebellion" and through the "group capacity for rebellion" the rebellion is strengthened.

This is a case of positive feedback: an activity intended to curb the rebellion ends up propping it up. Of course there are also negative feedback cycles. As an example the effect of the repression is also to hit the leadership of the minorities, so reducing their capacity of planning and implementing effective actions against the government. If this negative cycle is prevalent then the repression will be successful (at least in the short term), otherwise it will have the effect to fuel the violence.

An interesting analysis of the repression-rebellion cycle is contained in a paper by Kress and Szechtman (2009). Their model, based on a set of differential equations, is focused on the role of intelligence in counterinsurgency operations. In insurgency situations, governmental forces are confronted by relatively small guerrilla groups dispersed in the general population. For effective counterinsurgency operations good intelligence is required. In fact poor intelligence not only makes easy for the insurgents to escape unharmed and continue violent actions, but collateral damage caused to the population from poor targeting may generate resentment against the government and create popular support for the insurgency. Here the cycle derives from the fact that intelligence effectiveness can be considered an increasing function of the strength of the governmental forces deployed, but also of the size of the insurgency forces: more are the insurgents easier is to get information about them and to locate them. A high effectiveness of the intelligence implies higher insurgent losses, and henceforth a reduction in the insurgency forces. That in turn makes more difficult to get reliable information on them. Eventually the effect is an increase in the civil losses due to counterinsurgency operations, an increase in popular support for the insurgences and more new recruits for them. The conclusions of the authors is that it is almost impossible to eradicate insurgency by force only; soft actions such as civil support and psychological operations that affect the attitude of the population, may be needed too. Another self-reienforcing cycle in repression policies has been studied by Kaplan, Mintz and Mishal (2006), with reference to the Israeli-Palestinian conflict. Self-reinforcing loops are also described by Gallo and Marzano (2009) in the context of the analysis of structurally asymmetric conflicts, with applications to the Israeli-Palestinian case.

Multiple Interconnected Components - Systems are made of subsystems and, at the same time, they are subsystems of larger, more complex, systems. The problem is that too often, when facing a conflict or a situation of instability which can develop into an armed conflict, the complexity is disregarded, at least until the situation is so deteriorated that a sustainable peace has became almost unattainable.

The recent Afghanistan war is a typical case. "By 1 May 2003, the combination of the success in Afghanistan and the apparent military victory in Iraq meant that President Bush could deliver his "Mission Accomplished" speech on the flight deck of the USS Abraham Lincoln. ... [T]here was a confidence in Washington that the Afghan War was over, that the Taliban would not re-emerge and that European allies would bear the brunt of

reconstruction and development" (Rogers, 2011a). An important result that the victory would have made reachable "was that by maintaining a substantial military presence in Iraq and Afghanistan and controlling the Persian Gulf and Arabian Sea through the US Navy's Fifth Fleet, Iran would be thoroughly constrained. Given that Iran was seen as the most serious of all threats to US interests in the region, this would be a hugely positive outcome" (Rogers, 2011a). Today, after eight years from that day, the war is still going on, and plans are reported to keep US soldiers in Afghanistan until 2024 (Rogers, 2011b). The reality proved to be far more complex that it was expected.

At the end of 2009 a document commissioned by the Pentagon went public. It contained a System Dynamics model of the nation building effort in Afghanistan. The diagram synthesizing the model is the one of **figure 5**. Comments have been the more disparate. Some said that this why the american are not winning, because they are too busy at drawing fancy pictures like this one. Other praised the fact that System Dynamics is being used in an effort to grasp the complexity of the situation.
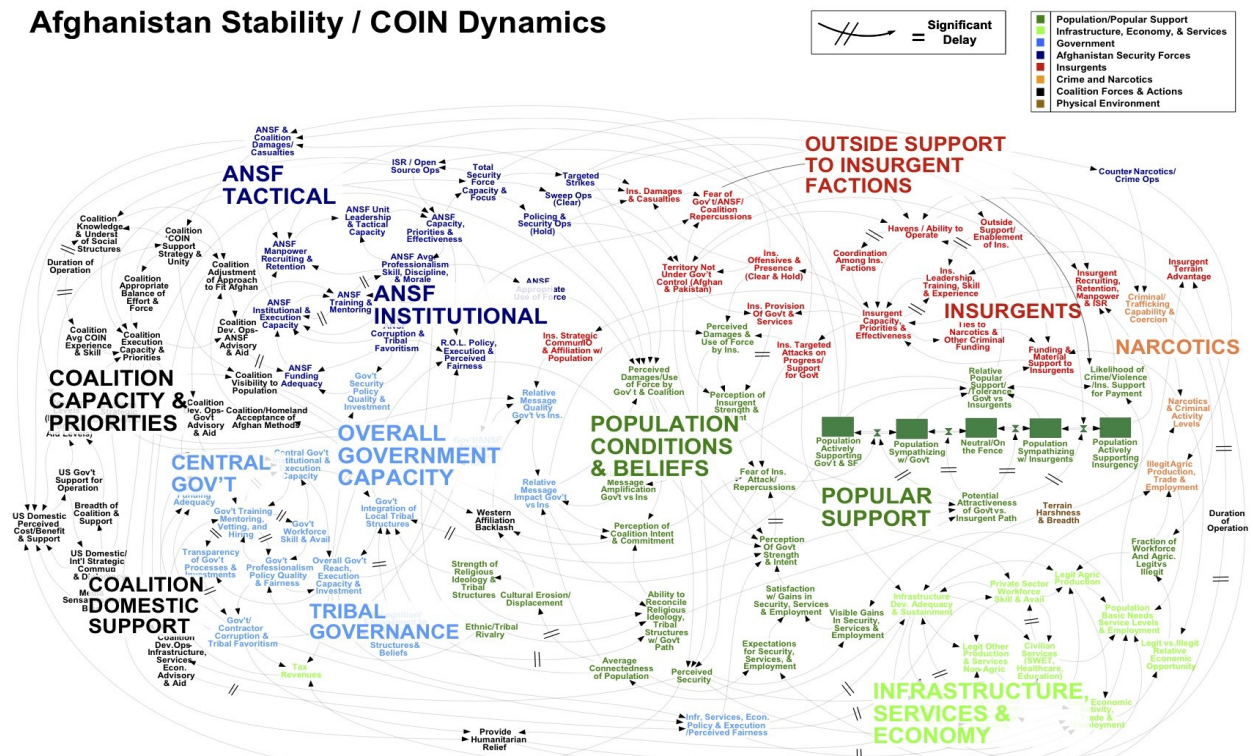

Figure 5 – A dynamic systems model of the Afghanistan conflict

It is almost impossible to assess the soundness of the model, although the variables used and the connections drawn appear to be reasonable. What we can say is that the complexity of the graph shows clearly how everything is connected to everything else, and makes evident how difficult and elusive a military victory is.[4]

Delays - One of the features which make the behavior of complex systems so difficult to predict, in addition to the intricate pattern of relations and nonlinearities, is the presence of delays. Delays may lead to counterintuitive behaviors or to striking differences between short and long term behaviors.

As an example, Choucri *et al.* (2007) present a system dynamics model, to assess the stability of a state, that is its capability to avoid that dissident actions develop into violent rebellions and in its own destabilization. Among the key variables in the model are the resilience of the state and the effectiveness and strength of anti-regime messages. The resilience is a function of different parameters, such as economic performance, regime legitimacy, political capacity and social capacity. the effectiveness and strength of anti-regime messaging depends on parameters both subjective (perceived strength of their content) and objective (availability of social networks and free media). The government may think to weaken the dissident groups by enforcing a tight control on the media and on the internet based social networks. This policy may work in the short time. But at the same time it curbs civil liberties, and, as a consequence, it reduces the very legitimacy of the government in the perception of the population. This is a process which, involving a change in attitudes and in perceptions, requires time. So its effects will be manifest with some delay. In the long run the strength of the dissident groups may be bolstered rather than reduced. In system dynamics terminology, the process through which the reduction in civl liberties leads to a growing awareness of illegitimacy within the population can be modeled by an exponential delay function.

3. Emergent Properties

One of the effects of complexity is that a system may present properties which are not easily derived from the analysis of its parts taken in themselves, but derive from the interactions among all its parts. Emergent properties have to do with the system considered as a whole. In Midgley's (2000, p. 40): "An emergent property is one that results from the interaction of a system as a whole rather than from one or two of its parts in isolation".

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4 "When we understand that slide, we'll have won the war," General McChrystal dryly remarked, accordingly to the New York Times, when he was shown the Power Point containing the diagram.

Emergent properties arise at different levels, from macro to micro. Sometimes we are not able to know the structure of the system directly, but through the analysis of its emergent properties we can derive some useful information on it. An interesting example has been provided by Alvarez-Ramirez, Rodriguez, Tyrtania and Urrea-Garcia (2010). They analyze the casualties data in the Iraq War trying to derive from them an idea of the structure of the different insurgent groups. The idea is that the casualties pattern over time derives from the way the insurgence is structured.

The main assumption is that a truly random behaviour suggests that there is not a strongly organized insurgency. Rather insurgency groups are scattered, loosely connected and poorly coordinated in their actions. On the contrary a behavior presenting a autoregressive structure suggests the presence of a well structured resistance. Paradoxically this last case, although in the immediate much more harmful, is preferable. In fact a well structured resistance is more easily countered and dismantled, while a loosely organized resistance is less harmful in the immediate, but it cal endure over time resulting at the end more dangerous.

For their analysis of the time series of the casualties the authors make use of the *Hurst exponent*, *H*, which is a measure of the relative tendency of a time series either to regress strongly to the mean or to cluster in a direction. In particular it is:

- $0 < H < 0.5$: time series with negative autocorrelation (an increase of values will probably be followed by a decrease),
- $0.5 < H < 1$: time series with positive autocorrelation (an increase of values will probably be followed by another increase),
- $H = 0.5$ indicates a true random walk (e.g. the time series has no memory of previous values).

Analyzing the data through the Hurst exponent "five regimes in the evolution of the war were identified. The first regime, occurring in the first months after the invasion, corresponds to a conventional confrontation. In the second regime occurred in the last months of 2004, the dynamics of civilian fatalities evolved toward uncorrelated behavior, indicating that the occurrence of daily fatalities was basically governed by random processes. This is in contrast to the dynamics of military fatalities that showed increased correlations. The second regime can be seen as the advent of a chaotic episode where the different insurgency groups acted within an erratic, poorly coordinated, manner. In the third regime that occurred in the first two 2005 quarters, correlations of civilian fatalities

increased and converged into the correlations patterns of military fatalities, and this was interpreted as the surging of a well-organized, although non-centralized, insurgency structure. The fourth regime lasted from mid-2005 to the last 2007 months and showed an important correlation decrement for the military fatalities. This was related to the clash of two antagonist war structures, namely, the traditional centralized Coalition Army and a non-centralized insurgent army. Finally, the fifth regime, from mid-2007 to date, is characterized by stable fatality dynamics converging to uncorrelated behavior" (Alvarez-Ramirez *et al.*, 2010).

Their conclusion is that today the insurgency is quite de-centralized, and its cells can be represented as the nodes of a *scale-free graph*. A scale-free graph is one in which the probability for a node to be of degree *k* is

$$P(k) = Ck^{-a},$$

where *C* and *a* are positive coefficients.

A typical scale-free graph, or network, is one in which the high-degree vertices are placed in the middle of the network, connecting them together to form a core, with progressively lower-degree nodes making up the regions between the core and the periphery. Such graphs are fault tolerant, as random removal of even a large fraction of vertices impacts the overall connectedness very little. Of course targeted attacks may destroy easily the connectedness, but do require a highly effective intelligence, which is something quite difficult to obtain in presence of scale-free graph structured insurgency.

Different types of confrontations/wars in which one of the parts' organization has the structure of a loosely connected network have been studied by Arquilla and Ronfeldt (2001). A typical case is the one of Al Qaida, whose network structure makes it particularly elusive and difficult to defeat.

4. *Overshooting and Collapse*

The behavior of a system may present quite different patterns. In systems characterized by a reasonably high degree of stability, key variables change continuously over time, with their value adjusting slowly in response to the overall dynamics of the system, with patterns which may be of either increasing, or decreasing, or in some cases oscillatory type.
Oscillatory behaviors are usually the results of threshold phenomena or overshooting. This

happens when a variable reaches a value which is higher than the equilibrium value[5]. In stable systems, as a result of overshooting, corrective actions are taken, mainly due to the many feedback loops the system contains, and the system, possibly after some oscillations goes back to its equilibrium state. In some cases we may have a kind of stable oscillatory behavior, with oscillations around the equilibrium value.

However, overshooting does not always lead to oscillations, possibly dampened. In some cases it leads to persistent instability or to a possible collapse of the whole system. Actually, in conflict analysis we are interested in those conditions which make a system to break down loosing its stability, that is in threshold phenomena. "Threshold phenomena like violence are difficult to study because they represent 'breaks' in system rather than uniformities. Violence, whether between persons or organizations, occurs when the 'strain' of a system is too great for its 'strength'. The metaphor here is that violence is like what happens when we break a piece of chalk. Strength and strain, however, especially in social systems, are so interwoven historically that it is very difficult to separate them" (Boulding, 1977).

Considering the conflicts which may arise within a given society, we may say that there is in most cases an unstable equilibrium between strains, arising from many internal and external factors, and the adaptation capability of the society, that is its resilience. When the strains overshoot the limits beyond which the society is unable to adapt, or the speed of strain growth outpace the adaptation capability, then the society may enter into a phase of instability and eventually may collapse. Situations of this type have been studied by Wils, Kamiya and Choucri (1998) by means of a system dynamics model based on the 'Lateral Pressure' theory of Choucri and North (1975).[6] The portion of the model dealing with domestic conflicts is described in **figure 6**.

In this model, the variable *internal pressure* represents the stress the society suffers. Such stress may eventually lead to an internal violent conflict. It is an increasing function of the population and a decreasing function of both the available *resources* and the *technology* level of the country. The main idea is that *ceteris paribus* an increase of the population puts an increasing pressure on the society, which may eventually lead to internal instability and even to violence.

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5 An equilibrium may be either dynamic or stationary. In the former case the variable either increases or decreases, while in the latter it remains approximately stable.

6 Unlike the study by Choucri *et al.* mentioned in page 11, here the interest is rather on the drivers of the strain leading to instability, rather than on the complex dynamics involving dissidents and governments.
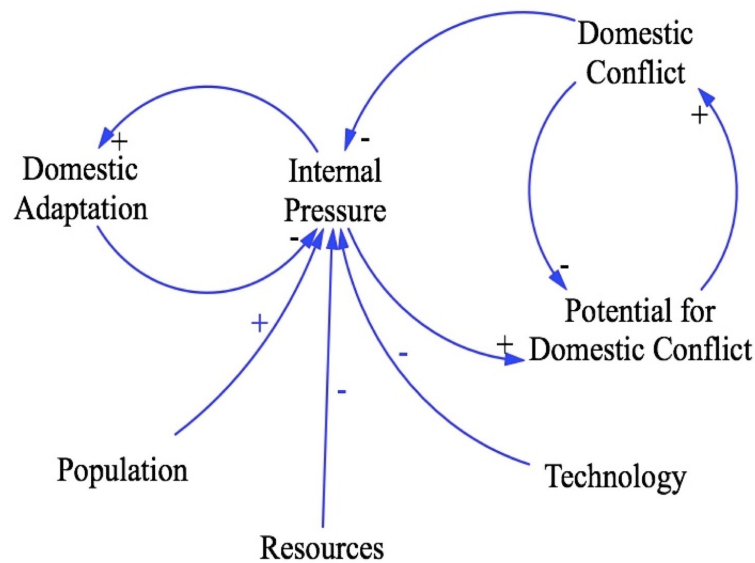
Figure 6 – Domestic conflict model

"[A]s population density relative to resource base rises, societies need to change their technological and social base, in general towards higher levels of complexity and sophistication - by devising intensified agricultural methods, industries, class differentiation, and such. High levels of population density and high levels of technology can result in internally stable societies, if access to resources is assumed; conversely, low population density requires only low levels of technology for stability'" (Wils *et al.*, 1998). Thus, to avoid instability, an increase in the population density requires either a correspondent increase in the available resources, or an increase in the society technological level. In general it is quite difficult for the resources to follow population growth: as noted by Homer-Dixon (1999, p. 42), "societies must be able to more social and technical ingenuity to adapt to rising resource scarcity". This capability to adapt to social changes is represented by the variable *domestic adaptation*. The outbreak of a violent domestic conflict may be the result either of the society incapability to implement the needed changes, or to delays which make difficult to the technology change to keep pace with the resource scarcity.

An important question concerns the conditions which make a society more resilient, that is more capable to adapt quickly enough to internal pressures. This point has been investigated by Hegre, Ellingsen, Gates and Gleditsch (2001). Making use of quantitative analysis they show that countries with a low level of democracy (they call such countries

semidemocracies) are less apt to absorb the social strains, and more prone to the outbreak of violent civil conflicts. "Semidemocracies are partly open yet somewhat repressive, a combination that invites protest, rebellion, and other forms of civil violence. Repression leads to grievances that induce groups to take action, and openness allows for them to organize and engage in activities against the regime. Such institutional contradictions imply a level of political incoherence, which is linked to civil conflict" (Hegre *et al.*, 2001). They claim instead that Institutionally consistent democracies and stark autocracies are equally unlikely to experience civil war.

The recent uprising in North African countries, known under the name of Arab Spring, provides an interesting example of instability leading to regime collapse. Without the pretense to provide a complete explanation of the North African events, we will try to present some elements which, at least in part, may explain such events as a threshold phenomenon. In 2001 the british magazine *The Economist* published an interesting paper by Wade (2001), an economist at the London School of Economics. Wade starts pointing to the fact that "new evidence suggests that global inequality is worsening rapidly. There are good reasons to worry about that trend, quite apart from what it implies about the extent of world poverty." According to Wade's analysis, the widening income gap in the world system may have worrying effects in terms of stability: "The result is a lot of unemployed and angry young people, to whom new information technologies have given the means to threaten the stability of the societies they live in and even to threaten social stability in countries of the wealthy zone."

In the analysis there are some key elements which play an important role: inequalities, unemployment, age, new information technologies. In the following table some data relative to Tunisia and Egypt are given (Blow, 2011):

	Median Age	Unemply-ment Rate	Gini Index	Spending on Food (%)	Level of Democracy[7]	Internet Users (%)
Tunisia	29.7	14.0	40.0	35.8	2.8	34.0
Egypt	24.0	9.7	34.4	38.3	3.1	21.2

7 Source: *the Economist* Intelligence Unit's "Democracy Index 2010" (Scale of 1 to 10).

These data depict societies with a population very young[8], with a high unemployment rate[9], a high level of inequalities[10], a very high cost of food[11]. A lot of young people, frustrated by unemployment and lack of perspectives, angry because of the inequalities, with a potential for mobilization strengthened by the access to modern information technologies. It is not a case that the North African uprising have been called the "facebook revolutions". The situation these countries experienced is not far from the one anticipated by Wade. In addition both the Tunisian and the Egyptian regimes did lack of strong legitimacy. In a sense we may say that they were typical cases of semidemocracies, autocratic, but at the same time allowing some liberties and with a relatively lively civil society. Completely different the case of Libya, a strongly autocratic country without a significant civil society, and the low penetration of internet confirms this fact. It is not a case that while in Tunisia and Egypt a nonviolent popular uprising was able to grow in strength and eventually to topple the dictators, in Libya only through an external military intervention the regime has been ousted. The analysis of these cases suggest a way to revise and enhance the internal pressure model. The new model is the one of **figure 7**.
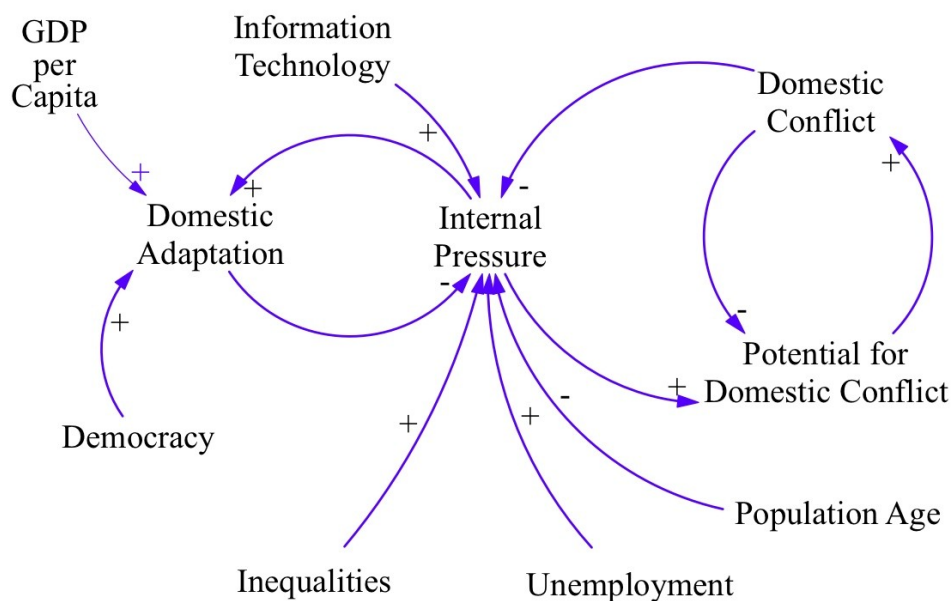

Figure 7 – Revised domestic conflict model

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8   Consider that the median age is near to 45 in Germany, around 40 in U.K. and near to 37 in the US.

9   The unemployment among young people is usually much higher than the average value.

10 The Gini index is the most used inequality index; it goes from 0 to 100, and higher values correspond to higher inequalities.

11 Consider that the average spending on food for an US household is 6.8%.

Here, instead of using directly the variable resources, we introduce two variables, *unemployment* and *inequalities*, which in a sense include some of the information provided by the resources. In fact in a situation of resource scarcity, not compensated by a high level of technology, inequality and unemployment are usually quite high. In addition inequality includes also the sense of injustice which derives from a uneven wealth distribution, which is one of the most relevant drivers for rebellion. We must add that technology as a variable is quite difficult to operationalize. Actually Wils *et al.* Have used the GDP as a measure of technology, which is rather arbitrary, being something depending not only on the technology but also on the available resources.[12] The variable *median age* is important because a large number of young people, unemployed and without perspectives, represent, as we have seen in 2011 in many countries, both rich and poor, a strong potential for rebellion.[13] In this model technology plays a different role than in the preceding one. Here we have singled out the information technologies, which have two effects. On the one hand they widen the horizons of the people's knowledge, so making more striking and frustrating the distance between the expectations and the grim day by day life. On the other hand they provide tool to diffuse information, to organize demonstration and to mobilize large portion of the population.

Democracy level and *GDP per Capita* play an important role in the country resilience, that is its capacity to provide adaptation mechanisms. Democracy provides mechanisms for dissidents to express themselves and to try to change peacefully the society, while high levels of GDP allow for wealth redistribution through social welfare measures.

5. Conclusions

Conflicts are very complex and defy the linear type of thinking which is too often used in their analysis. This is particularly true today when they are very often intrastate rather than interstate conflicts (see Ramsbotham, Woodhouse and Miall, 2005).

In the paper, by means of many examples, we have shown how important the role of systems thinking may be in conflict analysis. After a brief review of the main characteristics of a systemic approach, we have spent some time on the concept of emergent property of a system. An interesting example derived from the Iraq war has been provided. Finally, the

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12 Just as an example Austria and Kuwait enjoy a similar level of GDP per capita, but in the former case it reflects the high technology level, while in the latter it reflects the country's huge oil reserves.

13 After the Middle East Arab countries, it as been the case of Greece, Spain, U.K., Israel and Chile.

conditions which make a system to be unstable and eventually to collapse are studied with reference to domestic conflicts. On this last topic, based on the experience of the 2011 North Africa uprisings, a possible extension and enhancement of the classical Internal Pressure model has been briefly sketched. This extension, which presently is at a very preliminary level, will constitute the object of a follow up research.

Bibliography

Ackam, B. K., & Asal, V. (2005). The Dynamics of Ethnic Terrorism. Presented at the System Dynamics Conference.

Alvarez-Ramirez, J., Rodriguez, E., Tyrtania, L., & Urrea-Garcia, G. R. (2010). Regime-Transitions in the 2003-2010 Iraq War: An Approach Based on Correlations of Daily Fatalities. *Peace Economics, Peace Science and Public Policy*, *16*. doi:10.2202/1554-8597.1206

Arquilla, J., & Ronfeldt, D. (2001). *Networks and Netwars: The Future of Terror, Crime, and Militancy* (1st ed.). Rand Corporation.

Bartolucci, V., & Gallo, G. (2010). Operations research/management science contributions to peace studies. *International Transactions in Operational Research*, *17*(4), 475-483. doi:10.1111/j.1475-3995.2009.00725.x

Blow, C. M. (2011, February 4). The Kindling of Change. *The New York Times*. Retrieved from http://www.nytimes.com/2011/02/05/opinion/05blow.html?_r=4&ref=charlesmblow

Boot, M. (2003). The New American Way of War. *Foreign Affairs*.

Boulding, K. (1977). Twelve Friendly Quarrels with Johan Galtung. *Journal of Peace Research*, *14*(1), 75-86.

Byman, D. (2011). *A High Price: The Triumphs and Failures of Israeli Counterterrorism*. Oxford University Press, USA.

Choucri, N., & North, R. C. (1975). *Nations in conflict: National growth and international violence*. Freeman.

Choucri, Nazli, Goldsmith, D., Madnick, S., Mistree, D., Morrison, J. B., & Siegel, M. (2007). *Using System Dynamics to Model and Better Understand State Stability* (No. 4661-07). MIT Sloan School of Management.

Gallo, G., & Marzano, A. (2009). The Dynamics of Asymmetric Conflicts: The Israeli-

Palestinian Case. *Journal of Conflict Studies*, *29*, 33 - 49.

Galtung, J. (1996). *Peace by Peaceful Means*. Sage.

Gurr, T. R. (1994). Peoples Against States: Ethnopolitical Conflict and the Changing World System. *International Studies Quarterly*, *38*, 347-377.

Gurr, T. R. (Ed.). (2000). *Peoples versus States: Minorities at Risk in the New Century*. Washington DC: Washington DC:.United State Institute for Peace.

Hegre, H., Ellingsen, T., Gates, S., & Gleditsch, N. P. (2001). Toward a Democratic Civil Peace? Democracy, Political Change, and Civil War, 1816-1992. *The American Political Science Review*, *95*(1), 33-48.

Homer-Dixon, T. F. (Ed.). (1999). *Environment, Scarcity and conflict*. Princeton University Press.

Kaplan, E. H., Mintz, A., & Mishal, S. (2006). Tactical Prevention of Suicide Bombings in Israel. *Interfaces*, *36*, 553-561.

Kress, M., & Szechtman. (2009). Why Defeating Insurgencies Is Hard: The Effect of Intelligence in Counterinsurgency Operations - A Best-Case Scenario. *Operations Research*, *57*(3), 578-585.

Marshall, M. G. (1999). *Third World War. System, Process,and Conflict Dynamics*. Oxford: Rowman & Littlefield Publishers, Inc.

Midgley, G. (2000). *Systemic Intervention: Philosophy, Methodology, and Practice*. Kluwer Academic.

Ramsbotham, O., Woodhouse, T., & Miall, H. (2005). *Contemporary Conflict Resolution*. Cambridge: Polity.

Rogers, P. (2011a). *A War Gone Badly Wrong - The War on Terror Ten Years On*. Oxford Research Group.

Rogers, P. (2011b, September 9). The age of high-tech war: after Libya. *openDemocracy*.

Shlaim, A. (2001). *The Iron wall: Israel and the Arab world*. W.W. Norton.

Wade, R. (2001, April 26). Winner and losers. *The Economist*.

Wils, A., Kamiya, M., & Choucri, N. (1998). Threats to sustainability: simulating conflict within and between nations. *System Dynamics Review*, *14*(2-3), 129-162.