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THE IDEOLOGICAL CONFLICT PROJECT
THEORETICAL AND METHODOLOGICAL FOUNDATIONS

STEVEN MOCK AND THOMAS HOMER-DIXON

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ABOUT THE PROJECT

Launched in July 2014, this project convened a series of workshops to guide the development of a conflict analysis, negotiation and resolution tool kit for practitioners.

Building on the work of an earlier CIGI collaborative research project on ideational conflict, this project addresses the gap in the current understanding of the role of ideas and ideology in conflict. It uses concepts drawn from complexity theory to integrate and move beyond the insights of cognitive science and ideology research to inform conflict management and conflict resolution policy by clarifying ideational factors in conflict situations.

EXECUTIVE SUMMARY

We present in this paper the theoretical and methodological foundations of the Ideological Conflict Project (ICP).

Ideology is important to conflict. Shared beliefs create a sense of group identity, specify targets of hostility and enable coordinated action. Understanding ideology is key to effective conflict resolution and management. But up to now, ideology has been poorly understood. It is presumed to be something abstract or irrational, therefore best disregarded in the search for concrete explanations and solutions. Those who do pay attention to ideology tend to offer simple explanations for its role, often due to incorrect assumptions about the relationship between ideas and material objects, between mind and body and between individuals and the groups to which they belong. Political theorists examine the effect of ideology on society, while political psychologists examine either the biological, cognitive or social forces that shape individual beliefs. While all of these approaches contain insight, each explanation alone is too simple to yield effective predictions useful in dealing with real-world conflict situations.

Using complexity theory, we can account for the multiplicity of processes that combine to generate ideologies. At the same time, any effort to understand human behaviour must take into consideration the peculiar properties of the human mind, and so engage with cognitive science. Combining these approaches, we have developed two methods that can be applied toward clarifying the role of ideology in conflict situations:

- Cognitive-Affective Mapping (CAM): a method for depicting beliefs as networks of concepts that interact in a manner akin to the neural networks that process them. It offers a quick and easy means for depicting ideas as data, including the emotions attached to concepts that are crucial to decision making. CAM can be used in negotiation to locate points of difference and misunderstanding in the belief systems of disputants, as well as emotionally loaded concepts that could be hidden points of tension or, alternately, creative pathways for compromise. It can also be used to map the beliefs that are important to a group identity, so as to predict the effect of group membership on individual behaviour.

- Ideological State Space: a series of methods for classifying ideologies according to the fundamental dimensions on which they differ. This allows us to visualize how ideologies cluster around certain "attractors," offering explanations for why seemingly unrelated or even contradictory positions bundle into coherent ideologies, how belief systems co-evolve in relation to one another, why they are resistant to change and why change can be so rapid and dramatic when it does happen. The latter phenomenon can be

well-represented using the principles of catastrophe theory to model the rapid psychological changes that occur in groups during eruptions of violent conflict.

The ICP has developed these methods into a powerful set of analytical tools that researchers and practitioners can use to understand, manage and resolve conflict.

INTRODUCTION

Nelson Mandela was known to compare violent conflict to a bonfire: the wood is persistent economic inequality, ethnic and religious differences are the gasoline, and the spark needed to ignite it is the irresponsible actions of self-interested politicians.[1]

This metaphor warns against any temptation to reduce conflict to a single cause, whether material deprivation, religious or nationalist fanaticism, or the manipulations of political elites. Anyone seeking a single general cause to conflict is more likely imposing his or her own theoretical or ideological predilections than capturing the essence of the phenomenon. It is not even enough to attribute conflict to a list of "necessary conditions." Like a bonfire, it is not merely the presence of certain factors, but a particular interaction between them, that leads to the outbreak of violence.

The bonfire metaphor also captures the non-linear character of conflict. A person can pile wood, pour gasoline and increase heat continuously; at one point, fire appears where there was no fire the moment before, and once it has it can spread rapidly. So too does conflict often appear as a sudden, unpredictable event, even when it was the product of gradual underlying forces. And once this tipping point has been reached, it is not easy to reverse. Removing the spark that started a fire will not put it out; the fire remains, generating the heat that feeds it. So too with conflict, even when instigating conditions have been removed or corrected, the ideas and emotions they activate cause violence to take on a life of its own. This could be why the metaphor of a spreading fire is often used by commentators to describe an escalating conflict, or by revolutionaries to describe the spread of a social movement.

What is the role of ideas in conflict? This is the question that the ICP aims to address. But this seemingly simple question contains some of the most intractable problems in both the cognitive and social sciences. Ideas exist in minds; they are systems of mental processes that generate consciousness, emotion and agency in ways we are only beginning to understand. Yet conflict, in the sense that we use the term, is collective behaviour, demanding an understanding of social systems such as identity, culture and institutions. Explaining the intricate internal workings and structure of any one of these systems is difficult enough. We are tasked with explaining a phenomenon that is the product of multi-level interactions between them.

Conflict, broadly defined, refers to any state of protracted dispute between parties over divergent principles or interests. Although the parties in question need not be collectivities, these tend to be the focus in examinations of political conflict — which is to say, conflict relating to the exercise of social power. And although conflict need not necessarily be violent — involving the use or threat of coercive force with the potential to cause harm — violent conflicts tend to be of paramount concern and therefore dominate discussion.

Any meaningful explanation of how and why people engage in violent social conflict, when rational self-interest would nearly always seem to favour individual non-participation, must make some reference to ideology, which we define as a system of ideas, beliefs and values used to understand, justify or challenge a particular political and/or economic order. Shared beliefs and emotions are needed to give groups a sense of identity, specify targets of hostility, legitimize aggression and enable coordinated action.

But overall, the role of ideology in violent inter-group conflict remains poorly understood. In the 1960s and 1970s, scholars in the realist tradition introduced rational choice and equilibrium models to explain interactions between states. Such models, which continue to dominate the study of politics and international relations, tend to frame conflict in purely material terms, with conflict management policy focused on manipulation of material incentives. Realism tends to consider state interactions to be a direct result of the relative distribution of military strength and government's sole focus on survival and the maximization of relative gains in power. Realism largely neglects the importance of ideas, beliefs, values and norms because actors' interests are assumed to be exogenous and fixed over time. Hence, the question of how interests are formed based on values and beliefs about the world is not addressed.

Approaches in the liberal tradition that emerged in the 1970s have broadened the theoretical "tool box" for explaining patterns of conflict and cooperation in two ways. First, liberal approaches acknowledge a wider range of political actors aside from national governments, including domestic and international civil society. Second, liberalism recognizes that actors' interests may go beyond military security to also include economic prosperity. Neo-liberal institutionalism highlights that conflicts can be prevented and cooperation can occur if institutions are designed in a way that leverages common interests and thus makes

1 We cannot rigorously document that he made this observation, but Lucie Edwards, in her capacity as Canada's High Commissioner to South Africa (1999–2003), heard him use this metaphor on a few occasions.

everyone better off (Keohane 1984). Yet, liberalism still falls short of explaining the origins of specific interests and preferences; again, these ideational factors are assumed to be exogenous. Both realist and liberal approaches stay within a material ontology and are therefore able to draw on microeconomic methodology, including cost-benefit analysis, game theory and utilitarianism, in their analysis of sources of conflict. The notion of political actors as rational decision makers driven by material interests remains dominant.

Nevertheless, it is rare for realist and liberal scholars to deny the importance of ideas in driving human actions. (Finnemore and Sikkink 1998) emphasize that early realists recognized the enabling and restricting effects of ideas and norms. Obviously, people fight for things they feel strongly about, and beliefs, values and emotions are usually explicit in the way that parties understand and justify conflict. R. O. Keohane (2001), a neo-liberal institutionalist, points out how international relations theory needs to be extended to account for the crucial influence of values and beliefs in creating effective and normatively acceptable institutions. But even if one is prepared to acknowledge the causal significance of ideational factors, if these are seen as too complex to understand and measure, they are likely to be treated as random noise rather than structured signals, as opposed to actors' observable behaviour and tractable material interests.

Despite the elusiveness of ideational factors and the methodological difficulties associated with their measurement, an ideational turn occurred in the study of international politics in the 1980s. In the school of social constructivism, ideational factors became the central object of analysis. Social constructivism is a broad label that subsumes multiple distinct approaches to analyzing and explaining conflict and security, but the uniting principle across these approaches is that ideas must be recognized as important causal factors in political behaviour, along with the intersubjective constructs generated by ideas such as nationality, ethnicity, religion, class and ideology.

Social constructivism assumes that identities and interests are endogenous and contingent on social practices and relations situated in time and space. Social constructivists aim to identify underlying reasons for political actions that are logically prior to the utilitarian models employed by rational choice theorists. Nevertheless, an excessive and exclusive focus on ideas can lead to overemphasizing their causal significance over the material realities to which they refer and with which they must interact. Therefore, J. G. Ruggie (1998, 33) claims, a combination of both material and ideational factors constrain actors' decisions: "Constructivists hold the view that the building blocks of international reality are ideational as well as material; that ideational factors have normative as well as instrumental dimensions; that they express not only individual but also collective intentionality; and that the meaning and significance of ideational factors are not independent of time and place."

But beyond the sensible premise that ideas matter, specific theories as to how they matter — how exactly intersubjective constructs form, change and impact collective behaviour — are notoriously difficult to verify or falsify. Certain social constructivist scholars have taken important steps in this direction, however. M. Finnemore and K. Sikkink (1998), for example, examine the formation, diffusion and the influence of norms on behaviour in international politics. A norm is defined as a standard of appropriate behaviour for actors with a given identity (ibid., 891). While norms are far from prescribing behaviour, normative change over time is considered able to alter actors' interests. Nevertheless, instead of providing a full account of how exactly norms drive behaviour, Finnemore and Sikkink refer back to rational choice theory and suggest a reconciliation of their theory on norms with utilitarian approaches, rather than a replacement.

J. Boli and G. M. Thomas (1999) examine the role of culture in world politics, arguing that international non-governmental organizations function as carriers of world culture and work to diffuse cultural norms and values. They define culture as a "set of fundamental principles and models, mainly ontological and cognitive in character, defining the nature and purposes of social actors and actions" (ibid., 14). The diffusion of world culture, they argue, enables the emergence of a world polity, an international society with a cultural and legal world order that operates increasingly independently from states and shapes actors' actions, identities and interests. However, their explanation as to how exactly culture shapes actors' identities and interests and the substantial content of world culture remains rather simplistic. As M. E. Keck and K. Sikkink (1998, 210) point out, the notion of a developing world polity based on shared world culture negates the existence and uncertain outcomes of deep struggles over power and meaning in the process of normative change. In other words, Boli and Thomas have little to say about the conflicts arising along the way to a universal world culture — conflicts that stem from competing principles and models.

D. C. Thomas (2001) analyzes the fall of the Union of Soviet Socialist Republics (USSR) to illustrate the crucial role of norms and identity concepts in effecting radical political change. He argues that the USSR signed the Helsinki Agreement on Human Rights in 1975 in order to gain legitimacy among Western European states whose identity was characterized to some degree by their adherence to human rights principles. A shift in state identity incentivized the USSR to comply with the Helsinki norms, although they are not legally binding because the USSR's new identity implied that full acceptance by the West became more important than continuation of the communist system. Thomas (2001) concludes that

constructivist theory with its focus on norms, identity and the endogenous formation of interests provides better explanation for the USSR's behaviour than liberal theory with its focus on exogenous, utilitarian interests. Nevertheless, his analysis draws little general conclusions on ideational conflicts, beyond the general principle that ideas matter.

In summary, the study of conflict in international relations is balanced between, on the one hand, a realist-materialist ethos that tends to marginalize, if not discount, the role of ideas in favour of more easily tractable factors, and on the other hand, a social constructivist challenge that gives due emphasis to ideas but is not yet sufficiently integrated to generate a general model of exactly how ideas factor in to political behaviour. Acknowledgement on the part of rational choice theorists that the interests that define interest-seeking behaviour are not fixed properties, but rather can vary according to a context defined by differing culture and values, demands a method to account for culture and values as rigorously as one might account for more easily measurable material factors. And while the social constructivist emphasis that ideas matter is sensible on its face, it calls for a better, more concrete sense of just what "ideas" are. Particularly when these ideas take the form of norms and institutions — properties of groups rather than of individuals — a careful scientific understanding of how they form, where they are located and how they are diffused between the individual and the collective is needed to avoid reifying groups and attributing them with mysterious forms of agency. While social constructivist researchers have made significant progress in theorizing about the crucial rule of ideas in explaining political actions and conflicts between groups of actors, the specific mechanisms by which ideas come to be understood as properties of institutions such as states or organizations, or forms of community such as nations or ethnic groups and the ways in which such ideas can gain agency in social relations are still not fully illuminated. Our methods aim to build on the basic insights of social constructivism to meet these hitherto unaddressed challenges.

Classifying Conflict Stakes

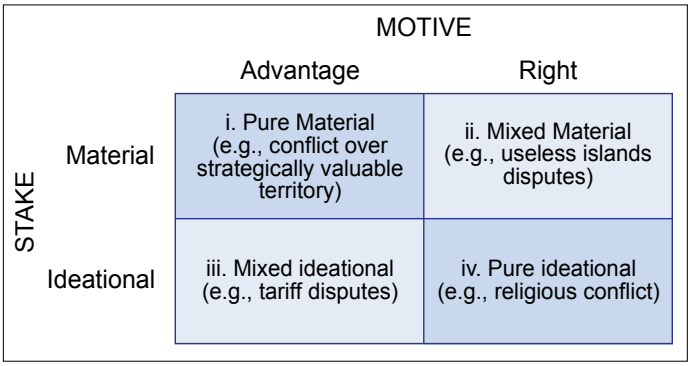
In an effort to integrate the strengths of these approaches, M. Raymond and D. Welch (2014) developed a method of classifying conflicts by isolating the conflict "stake" — a specific object of dispute, the reason why parties care enough to engage in conflict — and determining whether that stake is "material" or "ideational." Although any conflict stake is ultimately an idea in the sense that it is a concept contained within the mind, this approach offers a way to show how the dynamics of conflict will be impacted by the character of that idea; whether it refers to a concrete and therefore measurable property or to something more abstract, idiosyncratic and culture-dependent.

The first stage in classifying conflicts involves locating the conflict stake across two dimensions:

- whether the stake (the object over which conflict occurs) is material (concrete) or ideational (abstract-symbolic); and
- whether the motive (why combatants care about the object) is material (advantage) or ideational (right).

These two dimensions yield four conflict types, identified in Figure 1.

Figure 1: Conflict Stake Typology



Source: Raymond and Welch (2014).

Such a typology conveys more information than rational choice models alone, simply by accounting for types of conflict where ideational stakes and motives are causal factors, enabling recognition of cases where ideational strategies for conflict resolution might be effective. That said, it will be a rare case where a conflict stake or motive is purely ideational with no material aspect or purely material with no ideational aspect. Conflict motive and stake is, in practice, rarely easily classifiable according to such a simple scheme, as there might be multiple stakes and mixed motives involved. Furthermore, not all ideas have the same effect on conflict behaviour. Therefore, this scheme goes on to distinguish three types of ideational stakes: **identity** (concerning group membership and symbols that define a group), **justice** (relating to the rightful allocation of goods, both tangible and non-tangible), and **rule or institution** (relating to the rules that govern social interactions). Again, these must be understood as ideal types. Ideational stakes in actual conflict situations are more likely to involve a combination of identity, justice and rule components and different actors will emphasize different aspects of an ideational stake at different times. Of course, the specific symbolic content of what is important to a group's identity, what is considered just and what makes for an intelligible and reasonable social rule will depend on each disputant's culture.

When all of these complications are considered — the ideal-typical character of the categories, the possibility of multiple, mixed and mismatched motives and stakes

and the context-dependent nature of cultural content, added to the fact that conflicts may involve more than two disputants with further opportunity for mismatch — we are left with more possible conflict types than are easily tractable. Nonetheless, the exercise of focusing on the character of conflict stakes has the immediate value of bringing ideas to the centre of the study of conflict.

The notion that conflict is shaped in part by the combatants' understanding of what they are fighting over seems straightforward on its face. But this classification scheme offers means to test the intuition that conflicts may differ depending on whether they pertain to concrete measurable objects such as territory or resources, or more abstract psychological objects such as culture or religion.

However, questions as to exactly how ideas affect conflict remain to be answered. Merely counting the number of possible conflict types expressible by this classification scheme explains little, as not all combinations are likely to be useful or equally probable. Some conflict types will be found more often than others in examination of real-world cases. Further work is therefore needed to develop this framework into a predictive model, useful for informing practical policies for conflict resolution. For example, it is widely assumed that conflicts over material stakes that are concrete and measurable, such as territory or resources, are easier to resolve amicably through negotiation and compromise, while conflicts over abstract ideational stakes, such as identity or religion, tend to be more intractable. While this is a plausible hypothesis, there is already evidence to suggest that it is at best an oversimplification, if not a self-fulfilling belief stemming from the inability to adequately disentangle and measure ideational factors, causing them to appear indivisible. A early study undertaken by a group of CIGI Junior Fellows (Caverhill-Godkewitsch et al. 2012), in which this classification scheme was applied to a number of current and historical cases, suggested a more complicated picture, including instances where the introduction of notions of identity, justice and legitimacy to an otherwise material conflict improved prospects for conflict resolution.

Consider, for example, conflict between Mexican drug cartels and the Mexican state between 2000 and 2012. Although both sides had been known to use certain symbols of religion and culture, the connection between these and the core stake of the conflict was at best superficial. Rather, the stakes — wealth and control of the state — make this as close as one can imagine to being a purely material conflict. But therein lies the problem; a non-state actor that employs extra-legal means, especially violence, to strictly material ends is by definition criminal and illegitimate. When the National Action Party came to power under Vincente Fox in 2000, interrupting seven decades of rule by the Institutional Revolutionary Party, it was on a platform of overturning corrupt clientelist networks, including those that prevailed between the state and drug cartels, a policy that continued under Fox's successor, Felipe Calderón. Although this policy led to a dramatic increase in violence, it could not easily be reversed, as any accommodation to the interests of a criminal organization would compromise the principle of rule of law in Mexico. This would not have been the case if the violence served a cause that was not strictly material, but rather could be understood as a matter of justice, identity or legitimacy. Compromise, or at least negotiation, would be easier to justify with an indigenous or ethnic minority group seeking cultural rights, or a political movement seeking to change state institutions according to an alternative conception of social justice, such as, for example, the Zapatista Army of National Liberation.[2]

Another example can be found in the conflict that led to the secession and independence of South Sudan. So long as this conflict was perceived by the Sudanese state as a material issue — retaining sovereignty over territory, along with the human and material resources it contained — there was little basis for compromise over the nation-state's territorial integrity. But when Sudanese identity, as understood by the state, changed from being civic and secular to one based around Islamic culture, religion and law, a narrative allowing for the succession of the south on the basis of its different ethnic and religious character became more palatable.

These cases may be exceptional, and the hypothesis that abstract ideational factors tend to exacerbate conflict may still hold as a general rule. But it is a rule that must be subjected to more rigorous testing. And even if it stands, the existence of such outliers highlights the need for better methods for unpacking the role of ideology in conflict dynamics on a case-by-case basis.

Background to the Study of Ideology[3]

For the first half of the twentieth century, the study of ideology was the domain of historians and political theorists who examined belief systems thought to have had significant social impact. But with the rise of behaviouralist approaches to political science after World War II, particularly in the United States, scholars, using quantitative methods to measure political attitudes, found that real-world belief systems tended to be more varied and fluid than fixed terms such as "liberal," "conservative," "fascist" and "communist" implied. They concluded that ideological attachment was less significant than had previously been assumed, and ideology was devalued as a

2 The Zapatista Army of National Liberation is a leftist, mostly indigenous group involved in armed insurgency in the 1990s with whom the government has since been able to come to at least an uneasy modus vivendi.

3 For further elaboration on the existing literature on ideology, we recommend two works by members of the ICP research team: Leader Maynard (2013) and Mildenberger (2013).

legitimate topic of study. It came to be seen pejoratively as an irrational and therefore largely unfathomable obstacle to rational calculation that only confounded preferred material and strategic explanations of political behaviour (Converse 1964; Jost 2006).

The study of ideology has been revived somewhat over the past two decades, although research remains fragmented. Positivist political science in the United States tends to focus on factors that determine an individual's ideological outlook, treating ideology as a dependent variable. These factors include genes (Hatemi et al. 2011) and brain physiology (Amodio et al. 2007; Kanai et al. 2011; Chiao et al. 2009), as well as the social and psychological variables modelled by Systems-Justification Theory (Jost 2009), Moral Foundations Theory (Haidt 2001; 2007; 2012) and Terror Management Theory (Greenberg et al. 1990). Conversely, approaches grounded in sociology and anthropology and in the critical theory prevalent in European scholarship view ideology as an independent variable shaping political power, discourse and institutions. These bodies of work include Critical Discourse Analysis associated with the work of N. Fairclough (2001), R. Wodak and M. Meyer (2009), and T. van Dijk (1995; 1998); poststructuralist approaches such as those of S. Žižek (1994), E. Laclau (1997) and A. Norval (2000); and the morphological approach developed by M. Freeden (1996; 2003).

There remains a need for an approach that can integrate these disparate insights on the causes and effects of ideological attachment, into a comprehensive model that bridges disciplines and levels of analysis. At present, theorists who examine the causes and determinants of ideological attachment at one level — genetic, physiological, psychological, cognitive or social — tend to ignore other levels of analysis, as well as, crucially, interactions between factors at different levels. In fact, no factor is independent, and the true determinants of ideology bridge all levels through complex cross-scale interactions. Theorists also tend to assume simple mechanisms of causation. This is true both of those who examine the psychological and social determinants of ideological adoption and those who examine the function of ideology in shaping personality and society. In fact, causation is multidirectional, involving feedback effects between these two sets of processes. What's more, one can often detect normative judgements that call into question the objectivity of these endeavours. Different approaches have the tendency, and at times even the intention, to subtly elevate either conservative or, more often, liberal ideologies as superior; more evolved as opposed to primitive, more proactive as opposed to reactive or more integrated as opposed to narrow. A truly comprehensive approach must directly confront these ethical questions. While remaining primarily analytical — seeking to better understand past and existing ideologies and processes of ideological change — it must be prepared to acknowledge and address questions of what distinguishes a good, functional or constructive ideology from a bad, dysfunctional or destructive one.

Complexity and Cognition

The principles and methods of complexity theory provide us with the means to develop such tools. Complexity theory describes a body of concepts suited to explaining how interaction between densely connected systems, often operating at different levels of analysis, can generate emergent properties and behaviours. It initially emerged from research in mathematics, physics, computer science, systems engineering and meteorology. More recently, ecology has made important contributions, and researchers now apply complexity to systems as diverse as fresh-water lakes, immune systems and financial markets (Beinhocker 2011; Michell 2009; Strogatz 1994).

Efforts to apply complexity theory to social phenomena have thus far relied mainly on analogies to processes observed in physics and ecology. Consider, for example, a classic illustration of complex animal behaviour: a murmuration of starlings. The flock appears to move as a whole according to a graceful pattern, yet this pattern is not contained in the mind of any individual bird. Each individual merely follows a set of simple rules of conduct in response to adjacent birds, with the complex pattern emerging from collective adherence to these simple rules. So too could it be said that humans following simple rules — say, a drive to maximize material well-being and sense of security around those who are culturally similar — will generate political constructs that function as a unit such as nations or states. Another example is the use of epidemiology models to show how ideas can spread across social networks in ways similar to how a virus spreads in a population.

Figure 2: A Murmuration of Starlings

Source: https://commons.wikimedia.org/wiki/File:Starling_murmuration.jpg. See also http://vimeo.com/58291553.

Such analogies have proven insightful, generating knowledge about the nature of social behaviour that would

otherwise be difficult to conceptualize. But if we are to take this approach beyond the level of metaphor — even useful metaphor — and apply it to practical situations, we must acknowledge the limits of these analogies as well as their insights. Humans are not birds; we can hold in our minds images of our selves and our communities, and conduct ourselves according to those images. Humans are not viruses; we do not adopt ideas passively the way we catch diseases, but wilfully embrace them. And humans are not a bonfire. A bonfire does not choose whether to burn. When a certain set of conditions are met relating to the presence of oxygen, fuel and heat, a fire will catch. But in the case of conflict, as in all such examples of collective human action, there is choice involved. And these choices — to conform to group behaviour, to embrace an idea, to participate in violence — are personal and emotional: I will follow an army or join the revolution; I will adopt a new ideology or vote for a different political party; I am prepared to change deeply held beliefs and risk disrupting my social order; I am willing to risk being killed or severely beaten, to put my family at risk or to overcome my aversion to inflicting harm on others.

What makes social phenomena different from physical and non-human biological systems is the involvement of a peculiar sort of complex system: the human mind, with its unique capacity for abstract representational thought and consequent properties of consciousness, identity and agency. Any useful method for understanding social behaviour must account for the human mind and what is known about how human minds work. This requires direct engagement with cognitive science, the multidisciplinary study of mind and intelligence.

We recognize that a statement so categorical will be controversial, so it is important that we clarify what we mean by it to reassure that we are not advocating a kind of psychological reductionism whereby social behaviour and dynamics can be explained solely and entirely with reference to the individual human mind. On the contrary, it should be clear that we recognize social structures as *sui generis* realities that are the emergent products of the interactions of systems at multiple levels, including systems of social communication and systems observable in the material environment. But the *sine qua non* of any social construct — the only irreducible component without which intersubjective belief could not exist — is a mind capable of abstract representational thought. So, while other levels of analysis are undoubtedly needed to fully explain social phenomena, any explanation that stands in contradiction to how human minds work must necessarily be wrong. Therefore, correct understanding of how human minds work must be factored into any working model.

Cognitive science has developed rich models of the psychological and neural processes involved in perception, problem solving, learning and emotion, but up to now these have been used mainly to describe phenomena that operate within the individual. They have only rarely been applied to social phenomena such as inter-group conflict. Bridging the social and cognitive sciences requires difficult collaboration between disciplines as diverse as neuroscience, psychology, artificial intelligence, linguistics, anthropology, philosophy, sociology, political science, economics and history, which operate with different methods, terms and background assumptions. But such collaboration is necessary, as the mobilization of groups of people to engage in collective action must involve dense interaction between systems of social communication and systems of individual cognition. The concepts, beliefs and values that make up political ideologies ultimately reside in individual human minds. Yet, they are created, shared and changed by and across social groups. Comprehensive understanding of political behaviour demands an approach capable of exploring links both "up" and "down" across molecular/neurological, cognitive/psychological and social/institutional levels of analysis.

Four concepts drawn from cognitive science are particularly important to understanding ideology and its role in political behaviour: mental representation, coherence, motivated inference and neuroplasticity:

- **Mental Representation:** Every belief or idea derives from the basic ability, unique to the human species, to create and manipulate images in our minds that stand for objects in the external world, whether we are immediately perceiving these objects or not. While it may be beyond our current abilities to precisely determine every neural process that contributes to creating a particular mental representation, it must nonetheless be understood that ideas and emotions are ultimately brain processes and thus should be examined as objects in nature rather than as abstract or mystical properties.

- **Coherence:** Just as a multiplicity of neural processes interact to generate mental representation, so too do multiple mental representations interact to create a belief. Each mental representation leads to the activation of others that are logically and/or emotionally related according to a stable overall pattern. If, for whatever reason, the pattern is rendered unstable by means of an illogical or emotionally incoherent association, connections and valences in the system will shift and adjust until stability is restored.

- **Motivated Inference:** A process that distorts reasoning in favour of maintaining cognitive and emotional coherence, it occurs when a mental representation is so integral to the stability of a belief system it is conflated with an external fact. This leads to a selective weighing of evidence that tends to disregard information that reacts incoherently with the favoured representation.

- **Neuroplasticity:** While it is accepted that the brain is the source of all behaviours that make up the social environment, it is also true that the social environment can affect the structure of the brain. If mental representations are ultimately brain processes, then changes to one's mind instigated by inputs from the social environment that alter coherent patterns of thought must be understood as physical changes to the architecture of the brain that can have profound and durable significance.

Varieties of Complexity

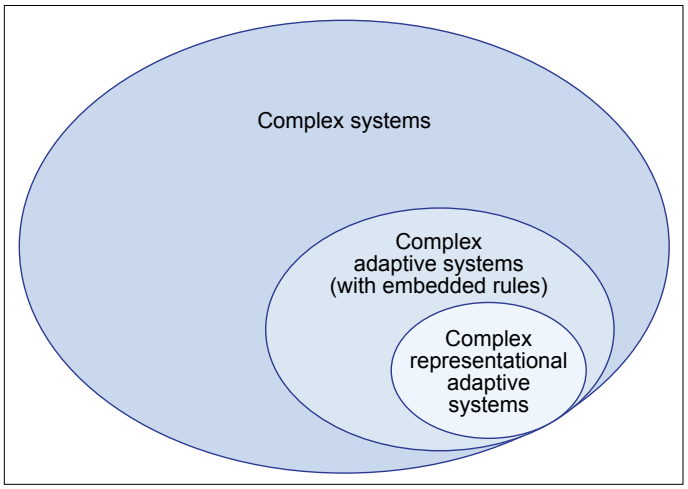
Complexity, in the scientific sense of the term, arises from the multiplicity of causal processes that result from dense interaction between dynamic systems. A system is an assemblage of elements — matter, energy and connective processes — that through their interaction produce a whole distinct from the sum of its parts, yet to which each part contributes. A system is considered complex, as opposed to merely complicated, if elements have a measure of latitude as to how they interact with their environment and with other elements of the system. The result is that changes to the behaviour of individual parts can have disproportionate effects on the whole, a phenomenon referred to as "non-linearity." Small causes do not always produce small effects; large causes do not always produce large effects (Menck et al. 2013): power grids, arrays of coupled lasers and the Amazon rainforest are all characterized by multi-stability. The likelihood that these systems will remain in the most desirable of their many stable states depends on their stability against significant perturbations, particularly in a state space populated by undesirable states. Here we claim that the traditional linearization-based approach to stability is too local to adequately assess how stable a state is. Instead, we quantify it in terms of basin stability, a new measure related to the volume of the basin of attraction. Basin stability is non-local, non-linear and easily applicable, even to high-dimensional systems. It provides a long-sought-after explanation for the surprisingly regular topologies of neural networks and power grids, which have eluded theoretical description based solely on linear stability. We anticipate that basin stability will provide a powerful tool for complex systems studies, including the assessment of multi-stable climatic tipping elements. This is the result of feedback effects: systems of circular causality, where the effects of one set of processes serve as causes of others and vice versa, forming a circuit or loop. This includes negative feedbacks, which keep systems in states of equilibrium despite whatever pressures and perturbations they might be subject to, and positive feedbacks, whereby relatively small pressures and perturbations can trigger chain reactions that disrupt systems or push them into new equilibrium states. These processes cause complex systems undergo critical transitions, sudden shifts or "flips" between equilibrium (Bertuglia and Vaio 2005; Scheffer 2009).

Consider, by way of illustration, a system such as a vehicle engine, which is complicated insofar as it consists of multiple components that must interact in a particular way for it to perform its function. But it is not complex, in that the manner in which each component functions and interacts is fully determined — if any one element fails to act in the prescribed manner the system as a whole ceases to perform its designated function. In contrast, in a complex system such as the flock of starlings, the sudden death of an individual bird will not severely affect the flock as a whole. However, the choice of direction made by any individual bird, even if it remains within the established parameters of behaviour, may affect the choices made by adjacent birds, leading to feedback effects that could alter the shape and direction of the entire flock.

Complex *adaptive* systems have all the features of complex systems, such as additive and multiplicative causation, positive and negative feedbacks, and disproportional causation or non-linearity. In addition, they survive, reproduce and evolve; enabled by embedded rules or "schemas" — representations of their external environments that guide action in that environment in response to selection pressures (Gell-Man 1995). DNA can be considered a type of schema, as are instinctive or autonomic behaviours built into the neural networks of organisms. As these rule sets are subject to random mutation, systems whose schemas are more adaptive to their environment will be more likely to survive and perpetuate, along with the schemas themselves. The presence of such schemas, and the adaptive nature of the system, could be understood as the simplest, most irreducible test for defining life.

In human societies, shared concepts such as ideologies and identities can be understood as the internal schemas of complex adaptive systems. However, we propose that these belong to a further subset of complex systems: the complex *representational* adaptive systems. Such systems have all of the features of complex adaptive systems, allowing us to apply the tools of evolutionary and complexity theory to their behaviour. But their schemas are products of abstract representational thought, necessitating the application of cognitive science understandings of mind and intelligence. If complex adaptive systems constitute life, then complex representational adaptive systems constitute human life, and all systems of which human life is a necessary part.

Figure 3: Types of Complex Systems



Source: Authors.

Four concepts drawn from complexity science have proven useful for understanding ideologies as complex representational adaptive systems. The first two — networks and state space — provide ways of conceptualizing the domain in which ideological systems form and operate. The next two — attractors and threshold change — describe processes that contribute to shaping ideologies.

- **Networks:** Ideologies can be understood as the emergent products of multi-level interactions between the neural and conceptual networks that make up individual minds and the networks of social communication that constitute political communities. We can apply analytical tools developed by network science, a subfield of complexity science, to both kinds of networks. Such a multi-level systems approach to ideology offers a means to simultaneously account for factors usually examined in isolation, from genetics and neuroscience to cognitive psychology and social history.

- **State Space:** Ideologies must necessarily — whether explicitly or implicitly — take positions on certain basic questions relevant to political or economic order; for example, the relative importance of the future versus the past or the degree to which individuals can choose their fate. Therefore, it should be possible to classify ideologies in relation to one another within a hypothetical space defined by the dimensions according to which of their positions on such questions might differ. Such an approach offers greater explanatory depth than existing bi-polar (left-right), two-factor or multi-factor schemes for classifying ideologies, offering as well a means to understand how particular social environments generate particular ideological groups and introduce constraints to ideological change.

- **Attractors:** Not all locations within the state space are equally probable, as not all possible combinations of answers to the questions are equally coherent. Within a given social or cultural context, certain combinations of values will prove more coherent than others, and it is at these points that groups tend to cluster around shared belief-systems. These constitute attractors; discrete points of equilibrium where ideological groups are likely to form.

- **Threshold Change:** When an ideology changes, it moves through the state space. If the state space has attractors, then this change — whatever its cause — is unlikely to be gradual and incremental. Rather, it will appear rapid and dramatic, similar to a gestalt shift or flip between psychological states, as multiple individuals transition from one attractor within the state space to another in a manner that presents as mass-conversion. Methods used to model critical transitions or "tipping points" can be useful for demystifying this phenomenon.

A synthesis of cognitive science, with its rich theories of mental representation, and complexity science, with its understanding of the structure and dynamics of large multi-level, multi-element systems, offers great potential to advance our understanding of ideology and its role in conflict.

IDEOLOGICAL NETWORKS: CAM

CAM is a method for visually depicting the content of belief systems in a way that reflects the functioning of neural networks, where the activation of one concept leads to the activation of another according to a characteristic pattern. The products of this method — CAMs — represent an individual's beliefs about a particular subject, such as another individual, group or a conflict stake.

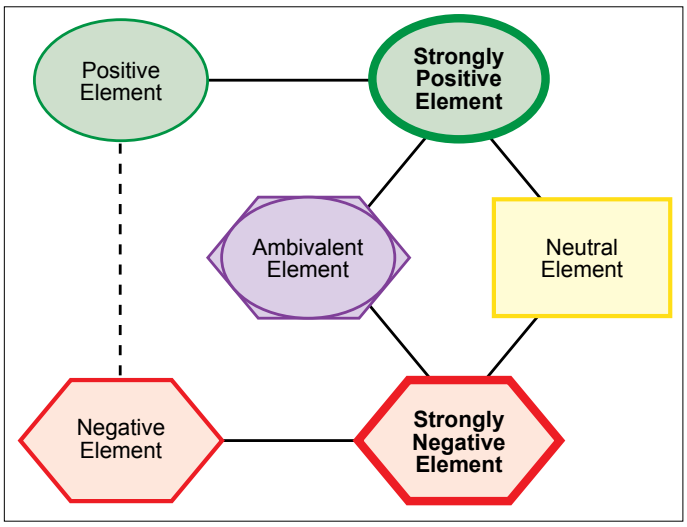
Cognitive maps — also known as conceptual graphs, concept maps or mind maps — have been used for some time by researchers in psychology, computer science and political science to visualize how people represent important aspects of the world (see, for example, Axelrod 1976; Novak 1998; Sowa 1999). Representing beliefs as sets of connected concepts allows one to recognize distinct patterns in decision making and other kinds of inference. Such depictions, however, tend to neglect the emotional values attached to concepts. CAMs incorporate emotion directly into the representation of beliefs (Findlay and Thagard 2014; Thagard 2010; 2011; 2012a; 2012b; forthcoming), in recognition of the principle that the emotional values attributed to concepts, far from being hindrances to rational thought as often assumed, are in fact crucial and indeed indispensible elements of human perception, understanding and decision making (see, for example, Damasio 1994; Loewenstein et al. 2001; Thagard 2006; Vohs, Baumeister and Loewenstein 2007).

It is increasingly recognized in the cognitive sciences that the old and still widely assumed distinction between "cold" and "hot" (rational and emotional) cognition is no longer serviceable. Concepts, beliefs and goals all come with emotional valences that are as important to rational assessments as logical or computational reasoning. Emotions are also involved in the rejection or revision of beliefs, and it is especially important to account for emotion in decisions involving conflict.

CAM Method

CAM serves to represent a belief system as a network of mental representations, using shapes to represent concepts and lines to represent relations between concepts.

Figure 4: Basic CAM[4]



Source: Authors.

Figure 4 can be deciphered as follows:

- ovals represent emotionally positive (pleasurable) concepts;
- hexagons represent emotionally negative (painful) concepts;
- rectangles represent concepts that are emotionally neutral;
- a superimposed oval and hexagon indicates ambivalence — a single concept that can generate simultaneous or alternating positive and negative emotions;
- the thickness of the shape represents the relative strength of the positive or negative value associated with it;
- if colour is available, ovals are green (go), hexagons are red (stop), rectangles are yellow and superimposed ovals/hexagons are purple;
- solid lines represent mutually supportive relations;
- dashed lines represent relations between concepts that are emotionally opposed; and
- the thickness of the line indicates the strength of the emotional relation.

There are five steps to constructing a CAM:

1. Identify the main concepts of the subject concerning the issue in question.
2. Identify these concepts as emotionally positive, negative, neutral or ambivalent, and represent them accordingly with ovals, hexagons, rectangles or ovals within hexagons, respectively.
3. Identify supportive (solid lines) or opposed (dashed lines) relations between concepts and the relative strength of these relations.
4. Arrange the concepts and their relations in such as way as to minimize crossing links. This brings closely related concepts into proximity with each other and helps identify highly connected concepts or "hubs."
5. Finally, confirm the validity of the resulting map, by either:
   - showing it to the subject to see if it accurately captures his or her understanding of the issue (because the method is easy to grasp, a subject can quickly understand and, if necessary, correct CAMs representing his or her viewpoint);
   - showing it to other people familiar with the subject's views on the issue in question; or
   - assessing it against interview, survey or textual data that reveal the subject's beliefs and emotional attitudes that had not been used previously to develop the CAM.

Before starting, a person constructing a CAM must, of course, have an initial body of evidence from which inferences about the subject's beliefs and emotions can be drawn. This evidence might initially be no more than personal experience with the subject that allows the development of a provisional hypothesis about the subject's beliefs. But one of the benefits of this method is that it allows for input from a convergence of varied empirical sources. CAMs could be drawn from analysis of texts, from survey or interview data, even by subjects themselves, or through a combination of such sources.

4 A software tool for drawing cognitive-affective maps is available at http://cogsci.uwaterloo.ca/empathica.html.

CAM: Benefits and Limitations

The application of such a rudimentary syntax to something as complex as a belief system leaves this method open to charges of reductionism. Breaking down mental representations to individual words or phrases vastly oversimplifies both their semantic and neurological content. While CAM may reflect how neural networks function, it does not provide an accurate depiction of any brain process. Each object in a CAM stands in itself for a complex network of neural processes. In addition, attributing each object only positive, negative or neutral valence obscures varied nuances of emotion. This method alone cannot draw out the vast and often significant differences between positive emotions (such as happiness, pride, exuberance, contentment, arousal, etc.) or negative emotions (such as anger, hate, jealousy, disgust, frustration, contempt and so on).[5]

The short answer to this objection is that any modelling language is by nature reductionist, providing the tools to zero in on a limited set of factors to draw out a limited set of connections in the interests of a limited argument. Although the reduction of mental representations to single words or phrases has the potential to oversimplify, it also provides a novel means by which the complexity of beliefs can be depicted and unpacked.

The immediate benefit of this method is, first of all, that it allows us to treat ideas as units of data. Ideas, values, beliefs, cultures and identities ultimately reside in the mind. CAM permits us to treat them as objects in nature rather than ephemeral abstractions that can be factored in to rational assessments of behaviour as are more measurable material objects. The ability to visualize ideas as real and comprehensible brain processes enables researchers to make specific claims about the nature and function of beliefs that are testable against a body of empirical evidence. Such claims can draw from multiple disciplinary sources, particularly cognitive science. Using CAMs, researchers can model the impact on belief systems of well-understood cognitive processes, such as motivated inference and the need to avoid cognitive dissonance. Most significantly, CAM can illustrate the centrality of emotion to any rational decision process. While deep understanding often requires a conception of emotion that goes beyond positive versus negative valence, our simple one-dimensional representation of emotions can capture a great deal of a dispute's emotional complexity, and therefore its essential character, by depicting the importance of overall cognitive and emotional coherence to the functioning and stability of a belief system.

Coherence is the central process for problem solving or decision making in a network of mental representations. The theory of emotional coherence on which CAMs are based (Thagard 2000; 2006)[6] can be summarized in three principles:

- Elements in a cognitive system have either a positive or negative emotional valence.
- The links between elements introduce constraints on how each concept in a linked pair is valued.
- The valence of an element is therefore determined in parallel with the valences of other elements to which it is connected.

For a belief system to be stable, each activation in the cognitive-affective network must be logically and/or emotionally associated with the next in a pattern that maintains the system in an overall state of coherence. If it is not, the system will adjust until it is. Thus, if new information is introduced in the form of new concepts, new links between concepts or changes to the valences attributed to existing concepts, additional changes will follow until the resulting network is again coherent. Ideological change involves simultaneous changes to several nodes and links, restructuring the network so as to maintain coherence at the system level.

CAM thus provides researchers with a deeper "insider" appreciation of a belief system: how it "feels" to a person holding it, and how it affects that person's perception of the world. It can show how a notion or symbolic attachment that may seem nonsensical to outsiders or out of sync with objective reality can be remarkably powerful and durable to those that possess it; integral, as it is, to the overall coherence of the system. And it enables us to theorize how changes to that system — such as exposure to new

5 At least two further dimensions are needed to fully describe the emotional content of mental representations (see, for instance, Fontaine et al. 2007). Activity, also called arousal or intensity, denotes the continuum from relaxed to aroused emotional responses. Potency, sometimes called control or dominance, refers to an agent's perceived capacity to effectively deal with a given situation. Specific types of emotion such as love, contentment, pride, fear, or anger can be represented as points in the three-dimensional affective space constituted by valence, activity-arousal and potency.

6 This theory is implemented in a computational model called hot coherence (HOTCO) in which units (artificial neurons) have valences as well as activations. Positive emotional connections are implemented by mutual excitatory links between units and negative emotional connections are implemented by mutual inhibitory links between units. CAMs can be converted into a HOTCO simulation of emotional coherence by the following method: 1) each CAM element becomes a HOTCO unit, capable of acquiring positive or negative valence; 2) each CAM solid line (coherent link) between elements becomes an excitatory link between the corresponding units; 3) each CAM dotted line (incoherent link) between elements becomes an inhibitory link between the corresponding units. The major difference between the HOTCO simulations and the CAM method is that the latter only displays the results of a calculation of emotional coherence, whereas HOTCO actually carries out the computation. CAMs display the static result of the dynamic process of computing emotional coherence that HOTCO performs.

concepts — might affect this coherence with otherwise unpredictable results.

This can be particularly useful to conflict resolution practitioners dealing with conflict stakes. A conflict stake is ultimately an idea. As such, it can be unpacked using CAM into its component concepts and relations to other ideas:

- The stake at the core of a conflict can be mapped in relation to other concepts that make up an individual or shared belief system at a particular point in time.
- The differences between how stakes are understood and the relative importance of different stakes between different parties can be depicted.
- A conflict stake may be considered more important to an individual or group if it has a heightened emotional valence associated with it, which may in turn be a factor of how crucial it is to the coherence of a belief system or how connected it is to other aspects of the social environment.
- The centrality of a stake can be measured by the number of connections it has to other elements in the system; the extent to which a challenge to the stake-concept necessitates a cascade of further changes or activations throughout the system in the interest of maintaining coherence. A stake with many connections is likely to be pivotal to the coherence of the system as a whole, whereas one with few connections is likely to be peripheral.

Such an approach puts improved means at our disposal to predict which conflict stakes will be deemed vital by one party as opposed to another. The emotions aroused by inter-group conflict are not just given irrational attachments. There is a logic to them, indeed an emotional logic that can be discerned, mapped and predicted. Treating emotion as a product of the mind prevents us from dismissing it as an irrational, and unfathomable, factor in our calculations. Understanding of emotional coherence can reveal connections between elements in one ideological framework that may not be present in another. It allows us to see not only the emotion attributed to a given object, but how this leads to other valences being attributed to other associated objects, enabling us to recognize patterns that might not otherwise be apparent. This ability to clarify how stakes are perceived differently by different actors can enhance the potential for creative resolutions to conflicts by providing insight into what aspects of belief systems are or are not open to change, and hitherto unseen opportunities to trade off ideationally non-vital stakes for more vital ones.

Applications of CAM

The simplicity of CAM allows for many uses. It can be used to express testable hypotheses as to how the content of a world view, or differences between world views, can contribute to conflict and misunderstanding. The method is not tied to any particular discipline, and so can be taught to non-experts or experts from a variety of fields, allowing for widespread collaboration. It is even possible that it could ultimately be used to quantify the role of emotion. Given a controlled amount of textual, survey or interview data, coded in a consistent and transparent manner, the thickness of the boxes and lines in a CAM could be tied to the frequency and strength of emotional relationships between certain mental representations indicated in the data.

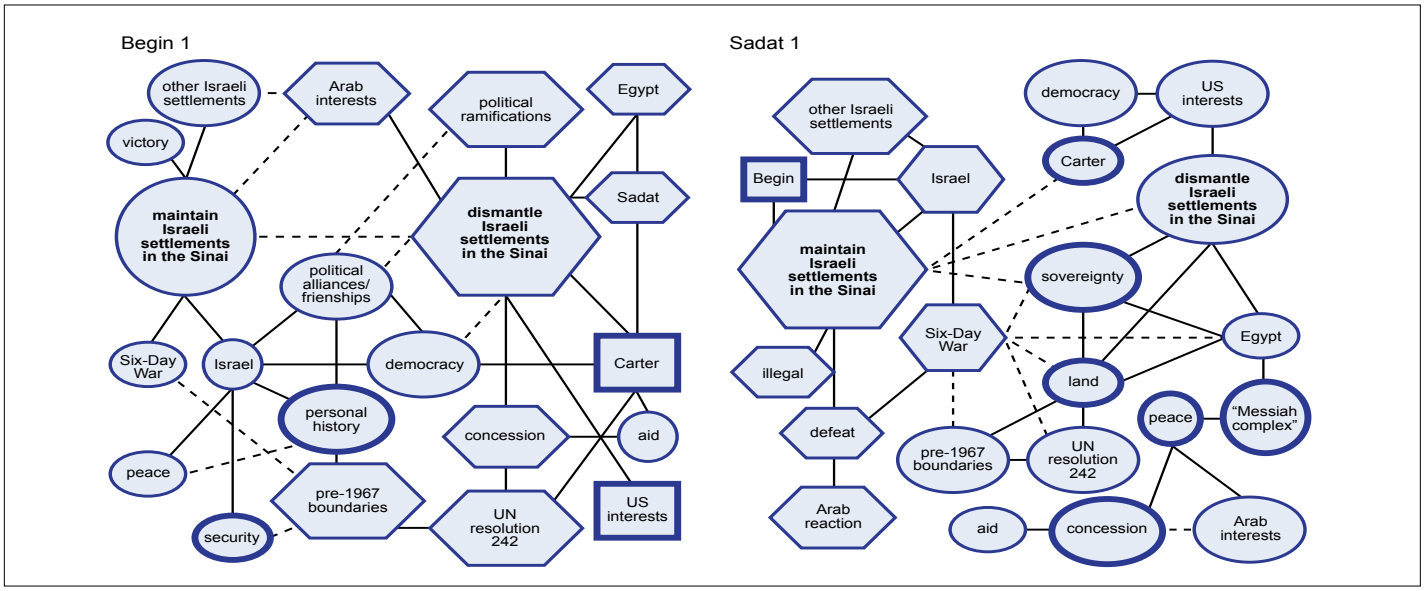
Finally, this method could be used directly in negotiations, to better understand the positions of parties in conflict and to further understanding between them. Current scholarship in the practice of negotiation stresses the importance of going beyond the conflicting positions of disputants to understand their underlying interests, so as to clarify differences and possibly uncover unrecognized compatibilities (Raiffa 1982; Fisher, Ury and Patton 1991). But this approach does not go far enough, as interests are not always defined and measured according to the same sets of values. One must go deeper to unpack the underlying beliefs against which interests are understood, and whether these diverge between parties. Disputants themselves can be taught the simple language of CAM and use it to improve understanding of their own perspectives or those of other disputants. Or they can engage in a mediated process by which an outsider produces CAMs of the various disputants' perspectives that are then adjusted in dialogue with the disputants themselves. CAMs can be used to identify key differences and similarities in the disputants' perspectives and thereby open up previously unconsidered possibilities for compromise or reconciliation.

To what sorts of actors and in what circumstances can CAM be applied? As it is a method for mapping mental representations, the irreducible quality that any entity must possess for CAM to be applicable is the capacity to form mental representations; in other words, a human mind. The most straightforward use is to map the belief systems of individuals, primarily leaders and elites whose decisions influence political events.

Individual Leaders

An example is provided by S. Findlay and P. Thagard (2014) who applied this method to Menachem Begin and Anwar Sadat during the Camp David negotiations between Israel and Egypt in 1978. Using first-hand accounts of the negotiations as their sources, Findlay and Thagard show how significant events in the course of

Figure 5: CAMs of the Start of Camp David Negotiations



Source: Findlay and Thagard (2014).

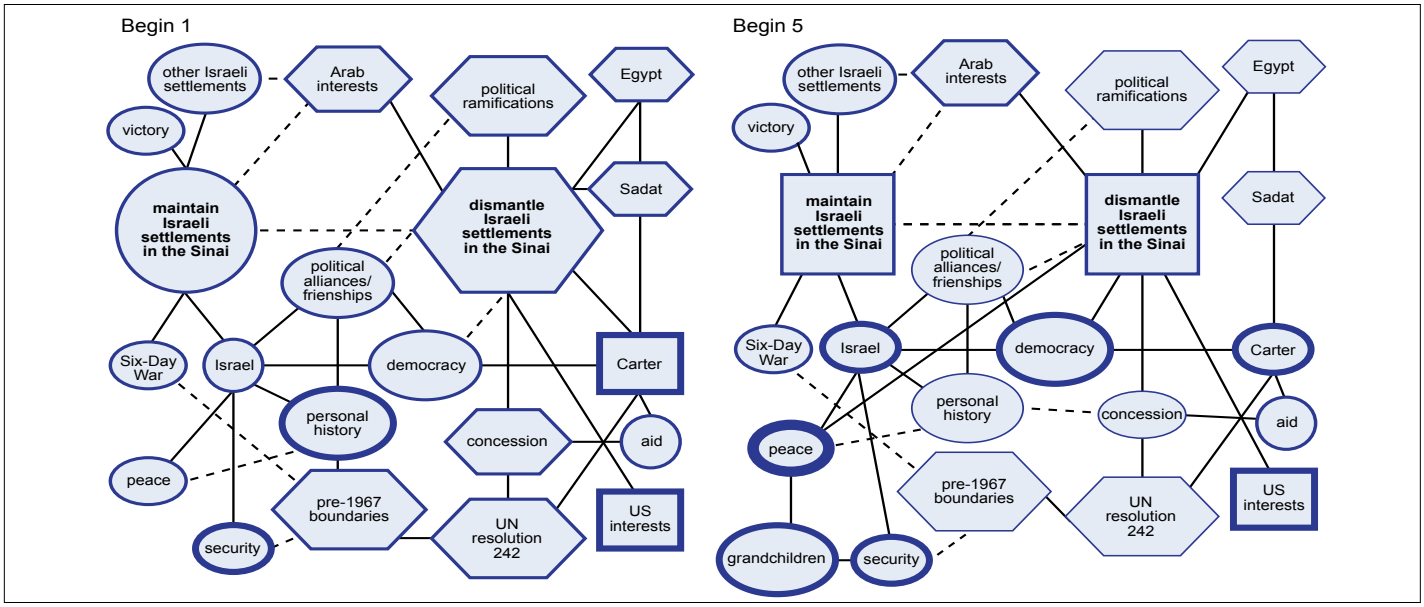
the negotiation served to alter the leaders' cognitive and emotional framework — that is, their underlying interests and values — in such a way as to render their eventual positions more compatible.

The positions of the two leaders at the start negotiations were mapped by Findlay and Thagard as follows:

The maps in Figure 5 offer a good introduction into how CAM can serve to clarify positions in situations of conflict and negotiation. The key incompatibility between positions is reflected in the different emotional valences attributed to either keeping or dismantling Israeli settlements in Sinai. These two positions are incompatible: a positive feeling toward one triggers a negative feeling toward the other, and vice versa; it is logically impossible to attach the same valence to both. Between the two leaders these interests appear as mirror images, and are therefore intractable. But these notions are connected in each map to different networks of logically and emotionally related concepts.

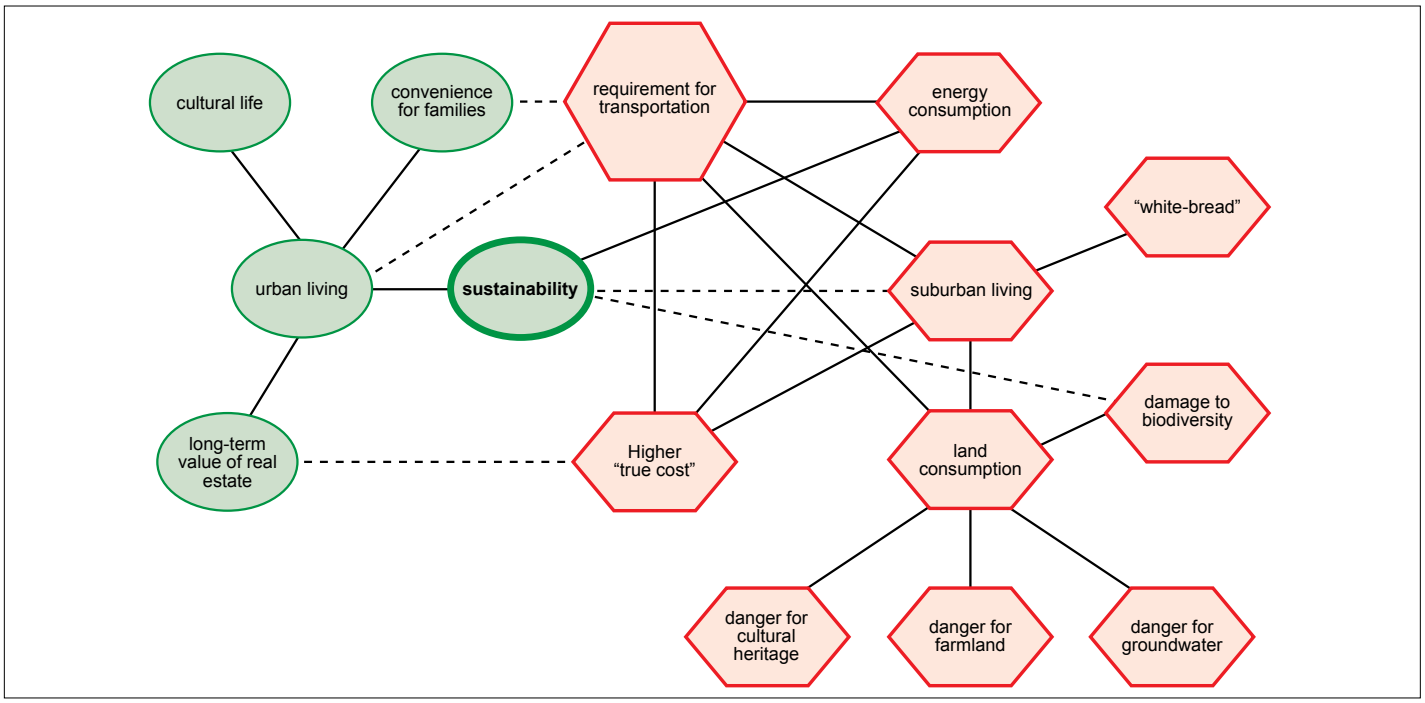
As the argument progresses, new maps are drawn for each of the leaders, demonstrating how key events during the negotiation served to alter the emotional valence attributed

Figure 6: CAMs of the End of Camp David Negotiations



Source: Findlay and Thagard (2014).

Figure 7: Sustainable Housing Policy in Germany — German Government Experts and Officials



Source: Schröder, Huck and de Haan (2011).

to elements in the CAM, and how each alteration had ripple effects on other elements in the coherent system that led to an eventual convergence. In total, a succession of five maps are drawn for Begin and six for Sadat. The first and last maps drawn for Begin can be compared as follows in Figure 6.

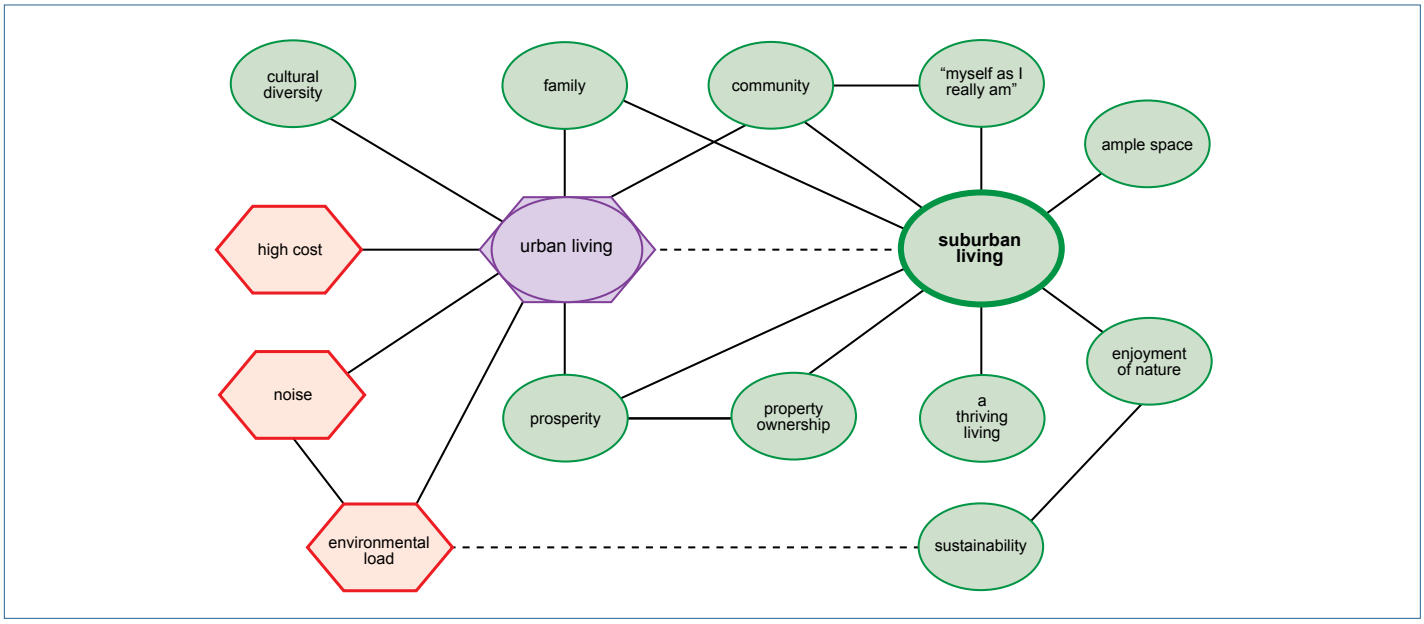
Among the changes that occurred between the beginning and end of negotiations, one can see a markedly different relationship between democracy and the dismantling of settlements. This was due, in part, to evidence brought to Begin's attention that Israeli public opinion was not as passionately opposed to compromise over dismantling the Sinai settlements as he had previously assumed, altering the ramifications of concessions. The positive valuation of democracy, and the implications of this valuation as to how other elements in the system were valued, was crucial to the impact that this new information could have on negotiating positions.

But there were other changes that went beyond the introduction of new information to alter rational calculations. At the bottom left of Begin 5, we see the introduction of the element "grandchildren" with a strong positive valence, strengthening, in turn, the positive valence attributed to the element "peace." Several sources noted that US President Jimmy Carter often raised the notion of future generations, sometimes obliquely through casual discussions about his own grandchildren, and that this had significant emotional impact on Begin, making the issue more personal, altering his emotional priorities.

> According to Carter, Begin's final emotional shift was brought about by a specific social interaction. With the negotiations apparently coming to an unsuccessful end, Begin had asked Carter to autograph photographs of the three leaders for his 25 grandchildren as a departing gift. On the advice of his secretary, Susan Clough, Carter got the names of each of Begin's grandchildren so that he could personalize the photographs. Carter thought this had a profound effect on Begin. The Prime Minister and President Carter both began to cry while talking about grandchildren and entered into a short but emotionally charged discussion concerning their grandchildren's future and war (Carter 1982: 399). The conversation contributed to Begin's emotional shift away from the fear of embarrassment and uncertainty about dismantling the Sinai settlements and being flexible in negotiations. He now focused more on ideals such as democracy, peace, and the future of Israel's young citizens as exemplified by his grandchildren. This final emotional shift salvaged the negotiations and was later cited as a turning point by Carter. (Carter and Richardson 1998, as noted in Findlay and Thagard 2014, 15)

Of course, it was not the argument of Findlay and Thagard's paper that the emotional changes brought about in these individual leaders was the sole relevant factor enabling a breakthrough in negotiations. Other systemic factors must

Figure 8: Sustainable Housing Policy in Germany — A Typical Member of the German Public



Source: Schröder, Huck and de Haan (2011).

be in place. But it does illustrate the usefulness of a method that can directly represent and account for emotional change as one such factor.

While the applicability of this method to mapping the emotions of individuals is evident, these leaders did not reach these emotional starting points in a vacuum. They were influenced by their social environments. The distinct networks of mental representation that form their cognitive-affective maps is shaped in large part by the identity groups to which they belong — state, national, ethnic, religious, ideological and so on — and by the institutional positions of authority they hold within those groups. Can we use CAM to account for the influence of these factors?

Ideal-typical Group Members

One possible way to do this is to map the mind of a hypothetical ideal-typical group member, as a product of the averaging of aggregate data. The following CAMs were drawn by Tobias Schröder, based on research into attitudes in Germany toward sustainable housing policy (Schröder, Huck and de Haan 2011), and are perhaps the first examples of CAMs for which the empirical source material was survey data in which subjects were asked to self-report the emotional valences attributed to certain concepts.

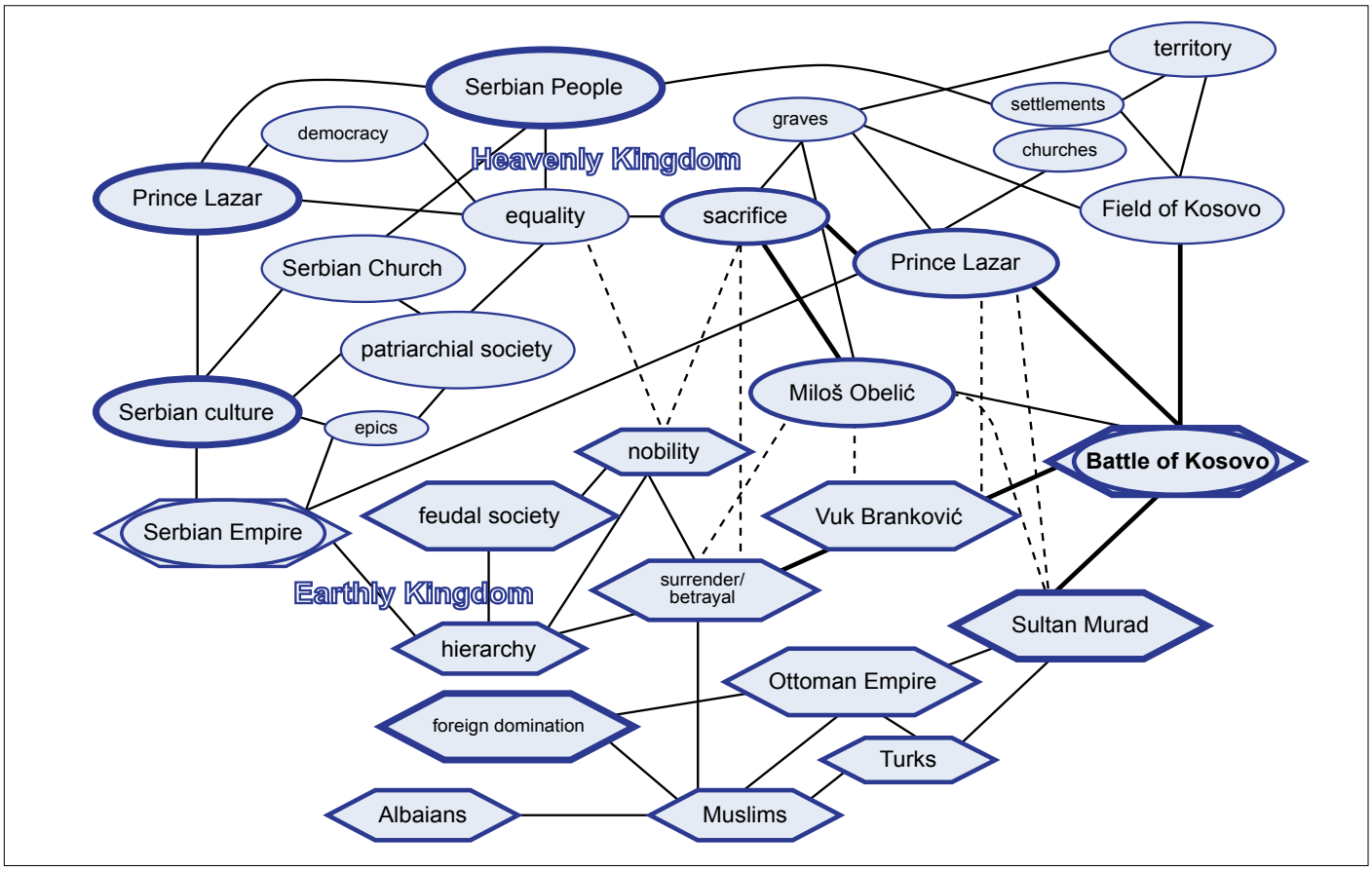
These CAMs provide insight into conflicts regarding urban and suburban housing policy in Germany by contrasting the preferences of German experts and officials with those of the public . These are not maps of any one person, and obviously the argument here is not that every German official or every member of the German public thinks in precisely this way as an individual. This is the aggregate product of survey data, as interpreted by the researcher.

What is interesting in these comparisons is some of the points of commonality, for example the positive valence toward the concept of sustainability and concern over environmental issues. This study served to highlight a widespread misperception that urban life is less environmentally sustainable, demonstrating that the emotional response to experiencing green space in the suburbs leads one to draw erroneous conclusions as to the relative environmental load of suburban life. People make decisions based on the green that they see in front of them, rather than the green that is destroyed by suburban sprawl and the increased need for transit. This knowledge can assist policy makers in determining what information needs to be better communicated to the public to further appropriate policy goals.

Mapping the Group

To understand the impact of group identity on conflict behaviour, mapping an ideal-typical member of a group is not always enough. The CAMs above may be products of data collected in Germany, but they tell us little about "Germans" as such. The individuals surveyed, and the hypothetical individuals mapped through the aggregation of those surveys, are influenced by many roles and identities aside from the national character. These results also reflect their perspectives as consumers, workers, officials, family members, among others. Is it possible to use CAM to draw out the influences on the individual of a particular group identity?

Figure 9: Serbian National Mythology of the Battle of Kosovo



Source: Authors.

The following CAM depicts how the Battle of Kosovo is interpreted in Serbian national mythology, drawn from research on this case in a comparative study of symbols of defeat in the construction of national identity (Mock 2012).

Even assuming this depiction is accurate, one must ask where such a system of mental representations resides. This would not be a faithful depiction of how any individual, or even a hypothetical "typical," mind of a member of the Serbian national group functioned. The sources for this map were textual analyses of the most popular epics and recent political discourse, but while this map might be said to represent a shared understanding of the myth and its component elements — of how the myth, when activated, can be expected to impact the wider belief system of a typical group member — the emotional force of this myth and its influence on the wider construction of identity will vary widely between different individuals, belonging to different subgroups at different times. What this map does, in effect, is draw out the mythology of the Battle of Kosovo using CAM methodology to depict the mental representations and emotional valences communicated by the group to its member individuals through this mythology. How this functions on an individual level, and how successful it is, would depend on numerous extraneous social, cognitive and emotional factors.

The Person-Group Problem: Using CAM to Map Shared Beliefs [7]

Group identity has significant impact on conflict behaviour, and this impact must be accounted for to thoroughly understand the role of ideas in conflict. Shared concepts are necessary for the group to function as a unit, and shared emotions are needed to arouse the loyalty that motivates individuals to fight and sacrifice. But how do we make sense of the notion of group beliefs and feelings? Any attempt to apply cognitive science principles to social groups leaves us vulnerable to the objection that we are reifying the group as a unitary object with agency equivalent to that of an individual. When the units of analysis are communities such as nations or institutions such as states, these units are often conceived as thinking, acting and feeling entities: "America invaded…", "banks reacted…" and so on. Does this reflect fallacious thinking, "metaphorical pointers" (Thagard 2010b) or a convenient way of speaking to a more complex reality? We hold that far from being merely fallacious, this language reflects an intuition that shared meaning is fundamental to human

7 An elaboration of the argument in this section with illustrative examples can be found in Milkoreit and Mock (2014).

societies, and at the heart of political behaviour. But can we really attribute beliefs to social groups? Groups do not have minds with which to think and feel, save for the minds of the individuals that compose them. How then can we draw a CAM of an entity that possesses neither cognition nor emotion?

The answer is that CAM can, in fact, be used as a means to better model the relationship between the emergent group and its component individuals. CAM was developed to map belief systems residing in individual minds, which, after all, are the only places where belief systems can exist, a mind being a necessary precondition for mental representation. But mental representations are formed, and belief systems shaped, through interaction with the external environment, which includes the social environment. Therefore, institutions — established systems of norms and patterns of social communication — have a significant and continuous impact on the structure of an individual's cognitive-affective network.

We must recognize, then, that when speaking of a group, two different systems are being referred to at the same time; one at the social-collective level, the other at the cognitive-individual level. While these systems are related, and densely interactive, it is necessary from a methodological standpoint to distinguish them to avoid confusion. It is easy to conceive of the group as something larger than the individual; as a collection of individuals and the links between them. But the group is also something smaller than the individual, as a subsystem of the mental representations that make up an individual mind. The group cannot exist without these two necessary conditions: a collection of individuals linked by networks of social communication, and a cognitive construct common to the minds of member individuals according to which the group is imagined. Neither condition can exist without the other, so the group must be understood as the product of feedback between these two systems. Networks of social communication place the image of the group in the minds of member individuals; yet these networks themselves rely on the presence and content of this image. The existence and form of the group depends on this recursive process between individual cognition of and social interaction within the group.

Picturing the group as a subsystem of mental representations as well as a supersystem of individuals opens a new approach to the problem of collective cognition, emotion and agency. Thought and emotion are brain states; only individual minds are capable of retaining mental representations with emotional valence. As groups do not have brains, collective beliefs and emotions are not real entities. However, the subset of mental representations received by and reflective of the group — contained, as it must be, in a mind capable of thought, emotion and agency — can, by extension, exercise these capabilities. The systems of mental representations communicated to the individual mind through interaction with the group have an inherent emotional logic and coherence to them. In addition to symbols and narratives, the group also conveys the values and feelings associated with those symbols and narratives. Thus although groups cannot think and feel and act, the common adoption of systems of mental representation that include emotional valence creates a dynamic that can be considered, or at least usefully labelled, collective cognition, emotion and agency.

However, the interdependence between the image of the group in the mind of the individual and the system of communication between individuals that constitute the group, will cause the subsystem of mental representations that amount to the group identity to function according to different rules than do other "ordinary" mental processes. Although, as with all brain processes, they are internal to the mind; because they are received through social signals external to the individual, they are experienced as part of the external environment — their content and structure set by processes over which the individual has no control. In this way they come to be reified, experienced as unitary entities, rather than composite structures, and finished products rather than open processes. They adhere to different rules of coherence, evolving and adapting in response to the needs of the social system rather than those of the individual. Because the concepts and valences that compose these networks are set by collective consensus and imparted to the individual by social communication, the individual experiences them as beyond his or her agency to change, rendering them significantly more resistant to change than other cognitive elements. They therefore trigger intense emotions if challenged or threatened, elevating the challenge to an existential threat.

This last point is key: stimuli that challenge the perceived reality of concepts that define the group consensus tend to provoke strong negative emotions of fear, anger and disgust (Haidt 2012). This is because shared systems of representations are needed for the group to exist as a group and thereby generate the benefits that come from collective, cooperative behaviour. It is only when these constructs are commonly experienced as real and invariable that each individual member can trust in the continuity of his or her social order. Any input that threatens to expose the conventional and ephemeral nature of the group consensus exposes the group and its member individuals to the threat of social breakdown and the very real costs, material as well as emotional, that could result.

When such an input is encountered, the individual is likely to reject or discount it, even if this appears to outsiders as irrational denial. This explains the path dependency of belief systems; the observable tendency of people to interpret or filter new information in such a way as to conform to existing beliefs, especially beliefs that are crucial to group identity. It also illustrates how attachment to a group identity can influence a person's behaviour

even over a concept he or she does not personally believe; for example, how individuals who are not themselves religious believers can be sincerely moved to fight over symbols, objects or doctrines of a religion associated with their nation or culture.

If the individual is unable to deny the new information, this may lead to a weakening of his or her association with, or positive feeling toward, the entire identity category. If an individual cannot reconcile to a concept received as part of a group identity, they may question whether they really have a right to be part of the group. This will call into question the reality of all other representations associated with that group, separating the individual from the social system relied on for security and meaning. This suggests another process that can lead to violent conflict. If the environment of a significant number of group members changes such that these individuals receive continuous and undeniable signals contradicting an essential part of their reified group identity, the resulting incoherence of that group identity may cause the group itself to collapse. Seemingly unrelated norms that enable in-group cooperation, or even basic civilized behaviour, may degenerate along with the challenged concept.

This has significant implications to how we should approach situations of ethnic or national conflict. When a group's symbolic attachments become key conflict stakes, such as when disputed territory is imbued with religious or national significance, it is often presumed by outsiders that the easiest and preferred solution is to convince that group to simply discard the offending attachment. So long as we sensibly reject the assumption that such attachments are embedded in the group's essential nature, the simplest course of action would appear to be to convince disputants to forego this attachment by exposing its irrational, inessential and historically contingent character. Symbolic attachments are not built into our DNA, so if they are the cause of strife we should have the sense to change or abandon them.

But if it were really that easy to remove a concept from a group identity, that group identity would not seem real enough to secure the loyalty and submission of group members in the first place. The special nature of collective beliefs causes these subsystems of mental representations to function according to different rules. Since the mental representation is received and validated via external signals, it cannot be altered without the connivance of those external, collective forces; namely, the whole (or at least a critical mass) of the group.

CAM can be used to draw out the concepts, beliefs and values that come to be reified as part of a collective identity. It can model connections and interactions between elements of belief systems internal to the individual mind and elements of the external social and physical environment. This facilitates understanding of how cohesive ideological or identity groups maintain their belief systems and what elements may be more or less flexible to change. It thereby offers a means to represent testable theories as to what concepts and connections could trigger crisis among a given population. It can be used, in effect, to draw a picture of the group; to represent the impact of a collective identity on individual behaviour.

This offers the prospect of predicting what sorts of external events or pressures might cause members of a group to engage in violent behaviour, as well as what sorts of changes in belief are more or less feasible in efforts to ameliorate existing conflicts. The scope of possible change is limited by what mental representations within a shared cognitive-affective system are reified by the group at a given time. Although this will, in practice, change constantly in the face of a shifting social environment, it is not within the agency of any individual group member — or even all of them, as individuals — to effect such change, at least not without somehow changing that environment as well and doing so in a way that does not dramatically upset the perceived reality of the group.

Symbolic attachments do not have to be genuinely primordial in order to be deeply felt or for there to be dramatic and unforeseen consequences to their disruption. An individual does not have to be personally convinced of the spiritual significance or even historical accuracy of a myth or symbol to experience and be moved by it as part of the shared and reified group identity. Whereas efforts that successfully cause members of a group to question or discard a concept integral to their group identity can have unforeseen effects on other connected concepts, possibly threatening the equilibrium of the identity as a whole and weakening bonds of social communication and norms of social constraint. Fear of such breakdown, and of the very real dangers of violence and suffering that would accompany it, can generate fierce emotional resistance in the face of such change against anyone — insider or outsider — who would threaten it.

Using CAM to model the impact of group identity in this way will provide tools to understand, possibly even predict these otherwise irrational responses and effects when they occur in conflict situations, making us better able to formulate appropriate and effective policy responses.

The Policy Utility of CAM

CAM provides a quick and easy means to depict belief systems as networks. This opens the possibility for modelling emergent patterns and properties that might result from the interaction between systems of mental representations, which make up individual minds, and systems of social communication, which make up identity groups. There are at least two ways that the use of this method can immediately enhance our understanding of conflict.

First, reframing beliefs less as a given collection of myths, symbols and values, and more as an interactive network of myths, symbols and values in a state of equilibrium amounts to nothing less than a conceptual revolution in the treatment of ideas as causal factors in political behaviour. Each concept and connection between concepts placed in a CAM amounts to its own testable claim that can be grounded in a variety of empirical sources. The map as a whole offers a model for understanding the structure and function of belief, predicting what sorts of changes or pressures might impact equilibrium and to what effect.

Second, an approach capable of directly incorporating emotion as a causal factor in the construction and coherence of belief systems, even if only on a rudimentary level, will generate superior understandings to one that neglects or mystifies this crucial aspect of cognition and decision making. A full account of the emotional structure of conflicts would require attention to other dimensions of emotion and perhaps a more fine-grained specification of particular emotions associated with different concepts and situations. But the simplicity of CAM makes it possible to depict in a half-page illustration much of what is most important about a given dispute, allowing disputants or mediators to identify concepts that are emotionally intense — emotional trigger points or pathways of emotional excitation within a belief system — and to specify the properties of the emotions involved. If the emotions are affecting the conflict's severity and persistence, disputants or mediators could devise strategies to change the emotional valence of concepts rather than the concepts themselves. More generally, CAM's emphasis on emotion could help disputants focus on values rather than their positions, enhance empathy for the other party's circumstances and thereby strengthen the joint motivation to produce mutually respectful solutions.

IDEOLOGICAL STATE SPACE

Even when we use CAM to model the relationship between individual and collective beliefs, CAMs are themselves always depictions of individual minds. When we draw a CAM of a group, we are in fact drawing the image of the group within the mind of the individual. But the fact that minds, and the ideologies they contain, do not develop in isolation calls for a method that can represent the relationship between such shared belief systems and the wider social environment.

If coherence is the primary mechanism behind individual decision making, this is bound to have an effect at the social level as well, as certain belief systems are likely to be more coherent than others within a given social context. The belief systems of individuals do not scatter randomly across whatever scale is used to classify them. They cluster, leading to the formation of self-conscious groups whose members recognize each other as sharing the same beliefs and values.

This process could be said to follow patterns similar to those found in nature. Just as water that falls on a landscape pools into basins, so too do ideologies gravitate toward patterns that are stable in a given social or cultural landscape. Therefore, what we need, in addition to a method for mapping those ideologies, is a method for mapping the landscape, so as to locate these points of stability where coherent world views — both existing and potential — can settle. This will give us a sense of just what ideologies and prospects for ideological change are possible and what factors constrain the scope of ideological possibility.

The ICP has developed a set of methods for locating belief systems in relation to one another using the concept of state space: a hypothetical space defined by the fundamental dimensions according to which such systems might differ, so called because this space thus contains all varieties of states in which a system might possibly exist. These approaches offer the means to transform the potentially infinite permutations of belief and behaviour into a plane of possibility limited by testable hypotheses as to how particular societies generate particular ideological groups, constrain ideological change and might create misunderstanding and conflict between groups over particular concepts or stakes.

Existing Schemes for Classifying Ideologies[8]

The most popular way of categorizing ideology, dominant in scholarship and popular discourse since it was established by the seating arrangement of the National Assembly during the French Revolution, is the bipolar left-right axis, with left representing inclination toward change and/or egalitarianism ("liberalism") and right representing inclination toward stasis and/or hierarchy ("conservatism"). Most scholars agree that such a dichotomy oversimplifies the fluid and multi-layered reality of political attitudes. Nonetheless, its use can be defended on the grounds that the human mind has a natural preference for simple categories, and this preference is itself a force in shaping ideological attachments. Perception of a dichotomous relationship between ideologies leads to institutional structures, such as two-party systems, that limit political options, thereby causing a clustering of attitudes (Braithwaite 1998; Jost 2009; Jost, Nosek and Gosling 2008).

Those who examine ideology as an independent variable shaping institutions and behaviour tend to tacitly adopt some variation of the left-right axis. Those who examine it as a dependent variable, on the other hand, must deal more explicitly with the multiplicity of diverse factors that converge to create an ideology, and are therefore more inclined to address the problem of classification directly

8 Background on existing ways of classifying ideology is derived from Mildenberger (2013).

using either two-dimensional or multi-dimensional models.

Two-dimensional classification schemes can offer deeper explanations than the simple left-right axis, while remaining easy to visualize. Among those that have been proposed in the literature are:

- "grid-group," with the grid axis measuring support for authority and control over members of society and the group axis measuring support for group membership and adherence to group norms (Douglas 1970);
- support for freedom and support for equality (Rokeach 1973);
- preference for security and preference for harmony (Braithwaite 1997);
- Social Dominance Orientation, which ranks "preference for inequality among social groups" (Pratto et al. 1994), and Right-Wing Authoritarianism, which captures submissiveness to authority, aggression and respect for tradition and norms (Altemeyer 1981; Sibley and Duckitt 2008); and
- traditional versus secular-rational value systems and survival vsersus self-expression (Inglehart and Welzel 2010).

Multi-dimensional schemes offer even richer accounts of available ideological possibilities, although at the cost of simplicity, as the use of any more than three dimensions makes them difficult to visualize graphically. Many of these schemes draw from the "Five Factor Model" (Caprara et al. 1993), which, through extensive survey data, determined five crucial dimensions of personality: energy, agreeableness, conscientiousness, emotional stability and openness.

- G. Hofstede (2001) proposes five dimensions to classify national cultures: power distance (degree of societal inequality), uncertainty avoidance, individualism versus collectivism, masculinity versus femininity (degree of gendered expectations of differentiated behaviour) and long-term versus short-term orientation. Drawing from the World Values Survey, his more recent work suggests a sixth dimension: indulgence versus restraint.
- Drawing from a thorough review of literature in anthropology and evolutionary psychology, J. Haidt (2001; 2007) identified five core moral foundations: harm/care, fairness/reciprocity, in-group/loyalty, authority/respect and purity/sanctity, although his later work (2012) added a sixth: liberty/oppression.

Although each method for classifying ideologies in relation to one another contains its own insight, together they are varied and often contradictory. Rather than generating any cumulative understanding of the dimensions of political attitudes, they instead offer a laundry list of candidate dimensions tied to the different disciplines from which they derive, the different methods used to draw out critical factors and the different questions they are used to answer. There remains a need for a scheme, or perhaps a set of schemes, for classifying ideological positions and clusters of beliefs in relation to one another that is readily comprehensible, yet that captures the most relevant information as to possible dimensions of ideological difference; one with the capacity to reveal coherent ideological possibilities that existing discursive or institutional constraints might otherwise obscure.

Dimensions of Ideological Possibility

If ideologies are the emergent products of multiple interacting systems — more than the sum of their parts — they require a classification scheme of their own; one that treats them as something *sui generis* rather than derivative of any one process at any one level of analysis. Differences in political ideology might be caused in part by, and correlate to, differences in personality, culture or moral intuition. But relying on a classification scheme derived from the study of personality, culture or moral intuition will have a distorting effect, privileging those factors over others that might be just as significant in shaping ideology.

Ideology must therefore be measured on its own scale, with the irreducible dimensions that define and distinguish ideologies treated as an empirical question in its own right. Such a classification scheme could be developed around a finite number of fundamental philosophical questions on which any ideological system must, of necessity — whether implicitly or explicitly — stake a position, even if that position is neutrality. An ideology could thereby be classified as a particular configuration of answers to these fundamental questions. Positions taken by adherents to an ideology on any specific issue should then be understandable according to the positions adopted by the ideology on fundamental questions related to that issue, while ideological change could be understood as change in an individual's position on one or more of these fundamental questions.

The precise content of these fundamental questions, and even how many of them there are, must itself remain an open empirical question. To begin with, we have proposed the following 13 questions (see Table 1) allowing for any ideology to be locatable as a point within a hypothetical 13-dimensional space, defined by its position in relation to each of these questions.

The expectation is that when real-world ideologies are examined and located in this scale, not all combinations of

Table 1: Dimensions of Ideology

		Issue	Question		Belief Strength					
IS	General	*Time*	Which is more important, the future or the past?	**FUTURE**	S	M	AMB/NP	M	S	**PAST**
		Change	Do things constantly change or do they basically stay the same?	**MOVEMENT, GROWTH**	S	M	AMB/NP	M	S	**STASIS**
		Intelligibility of Reality	Is the universe understandable?	**INTELLIGIBLE**	S	M	AMB/NP	M	S	**UN-INTELLIGIBLE**
		Spirituality of Reality	Is the universe infused with a spirit?	**MATERIAL**	S	M	AMB/NP	M	S	**SPIRITUAL**
		Moral Principles	Are moral principles objective and universal? (Relativism vs. absolutism)	**SUBJECTIVE, CONTEXTUAL AND MALLEABLE**	S	M	AMB/NP	M	S	**OBJECTIVE, UNIVERSAL AND INVIOLABLE**
	The individual	*Human Agency*	Can a person choose his/her fate? (Determinism vs. free will)	**WEAK**	S	M	AMB/NP	M	S	**POWERFUL**
		Human Nature	Are people basically benevolent or malevolent?	**BENEVOLENT**	S	M	AMB/NP	M	S	**MALEVOLENT**
		Humans and Nature	Are humans part of nature or exceptional?	**HUMANS PART OF NATURE, EMBEDDED**	S	M	AMB/NP	M	S	**HUMANS EXCEPTIONAL, SEPARATE**
	The individual in the group	*Social Differentiation*	Are the differences between people and/or groups of people large and essential?	**SMALL AND UNIMPORTANT**	S	M	AMB/NP	M	S	**LARGE AND ESSENTIAL**
		Personal Identity	What is the main source of my identity?	**MY GROUP**	S	M	AMB/NP	M	S	**MYSELF**
OUGHT		*Personal Responsibility*	How far from me does my responsibility extend? (Empathy)	**TO COMMUNITY**	S	M	AMB/NP	M	S	**TO SELF**
		Power	Is use of power over others usually wrong or often right? (Justice)	**USUALLY WRONG**	S	M	AMB/NP	M	S	**OFTEN RIGHT**
		Wealth	Is relative wealth moral or immoral? (Fairness)	**IMMORAL**	S	M	AMB/NP	M	S	**MORAL**

Source: Homer-Dixon (forthcoming).

Note: S stands for strong; M for moderate; and AMB/NP for. ambivalent/no position.

answers to this set of questions will be equally prevalent. Within a given cultural context particular combinations of answers will prove more logically and emotionally coherent than others. This model could thereby explain how certain seemingly incompatible issue positions often cluster and coexist under particular ideological labels (for example, how the "pro-life" stance that motivates social conservatives to oppose abortion rights tends to correlate with support for capital punishment). It also allows us to track the **co-evolution** of ideological systems, as each vies to form and occupy a particular space in part by defining itself against others according to their positions on certain key questions or representative issues.

Coherence is thereby depicted in this model as a type of **equilibrium**: a state in which forces are balanced such that it takes a minimal input of energy for the system to remain stable. The theory is that while it takes the mental equivalent of energy to maintain an incoherent belief system, it takes less energy to maintain a coherent one. In a landscape of possibility, these points of equilibrium constitute **basins of attraction**, where particularly powerful or attractive ideologies, defined by their coherence and similar in their deep assumptions, are likely to cluster. Small changes to one's position on individual questions are difficult to the extent that they interact incoherently with existing positions on other questions, thereby pushing the system away from equilibrium (explaining resistance to ideological change in the face of new information). That is, unless they are balanced by larger changes to positions on other questions, causing the system to be pushed across a **tipping point** that shifts it into a new equilibrium (presenting as a kind of conversion experience).

The dynamics of transition between basins of attraction explains both the "stickiness" of ideology in the face of challenge and the apparent rapidity of ideological change when change does occur. In other words, the state-space approach gives us a means to model the effects of **path dependency**. How an ideology changes depends significantly on where it starts from; the initial configuration of beliefs and assumptions constrains its future possibilities. Some pathways of change will be coherent and therefore plausible, others less so. Pathways will also include key junctures where small changes in belief start a cascade of shifts that opens up new and alternative routes of change. In that event, ideological change can be dramatic and happen very quickly. A state-space model can capture the processes underlying such non-linear change, allowing us to better understand the causes of rapid change from one ideological basin of attraction to another.

But while state-space representations of ideological possibility can potentially capture all relevant dimensions of ideological difference, the problem with this approach remains the difficulty involved in visualizing it. Locating and tracking the movement of a point against 13-dimensional axes involves too much information and too many relationships to be tractable. There will be occasions when it is beneficial to sacrifice some of that nuance, by either selecting a maximum of three dimensions most relevant to a given issue or devising a maximum of three categories into which these dimensions can be sorted. For example, the "Ought" questions in the table above could be said to be questions relating to the broader category of justice, and while the values of each of these questions might not always correlate, it could nonetheless be suggested that they all contribute toward an overarching notion of the legitimate distribution of goods, both material and conceptual. Similarly, the "General" questions and most of the questions relating to the individual could be clustered together as questions of agency, relating to the extent to which human volition controls individual circumstances and fate. The questions involving the individual and the group are ultimately questions of identity, issues contributing to the differentiation of individuals into groups and to an overall sense of the basis and significance of such differentiations. Mapping the relationships between no more than three factors at a time allows for the possibility space to be visually depicted in a three-dimensional grid and enables us to apply other concepts derived from complexity theory to predict and explain processes of ideological change.

Catastrophic Dehumanization

An example is the use of "catastrophe theory" (Thom 1975; Zeeman 1976; 1977) to represent how a convergence of forces causes psychological changes in large numbers of people consistent with dehumanization; the phenomenon, observable in situations of violent conflict, where people who were previously peaceable neighbours rapidly become fierce enemies, denying each other the protection afforded by membership in a shared community to the point of being willing to engage in violence against one another.

Until now, catastrophe theory has not been widely used in political science or conflict research. But used in this way, it can successfully account for several key aspects of sudden behavioural change that are not easily explained otherwise, such as sudden shifts in the character of in-group/out-group relations, the inaccessibility of intermodal values between these states, the existence of hysteresis in the pathways of change between states and the widening divergence between states which increases with the size and severity of the discontinuity (Gilmore 1981; van der Maas and Molenaar 1992). We use catastrophe theory to visualize processes that cause minds to transition from one ideological basin of attraction to another. It maps a set of psychological states in the mind of a hypothetical individual member of a group and the possible pathways of movement between states when that individual is subject to external inputs. It is based on the

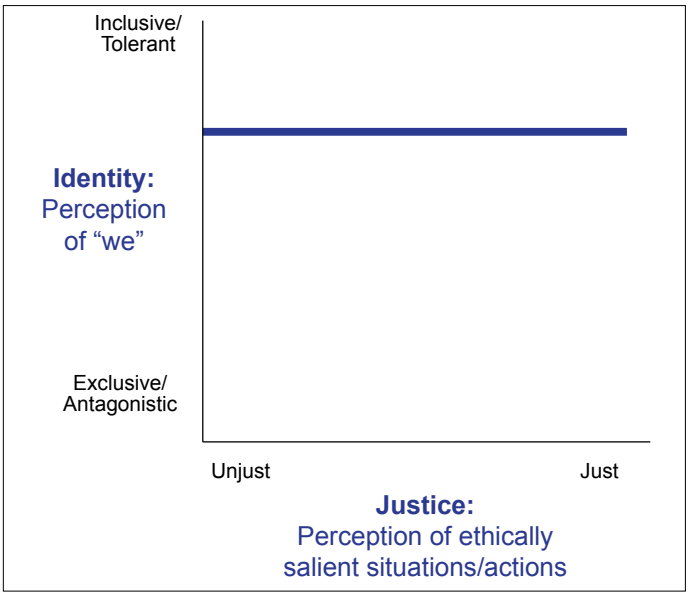
assumption that multiple individuals subject to the same social forces will tend to alter their psychological states in similar characteristic ways, changing their behaviour in tandem to allow for new forms of communication and interaction between them. Non-linear change in collective behaviour is understood as the product of critical transition, or threshold change, in the belief systems of multiple individuals subject to similar social influences. The theory is that the resulting shifts or flips in ideological positioning are not unlike the sort of critical transitions that can be found in nature and may indeed follow related mathematical patterns.

The ideological dimensions represented as contributing toward dehumanization are broken down into the three categories of **identity, justice** and **structural constraint**. Identity measures the degree to which individuals perceive themselves members of a group as distinguished from an out-group and the degree to which that out-group is perceived negatively. It is measured on a scale with "inclusive/tolerant" at one end and "exclusive/antagonistic" on the other. Justice refers to the individual's assessment of the justness of either the individual's own situation, the situation of others in the population with whom the individual identifies or the actions of others in the population toward the individual or toward people with whom the individual identifies. The scale varies between "just" and "unjust." Structural constraint is the degree to which members of the population perceive themselves and others to be restricted in their ability to exercise their agency. When "strong," the individual perceives that surrounding material and social structures provide members of the population limited, if any, latitude for agency. When "weak," the individual perceives that these structures provide members of the population-wide latitude for agency.

Each of these axes could be said to correspond to an existing school of thought on the causes of conflict, which tends to focus excessively on that axis to the exclusion of others. Identity is the axis that preoccupies scholars of social history who stress the need to take seriously pre-existing identity categories and attachments to myths and symbols as significant causal factors in conflict behaviour. The justice axis is the domain of Marxian and other instrumentalist or materialist theorists who ultimately see conflict as a factor of unequal power relations and resource distribution. The structural constraint axis is the one that currently dominates international relations theory, reflected in the rational choice paradigm as well as most critical constructivist approaches, both of which tend to see social movements as collections of individuals coalescing to pursue rational self-interest within or without prevailing normative structures and constraints. None of these approaches alone adequately explain unpredictable collective phenomena such as mass violence. A state-space approach enables us to integrate the insights of these paradigms, using the strengths of each to address the weaknesses of the others.

The theory that postulates a catastrophe cusp representing a threshold change between non-conflict and conflict equilibriums is based on four hypotheses. Each side of the cube represents a presumed relationship between two variables when the third is held at an extreme value. The shape of the emergent surface within the cube represents a fifth and overall hypothesis as to all possible relationships between the three variables when none is at an extreme value — and, in particular, about the splitting effect induced by changes to the level of structural constraint. While the space and means is not available to prove these hypotheses at this time, they are all inductively plausible as well as being empirically testable in principle, such that if we can provisionally accept them as assumptions, the product of their triangulation will stand as a useful theoretical model.

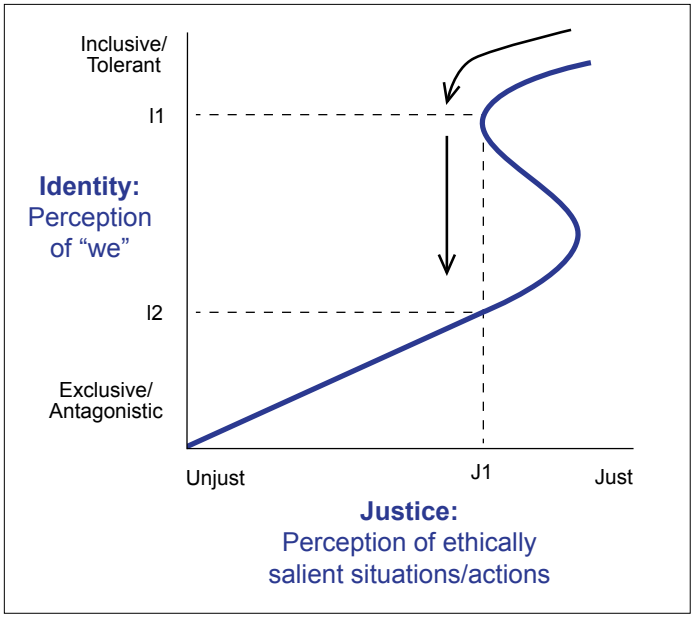
Figure 10: The Relationship between Identity and Justice under Conditions of Strong Structural Constraint



Source: Homer-Dixon (2012).

Under conditions of full structural constraint — say, a hypothetically absolute totalitarian society where every aspect of individual thought and behaviour is rigidly monitored and controlled — the level of inclusivity of the in-group would be unrelated to the perceived level of justice and may indeed even show a consistently high level of tolerance. When an individual thinks that all members of the population have equally limited latitude for agency, he or she will not attribute responsibility to any member of the population for situations or actions perceived to be unjust. A society constrained by a fatalistic world view will attribute injustice to fate or to divine will; a society constrained by an effective absolute authority will blame "the System."

Figure 11: The Relationship between Identity and Justice under Conditions of Weak Structural Constraint



Source: Homer-Dixon (2012).

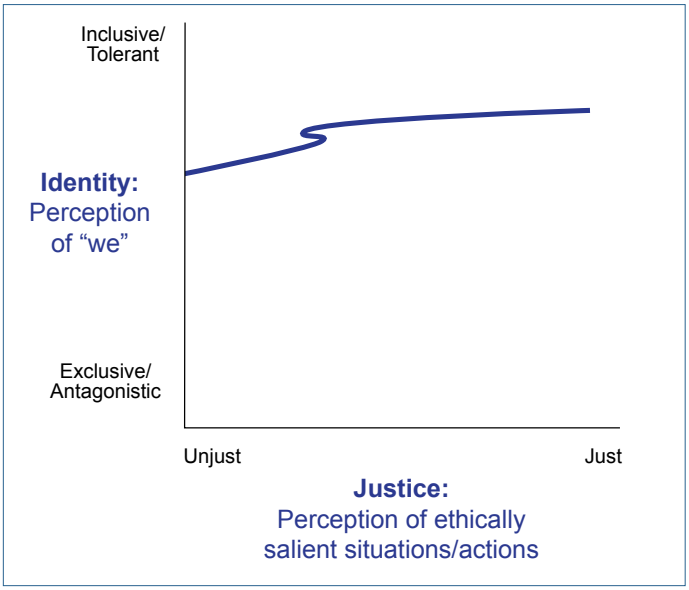
In contrast, when people are perceived as having a high level of agency, there will be a correlation between perceived injustice and identity polarization, as the experience of injustice leads an individual to look for other autonomous agents whose pursuit of their own interests might be the cause of frustration. When this occurs, the change will be rapid, reflected a sudden drop from value I1 to value I2, past the values represented by the curve of the solid line, which are inaccessible. This represents a threshold change from one equilibrium in which identity is tolerant, to another in which it is suddenly quite antagonistic.

This notion is intuitively sensible. Although the ideological change that leads to dehumanization may be the product of gradual and incremental social forces, the eventual decision on the part of an individual to either trust or fear a particular "other" — to see them as either "us" or "them" — is a binary one. If large numbers of people make this choice when the same point is reached on a continuum of collectively experienced social forces, the result will be a radical and otherwise unexpected shift in collective behaviour. Once this cognitive change has occurred it is difficult to reverse, even through a reversion of those same contextual social forces.

The identity values between the upper and lower cusps become inaccessible regardless of the value for justice. Once a certain threshold has been reached, a process (the specifics of which will be elaborated below) is triggered that flips the system into a new state, such that returning the independent variable to its previous state does not do the same to the dependent variable. This phenomenon is known as hysteresis: the path back to an inclusive identity is not the same as the one that led to the antagonistic identity. Perceived justice rather has to increase to a level even higher than status quo before another sharply discontinuous shift to an inclusive/tolerant identity occurs, sufficient to return the individual to a psychological state approximating his or her prior condition. This would be observable in the phenomenon whereby a war or revolution with initially modest grievances and demands radicalizes those demands once conflict is underway.

In the language of catastrophe theory, the point where the response surface splits into two planes is called the singularity, which in this case appears when weakening structural constraint causes a discontinuity in the relationship between justice and identity. This is one of the core hypotheses of the model: the weaker the constraint on agency, the less injustice is needed to trigger a search for agents of injustice, the more they will be held responsible for their actions, and therefore the more this will exacerbate identity polarization and hostility — in other words, the steeper will be the drop from I1 to I2. At an intermediate level of structural constraint, the curve might look more like this:

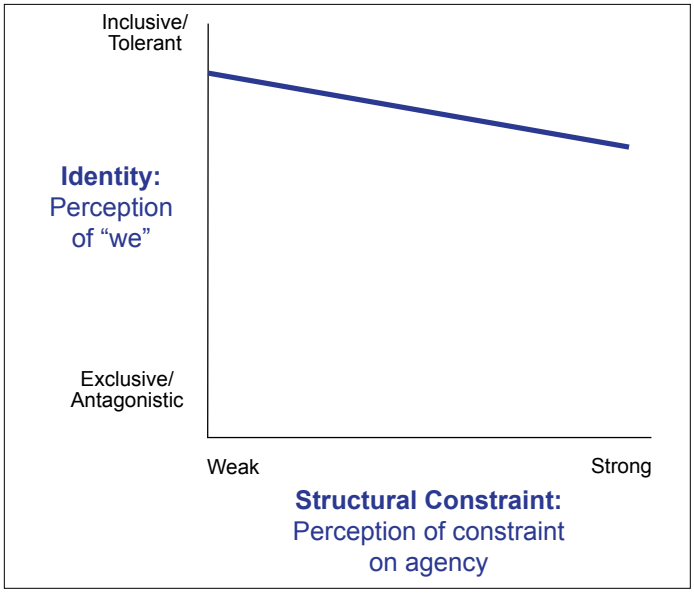
Figure 12: The Relationship between Identity and Justice under Conditions of Moderate Structural Constraint



Source: Homer-Dixon (2012).

The threshold change is still present, but it takes a greater level of injustice to trigger a lesser drop toward an exclusive/antagonistic state. In an environment of moderate structural constraint, it takes a greater stimulus of injustice to push the system into a new identity equilibrium. But as structural constraint weakens, the discontinuity, first observable here, grows into that seen in the previous figure.

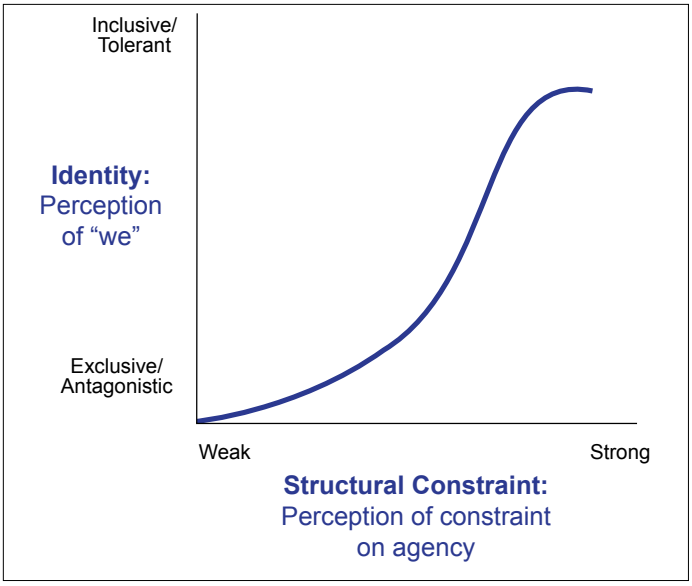
Figure 13: The Relationship between Identity and Structural Constraint under Just Conditions



Source: Homer-Dixon (2012).

This is the high side of the cusp, dominated by an uninterrupted "stability plane." Regardless of the value of structural constraint, if the individual believes overall that his or her circumstances (and those of others with whom he or she identifies) are just, then the individual's perception of identity will remain relatively inclusive or at least tolerant. Under conditions of justice, there is little cause for animosity toward others, regardless of the level of structural constraint. Hence, the relationship will be relatively constant with a high level of inclusiveness and tolerance. Indeed, it could be said that in an environment experienced as just, lower levels of structural constraint with generate greater levels of tolerance and inclusiveness. The individual's increasing attribution of responsibility to others for the perceived justice of his or her situation boosts their feelings of trust in, and identification with, other members of the population, strengthening the perception of an inclusive civil society. If you perceive both yourself and others as enjoying autonomy of action, yet justice and a sense of personal safety and security prevails, you will feel solidarity with those around you, trusting them to continue behaving cooperatively and be more inclined to behave cooperatively yourself.

Figure 14: The Relationship between Identity and Structural Constraint under Unjust Conditions



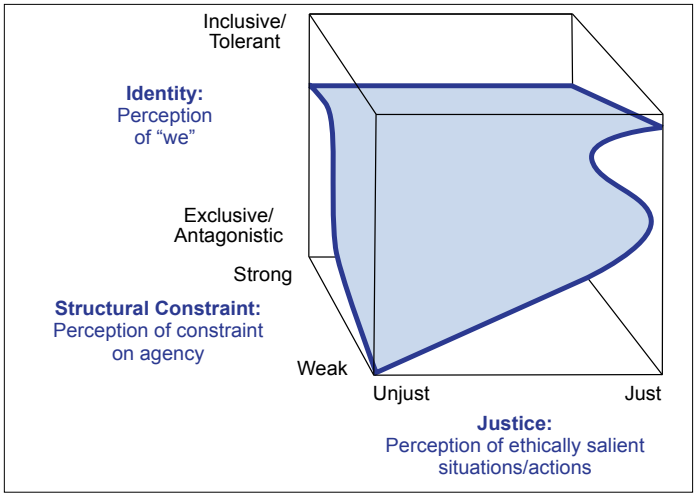
Source: Homer-Dixon (2012).

Below the cusp, however, the "activity plane" has an entirely different shape. In an environment of rampant injustice and inequality, antagonism will correlate sharply with the weakness of structural constraint. Given a high level of structural constraint, stability could be maintained even in a situation of injustice. But as structural constraint weakens, the identity plane descends rapidly toward the exclusive and antagonistic. Declining structural constraint encourages the individual to increasingly blame identified others for perceived injustice and to perceive those others as a greater threat.

Such a transition from a strong to weak level of structural constraint could refer to the collapse of an authoritarian regime into a failed state lacking any rule of law, where everyone is divided into armed factions pursuing individual and group self-interest. In such a situation, everyone is a potential threat and there are any number of "others" available to be held actively responsible for injustice. But weak structural constraint might also be said to be the permanent condition of developed liberal-capitalist democracies with their laissez-faire economies, wide space for civil society and a state that at its most functional exists to defend diversity and individual autonomy. The stability of such a state is highly sensitive to changes in the perceived level of injustice, as evidenced by the measureable increase in hate crimes that occur during periods of economic recession.

The overall result when these hypotheses are combined into a three dimensional grid is a plane representing all possible values of these three factors in combination.

Figure 15: Overall Model of Catastrophic Dehumanization



Source: Homer-Dixon (2012).

This plane represents a possibility space or state space, with the shaded area representing the threshold/hysteresis effects and their related inaccessible values. Note that the size of threshold change between inclusivity and antagonism increases in magnitude as structural constraint weakens.

Cognitive Drivers of Threshold Change

What then is the underlying cause of this threshold effect? The above model is designed to map what happens in the mind of a hypothetical individual subject to a convergence of inputs from the social environment. The question, therefore, is what decision, what change of mind, is reflected in the transition across the catastrophe cusp; why does the individual's attitude toward identity flip between two discrete states? Although the social inputs mapped may be on a continuum, at a cognitive and emotional level it is ultimately experienced by the individual as a binary choice: do I trust or mistrust members of the defined out-group? Are they "us" or "them"? As perceived injustice increases, the individual makes greater effort to scan the surrounding population for people to blame for the injustice; an endeavour that becomes easier as structural constraint on agency declines. At the edge of the cusp, the individual has provisionally identified a potentially discrete group of people who are at least partially responsible, but the individual has not yet developed an antagonistic attitude toward members of the group nor identified them as fully separate and excluded. As the justice value declines past the cusp, the individual's estimate of the costs and benefits of engagement with the out-group shifts sharply as the individual concludes that he or she is better off distrusting members of the other group than trusting them. Once the cusp has been crossed, the individual's psychological state changes radically. The decision to distrust the other group and act against them accordingly converts potential threat into actual threat, and the perception of actual threat produces fear. This fear translates directly into an exclusive and antagonistic attitude toward the out-group, which explains the widening gap between the stability and activity planes as structural constraint declines.

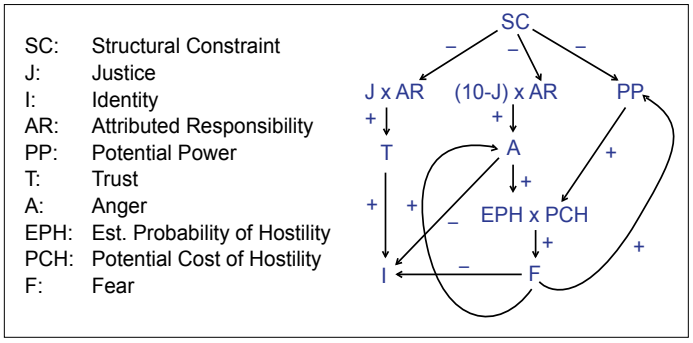
Feedback effects are what create the dynamics for threshold change. The question can therefore be reframed as: what can cause feedback effects in a belief system? The answer, drawn from recent cognitive science research, is motivated inference. Motivated inference occurs when beliefs, emotions and other mental states are conflated in processes of decision making with external facts in evidence. There are different kinds of motivated inference, and the type of emotion associated with the mental representation biasing the process has significant effect on the process itself.

The term motivated inference is most often used to refer to what is actually a subset more specifically called desire-driven inference, where the fact that you believe or want something to be true is interpreted as evidence of its truth. This must be understood as something more than mere wishful thinking. A process of desire-driven inference occurs when the mental representation of the desired object is so vivid and integral a part of an individual's belief system, it leads to prejudiced selection and weighting of other evidence. During the 2012 US elections, many otherwise well-regarded conservative pundits dismissed the overwhelming evidence reflected in polling data that Barack Obama was well placed to win re-election. Instead, projecting their own dislike and disapproval of the president onto the electorate, they picked and chose information favourable to a victory for his opponent Mitt Romney and embraced arguments that interpreted less favourable polls as systematically biased. On the eve of the election, they did not merely hope but were certain that the evidence proved that Obama would be defeated.

Desire-driven inference is easy to understand. Although it may have a distorting effect on reasoning, it comes with a short-term payoff in the form of positive or pleasurable emotions. There are other kinds of motivated inference which due to their counterintuitive nature are at times referred to as counter-motivated inference. For example, fear-driven inference, in which a feeling that something is wrong is erroneously taken as evidence that something really is wrong (Thagard and Nussbaum 2013). Such counter-motivated inference was evocatively portrayed in Shakespeare's *Othello*. Despite the fact there is only the flimsiest of evidence, once the mere possibility of Desdemona's unfaithfulness enters Othello's mind, it is eventually experienced as a reality to the point where Othello is prepared to murder Desdemona in response. Although they rarely proceed to such an extreme, such inferences are often the cause of misunderstanding and miscommunication in romantic relationships. This seems irrational; a cognitive process that distorts reasoning

without promoting, indeed being detrimental to any emotional benefit or interest. Anger-driven inference is similar, where the prospect of something makes you so outraged, it again becomes vivid enough in your mind to be taken as objective fact and you already begin preparing to react.

Figure 16: Process of Dehumanization



Source: Homer-Dixon (2012).

In the context of our model of violent social conflict, the processes of motivated inference can be mapped as follows:

- Structural constraint (SC) is correlated inversely with *attributed responsibility* for action.
    - As SC is perceived to decline, the individual increasingly holds other members of the population responsible for their actions.
    - It is also inversely correlated with perceived *potential power*. As SC declines, the individual perceives other people seeking to achieve their interests as a greater potential threat to his own.
- As SC declines, the extent to which the world is perceived as *just,* combined with the extent to which people are deemed to have active responsibility for the state of the world, increases *trust* in others and maintains the stability of an inclusive and tolerant identity.
- However, to the extent that the world is perceived as *unjust*, as attributed responsibility increases, leads to *anger*, and the drive to identify parties responsible for injustice leads to polarization and intolerance among those parties.
- This anger is interpreted as evidence of those parties' responsibility for the injustice, and therefore increases the sense that those parties are likely to continue to act in a hostile manner. The more SC decreases, the more other individuals and groups are perceived as having the capacity to do harm to the self or related interests, increasing the potential cost of conflict with others. The combination of the increased sense of likelihood of hostile action on the part of others and the increased consequence of their hostility generates fear.
- This fear, in turn, has a feedback effect. Fear, once induced, accentuates the perception of injustice as the individual will think it unjust that he or she should be threatened and afraid. The fact that an individual is made to experience fear of the out-group makes them more angry with the out-group for inducing that fear, while the experience of fear is interpreted as objective external evidence that the out-group must pose a genuine threat.
- At a certain threshold, which depends on the level of injustice felt and the extent to which SC has weakened, the effect of this feedback will serve to increase the level of fear to the point where it overwhelms the trust that maintains equilibrium.
- Once this happens, the individual's psychological state will be rapidly pushed down the slope of the plane from an inclusive and tolerant construction of identity to sharp hostility toward a sharply delineated out-group. This change in the value of the identity variable increases the likelihood of the individual being willing to engage in hostile activity against members of the out-group.

Illustrative Cases: Bosnia and Egypt

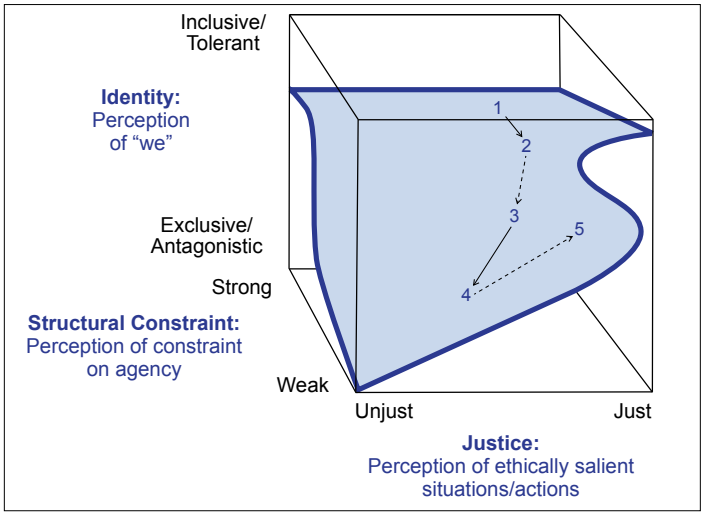
Can such a model be used to illuminate real-world conflict situations, adding value to existing explanations? Consider the case of the collapse of Yugoslavia, in particular the process that led to civil war and ethnic cleansing in the previously multi-ethnic republic of Bosnia-Herzegovina. Explanations for the rapid descent into conflict have traditionally been divided between two camps. The "ancient hatreds" school of thought holds that the fact conflict occurred as the constraints of the Yugoslavian system began to ease proved the depth of animosity between separate identity groups, which was held in check only temporarily by the constraints of the socialist state. This group focuses on the dimensions of identity and structural constraint, arguing (to frame it in the language of systems theory) that the latter kept the former in a state of disequilibrium reflected in artificial tolerance and inclusiveness, whereas its reduction restored identity to its natural equilibrium of polarization and animosity. In response, another school of historians have adequately supported the position that inter-group relations in Yugoslavia were more often characterized by inclusive and cooperative behaviour than by animosity and conflict, indicating that the equilibrium state was one of high tolerance. This group tends to attribute conflict to the self-interested manipulations of politicians, such as Slobodan Miloševic, who sought to enhance their own power and position within their own groups by exaggerating the

threat posed by others — in other words, manipulating the identity and justice axes with their rhetoric.

These different views amount to more than an academic dispute over history. They have significant policy implications regarding whether and what sort of interventions into conflict might have positive effect. It was reported that a shift in American policy during a sensitive point in the negotiations over Bosnia occurred when President Bill Clinton read *Balkan Ghosts* by Robert Kaplan. This book, heavily informed by the "ancient hatreds" perspective, altered his previously pro-Muslim stance in favour of a position of non-intervention. His position shifted back again when he engaged the works of Noel Malcolm, a proponent of the "political manipulations" view (Owen 1995).

Subsequent explanations have tended to credit both views or attempt to strike a balance between them. But merely acknowledging the significance of multiple factors, while it makes for a more defensible argument, only compromises the explanatory power of single factor models. Unless, that is, one can make a case as to exactly *how* factors interact to produce these outcomes — specifically, what interactive changes between institutions (structural constraint), the beliefs of and relations between groups (identity) and the manipulations of political leaders (justice) generated rapid descent into antagonistic violence. Catastrophe theory offers such a model, by hypothesizing the existence of two similarly stable planes of equilibrium — a "peace plane" and a "conflict plane" — without stable points in between.

Figure 17: Threshold Change, Bosnia



Source: Authors.

Consider each numbered point mapped onto the grid above to be a successive point in time in the progression of the Bosnian conflict. Point 1 represents the pre-conflict status quo prior to the collapse of Yugoslavia. While there may have been a sense of injustice experienced by members of the various identity groups, the level of structural constraint is high. It is our argument, expressed through this model, that this level of structural constraint did not merely serve to restrain ethnic animosity that remained beneath the surface as the "ancient hatreds" school of thought would have us believe. Rather, the shared sense of lack of agency generated an authentic and felt common identity between potentially disparate groups in the population. "Brotherhood and Unity" cannot be dismissed as a mere propaganda slogan; it was indeed a lived reality to many, so long as the institutional structure remained in place.

Point 2 represents the transition to the late 1980s and early 1990s when that institutional structure changed significantly in terms of the level of constraint it could impose on individual agency. The collapse of the Soviet Union and the Warsaw Pact weakened the appeal of Yugoslav socialism as a shared ideology and called into question the coercive power of the Yugoslav state to enforce shared norms. But the consequent reduction in the level of structural constraint would not necessarily push the society across a tipping point into antagonism. It would, however, move the society closer to the edge of the threshold, reducing the level of perceived injustice or threat needed to push it over. This push was provided by the media and the rhetoric of politicians, who sought to maintain their hold on power in the wake of the evident decline in the salience of their party and its political ideology by appealing to fears within their respective ethnic communities. Rhetoric that would have had little effect at a time when stable institutions afforded little latitude for agency was, under conditions of high agency, able to sow mistrust against others as to their responsibility for current injustices and their potential to threaten future injustices, pushing a critical number of people from point 2 to point 3: a state of animosity and active conflict. And, of course, once conflict was underway, the fear of injustice was substantiated by the actual experience of violence and threat at the hands of the other, pushing the society ever further down the slope to point 4. Greater violence and injustice feeds greater animosity, with both leading to the further collapse of institutions and an anarchic situation that further escalates a sense of threat.

But even once stability was re-established in Bosnia-Herzegovina through the Dayton Accords and the leaders who helped instigate the crisis were replaced, this alone was not sufficient to restore the pre-conflict status quo in inter-group relations. Rather, point 5 represents a new post-conflict equilibrium. Peaceful relations may gradually improve cooperation and trust, affecting a gradual decline in identity polarization and hostility. But the conflict will have engendered actual changes to the cognitive structure of minds that cannot simply be reversed with the removal of the stimulus that instigated them. The removal of conflict conditions still leaves a changed landscape of ideological possibility. New institutions, new language and new

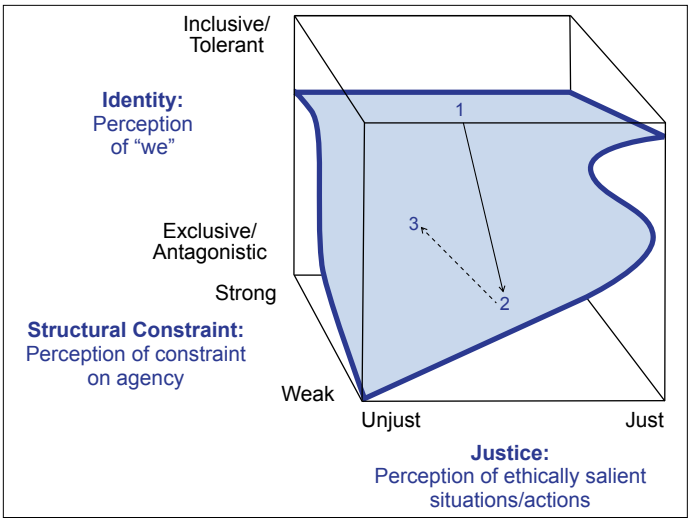
constructions of identity impacted by the conflict keep the society at a higher level of polarization and animosity than was prevalent before, demanding greater effort than was required previously to keep it from descending into conflict once again.

Another illustrative example of the use of this model can be found in its application to the 2011 protests that culminated in the overthrow of the Egyptian government. There has been much discussion as to the critical role played by the Internet and social media in these events. J. Lang and H. De Sterck (2014) of the University of Waterloo developed a mathematical model to account for the impact of social media during revolutions in dictatorial regimes, and many of their conclusions are tractable against the catastrophe cusp resulting from the triangulation of identity, justice and structural constraint.

An individual's decision whether or not to participate in a revolution involves the weighing of several emotional and practical factors, including agreement with the movement's goals, anger at a definable out-group against which struggle can be waged, the amount of personal risk involved and perceived effectiveness of the movement and its chances of success. The perceived size of the protest is significant to several of these factors. The larger the protest, the greater its prospects for success and the less the state will be able to effectively retaliate against individual participants. If individuals perceive a revolution to be below a certain threshold of participation, they will presume the chances of success to be too low and the risk of punishment too great, despite whatever desire they might have themselves to see the regime fall. Above this threshold, an individual's desire to see the regime fall and hope for a successful outcome will overpower their fear of government reprisal. It is for this reason that dictatorial regimes keep protests hidden from the population through their control of the media and through censorship; a state of affairs reflected in point 1 on the grid below, where, despite a relatively high level of perceived injustice, structural constraint was such that effective mobilization against a defined other was not a realistic prospect.

Without the language and conceptual framework for any coherent, coordinated alternative, the individual will feel they have limited agency to effect change or even to assign blame for the current state of injustice. Identification among the regime, the army and the nation was simply accepted by the individual as part of the network of mental representations communicated by the social environment.

Figure 18: Threshold Change, Egypt

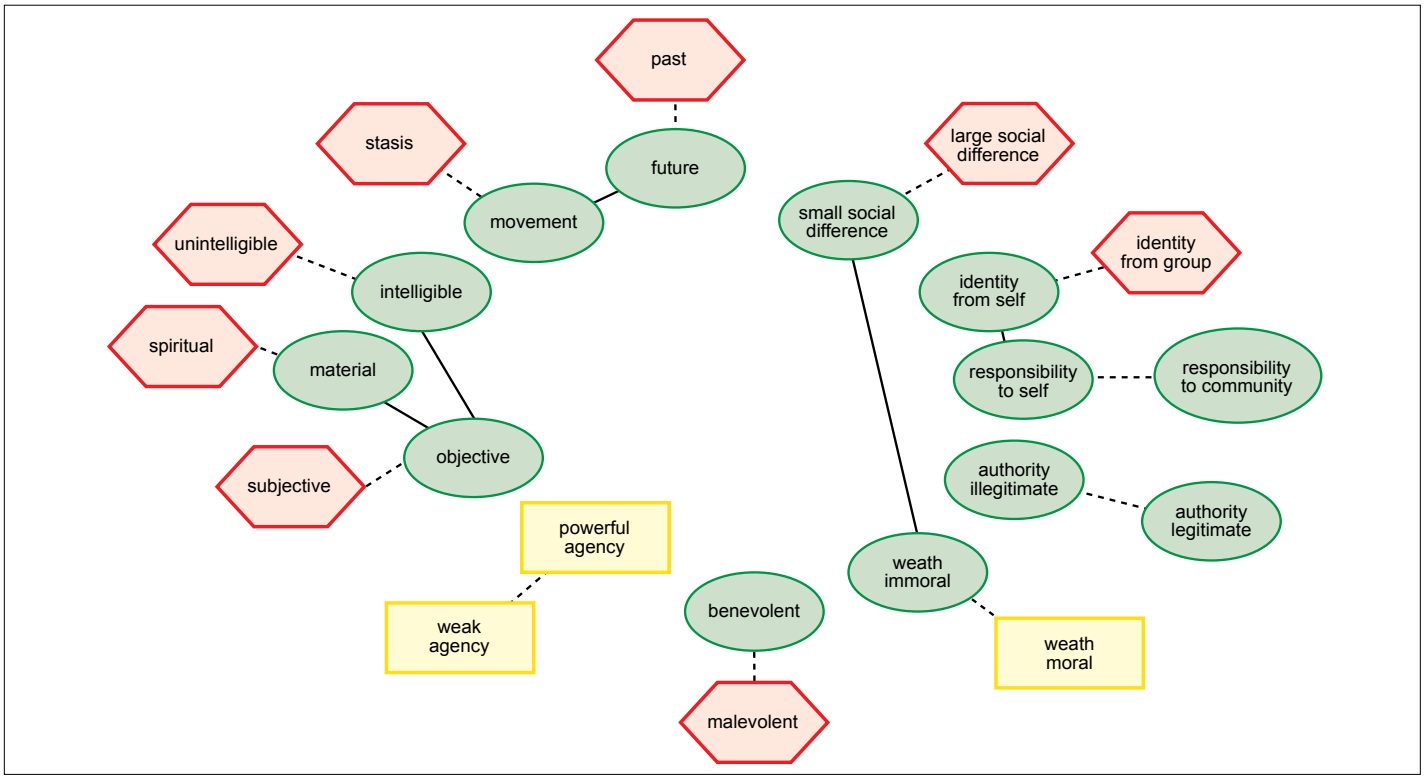


Source: Authors.

Several factors served to drastically reduce perceived constraint on agency in early 2011, causing a sufficient number of individuals to cross the tipping point into a state of activity represented by point 2. News of a successful revolution in Tunisia would have reframed the perceived landscape of possibility, causing Egyptians to discuss and re-evaluate the strengths and weaknesses of the regime, the discontent of the general population and their chances of success. Support for the protests by the Egyptian army would have further reduced structural constraint on agency for the protesters, curtailing the regime's policing capacity. But the availability of new social media tools cannot be discounted as an ongoing significant factor. By circumventing the state's control over the flow of politically sensitive information, the Internet, social media, satellite television and cellphones provided a previously unavailable means to overcome problems of organization and coordination. Once protests were underway, technologies such as SMS and Twitter messaging were used among protesters, for example by communicating which streets were the most or least obstructed by security forces, enabling them to mobilize faster and more safely. These technologies also provided information that better enabled individuals to assess public support for the revolution and, as well, enhanced awareness of the nature and severity of government repression.

Aware of the significance of this factor, the regime disrupted Internet service between January 28 and February 1, 2011, during which time social media was unavailable as a source of information and means of coordination. This re-imposition of constraint on agency had a measurable effect in reducing the size of the protests, represented in the transition from point 2 to point 3. But as the threshold had already been crossed, it was not enough to restore the status quo. By the time the Internet shutdown had been implemented, minds had already been changed. People

Figure 19: CAM of Ideological Dimensions



Source: Paul Thagard, in personal correspondence, October 2013.

were sufficiently aware of the size of the protest to have been shifted to a new cognitive equilibrium, characterized by a new language and framework for voicing grievance and a changed sense of polarization as opposed to identification between the regime and the society. It would have taken a considerably greater level of repression than had existed prior to the protests (or a considerable improvement in the perceived sense of justice — i.e., success of the revolution) to restore activity to its previous state. As this was not available to the regime, it collapsed.

The Policy Utility of State Space

The three dimensions of identity, justice and structural constraint call to mind the three categories of identity, justice and rule/institution used earlier to classify conflict stakes, although they also recall the critique that any attempt to reduce these properties to a value on a scale will inevitably sacrifice a great deal of often significant nuance. Identity in this model measures at least two different things: sense of distinctiveness from and animosity toward an out-group. As different as these two phenomena are, measuring them along a single dimensional axis makes sense in the context of this particular model, as the former must precede the latter; there must be a sense of group identity distinct from an other before there can be animosity toward said other. That said, there is more to identity in terms of symbolic and emotional content than just degree of distinctiveness and animosity toward an other. Context is vital toward understanding any change to identity in any given situation. Certainly, the same is true for justice in the sense that different people with different cultures will invariably have different conceptions of what is fair and legitimate. And there is also more to institutions than their ability to enable and/or constrain agency. Such constraints can take the form of actual physical constraints expressed in legal strictures and mechanisms for their enforcement, or abstract representational ones such as social or religious taboos that render certain behaviours unthinkable.

We can use methods such as CAM to fill this gap. CAM can track precisely what happens on a cognitive level that would explain the processes and trends mapped onto a state-space model. It can depict the precise network of mental representations that renders a particular data point on the grid coherent or not, whether in general terms or with reference to the concepts and narratives specific to a given case. And it can show what concepts are introduced or altered to the system that precipitated or resulted from the shift along the possibility plane — the precise whys and hows involved in the strengthening of identity, stoking of injustice or empowering of agency — and how these changes trigger others until coherence is restored to the system and it settles in a new equilibrium.

For example, the positions taken on the 13-dimensional scale by an individual adherent of an ideological system

could be represented as paired objects in a CAM, complete with positive or negative emotional valences.

This is not a complete CAM, rather fragments of one. A set of concepts and connections, most likely received via communication with the particular social-ideological group, could be incorporated into the larger CAM of someone adhering to the ideology, represented by this combination of positions on the 13 dimensions. Once incorporated, these items will likely be connected to many more concepts of a more specific, individual nature and the coherence of the system as a whole will, in part, be a factor of how it interacts with those additional concepts. And, like other received concepts, they will be highly resistant to change without upsetting that coherence, insofar as the balance between them serves to maintain the ideological system in a state of equilibrium.

CONCLUSIONS: A RICHER ANALYTICAL AND MORAL FRAMEWORK FOR UNDERSTANDING IDEOLOGICAL CONFLICT

The phenomenon of violent social conflict involves too many interacting parts and systems for any one theory or method to capture them all. We make no such claim for any of the theories and methods presented here. As with any model, each oversimplifies at the cost of vast quantities of often significant information to zero in on a particular aspect of the phenomenon. Each, however, focuses on a sufficiently different aspect that the strengths of one method can address the weakness of the others; information gained by one compensates for information lost by another. Therefore, used together, they provide exponentially more explanatory power than in isolation, enabling us to recognize constraints on and pathways toward ideological change that would otherwise be indiscernible.

The scheme for classifying ideational and material conflict stakes enables us to determine if a focus on ideological factors is appropriate to a given conflict situation. If so, then state-space representations allow us to better understand the relationships between antagonistic group beliefs or ideologies — in particular differences in their core assumptions — and to identify routes for belief change. Finally, network theory enables us to understand the details of a disputant's belief system or ideology and to discern specifically what makes it coherent, stable and attractive. It allows for detailed analysis of the implications of specific changes in beliefs, such as the addition of new concepts or changes to the links between concepts, in a way that effectively frames ideas as units of data and can account for known cognitive patterns and processes.

The use of these methods together enables a more thorough analysis of ideological conflicts than any theory or approach has been able to develop to date, allowing for the simultaneous incorporation of insights from multiple disciplines at multiple levels of analysis — from the molecular and neurological, to the cognitive and psychological, to the social and historical — as well as shedding light on the interactive relationships between these levels of analysis. Application of these methods to historical and current cases will provide opportunities to test numerous predictive or explanatory hypotheses prevalent in the existing scholarly literature and in popular discourse as to the causes and effects of ideological conflict, such as:

- Are conflicts more often the product of "ancient hatreds" ingrained in deeply held divergent identities, or are such hatreds easily manipulated by elites for instrumental ends?
- What is the relationship between economic inequality and social conflict?
- What has been the role of new technologies, such as social media, in exacerbating or ameliorating ideological conflict?
- Do extreme times produce extreme ideologies? Are people under high levels of stress more inclined toward radical ideological alternatives?
- Are the causal factors that underlie rapid changes in ideological beliefs to be found more at the group-dynamic or the individual-psychological level?
- Are patterns similar or divergent across epochs and between different global "civilizations"?

These questions, far from being strictly academic, are vital to the development of sensible policy responses to global conflict situations as they arise. As humanity enters into a new era of geological proportions, in which human activity has become the most significant force for planetary change, the question of whether we will be equipped as a civilization to mobilize against the unpredictable challenges of this new era is a source of great concern. Throughout human history, periods of rapid social change have been marked by episodes of arbitrary violence, dislocation and suffering, as people responded to the insecurity of change either by entrenching themselves in familiar but outdated and unworkable ideologies, or by embracing and aggressively chasing the utopian promises of new and extreme ones.

The most recent such transformation — from traditional agrarian to modern industrial forms of society and economy — included such events as the French Revolution and Napoleonic Wars, World War I and World War II, multiple struggles for national independence, episodes of ethnic conflict and genocide, terrorism, and numerous revolutions and uprisings that brought about the rise

and fall of several forms of dictatorship and democracy. Ideology was one of the most widely acknowledged, yet least understood, factors driving this transition, as the crises leading up to the present were defined by the ideological categories implicated in each event. Nationalism and secularism rose to challenge traditional monarchies, hierarchies and religious authority. World War II pitted these forces against fascism and Nazism. The Cold War and its related proxy battles was ultimately a conflict between the forces of capitalism and communism. These "-isms," representing belief systems and their related forms of institutional order, are widely perceived as driving forces behind modernity's progression toward greater freedom and prosperity, as well as the culprits behind its worst episodes of mass violence and devastation.

Are we destined to repeat this history? Politics in the developed world today reflects an increasingly polarized contest between various forms of conservatism and liberalism, while on a global scale these stand challenged by resurgent movements of anarchism and religious fundamentalism. Beliefs and positions are increasingly bundled into mutually antagonistic clusters under ideological labels that become ingrained in people's identities and determine their political choices and behaviour, causing political paralysis that hinders the development and implementation of ambitious and creative responses to the challenges of a changing world.

But if one thing is different this time, if there one advantage we enjoy over previous eras that witnessed radical social dislocations, it is our knowledge, unprecedented in the science and philosophy of our ancestors, of how complex systems behave. This knowledge is crucial, not just because it affords us unique foresight into the sorts of crises we will face as a civilization; not just for the light it can shed on how these crises will impact the systems we rely on for our well-being; and not just for the methods it offers for devising practical solutions. It may also provide us with a means to mobilize our human resources to implement these solutions and adapt to the new realities that emerge.

For ideologies are themselves complex systems that operate across multiple levels of analysis; networks of concepts, beliefs and feelings that reside in individual human minds and are shared and communicated across emergent communities. It is crucial that we apply our understanding of the rules that govern complex systems to ideologies. This may help us better comprehend and ameliorate the ideological polarization that leads to political deadlock. It also offers a means that previous generations facing similar epoch-changing events did not have to shape the future and avoid the calamities to come through the development and exploration of new ideological alternatives. Our understandings of how climate changes, how diseases spread, how economies collapse, populations peak, energy regimes transform and societies fail will remain strictly academic unless we can devise plausible and constructive means to mobilize people around solutions to these deep challenges.

The world is changing rapidly, and people are developing and altering their beliefs in response to these changes. We need to better understand the process both on an analytical level, in terms of what types of ideologies will be expected to emerge, and on a normative level, what types *should* emerge that can effectively confront the problems of our time. Will the provision of such new options merely require modification of existing ideologies or the generation of something entirely novel? And if the latter, how accessible will these new ideological options be? Will they retain and preserve values that people in the modern world have come to equate with liberty, justice and human well-being? Will they be coherent and comprehensible enough to mobilize sufficient numbers to adapt to the realities of the new era?

The breakdown of old systems is a cause for insecurity and upheaval. But it is also an opportunity for the production of newer and more resilient systems in the interest of long-term renewal. A deeper understanding of ideological systems is needed to better understand the dynamics of current political crises and to confront global problems in a manner consistent with the goal of preserving a civilization built on the legacy of the Enlightenment: tolerance and open-mindedness, popular sovereignty, the pursuit of knowledge through reason and empiricism, the dignity and sanctity of individual human life and the maximization of human autonomy further to the individual pursuit of happiness.

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CIGI was founded in 2001 by Jim Balsillie, then co-CEO of Research In Motion (BlackBerry), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario.

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