WARS WITHOUT END

The world is full of bloody conflicts that can drag on for decades. Some researchers are trying to find resolutions through complexity science.

BY DAN JONES

I n the seven decades that Colombia has been riven by civil war, the country has seen kidnappings, rapes, terrorist attacks and pitched battles that have cost more than 220,000 lives and displaced millions of people. Negotiations, peace accords and ceasefires have come and gone to little lasting effect.

The latest round of this seemingly unending cycle began in August 2012, when the Marxist rebels of the Revolutionary Armed Forces of Colombia (FARC) agreed to meet with the central government in yet another round of peace talks. But the negotiations collapsed in November after the rebels kidnapped a

Colombian army general. The talks have since resumed, but even if they one day yield a peace accord, there is no guarantee it will hold. More than one-third of the world's peace agreements and ceasefires since the 1950s have relapsed into violence within five years.

Colombia's long history of strife is a classic example of 'intractable' conflict — a self-perpetuating cycle of hostility that can grind on for decades. Such conflicts are relatively scarce — only about 5% of the world's myriad wars qualify — but their longevity means that they exert a huge toll on societies. Their tragic poster child is the 68-year-long

Israeli–Palestinian conflict. But the list also includes India and Pakistan's equally long battle over Kashmir, and Sri Lanka's 26-year civil war. The Democratic Republic of the Congo (DRC) has been riven by conflict since 1996, as has South Sudan since its inception in 2011. Any number of intractable conflicts may now be emerging in the Middle East as Libya, Syria and Iraq are ripped apart by sectarian violence and with the rise of the Islamist group ISIS (see 'Intractable conflicts'). The intensifying civil war in eastern Ukraine

The Israeli–Palestinian conflict has been ongoing for 68 years.

may eventually join the list as well.

By definition, these are the conflicts that are resistant to all the mainstream techniques of dispute resolution, says Robert Ricigliano, a mediation expert at the University of Wisconsin Milwaukee. Typically they are plagued by a history of "fixes that fail", he says — peace agreements that collapse within days or weeks. "We mediate agreements, change leaders, arbitrate boundaries," he says. "But those things don't necessarily get at the underlying dynamics fuelling conflict."

He and a growing chorus of other conflict researchers have therefore been pushing for a fresh approach — one that views intractable conflicts as dynamic, complex systems similar to cells, ant colonies or cities, and analyses them with the mathematical and computational tools developed over the past 30 years in complexity science.

Mainstream practitioners tend to be dubious, says Dan Smith, head of the London-based peace-building organization International Alert. "We know that conflicts are complex," he says. "What would be useful would be a clearer idea of what to do about it."

But Ricigliano and others have begun to answer that criticism by using complexity-inspired techniques to help resolve conflicts in places such as the DRC. They say that the approach can be a much-needed corrective to business as usual in the conflict-resolution world, where governments and international organizations too often tackle conflicts piecemeal. These bodies tend to "look at the economy, or governance, or gender relations or education as if each existed in isolation", says Smith. "It's a convenient way to handle the issues, but it means you don't really address the complex reality."

HARD PROBLEMS

It was just this kind of blinkered thinking that led psychologist Peter Coleman to rebel. It was 2000, recalls Coleman, head of the Morton Deutsch International Center for Cooperation and Conflict Resolution at Columbia University in New York City. He had broken his foot and decided to spend his convalescence at home delving into the research literature on intractable conflict. But what he found left him deeply frustrated. "People had their simple, sovereign theories about why conflicts become intractable," he says. "It's because of trauma, or social identity or a history of humiliation. We understood pieces of the problem, but not how they interact."

Coleman discovered an alternative approach just a few years later, when he came across the work of social psychologists Robin Vallacher and Andrzej Nowak, both now at Florida Atlantic University in Boca Raton. Their work was not directly related to conflict — they were studying things such as how the human sense of self emerges, and how feelings about others can switch from positive to

> ## "SUCCESS DOESN'T MEAN THAT WE'VE ENDED THE CONFLICT. IT MEANS WE'VE ENGAGED A SYSTEM SO THAT VIOLENCE DECLINES OVER TIME."

negative. But Coleman was impressed with Vallacher and Nowak's use of a mathematical tool known as dynamical systems theory to analyse their results.

Made famous by James Gleick's 1987 book *Chaos*, this theory provides a framework for understanding a remarkably broad range of complex systems, from weather patterns to neural activity in the brain. One way to visualize the mathematics is to imagine a landscape of hills and valleys. The behaviour of the complex system corresponds to the path of a ball rolling across this landscape. The trajectory becomes very complicated as the ball is deflected by the hills. But eventually, the ball will get trapped in one of the valleys, where it will either cycle endlessly around the walls or sink to the middle and lie still. The ball's final trajectory or resting place is called an attractor.

To Coleman, this kind of entrapment was the perfect metaphor for the stable, if destructive, patterns of social behaviour seen in intractable conflicts. The landscapes in this case are mainly psychological and social, comprising innumerable strata of history, identity and collective memories of harms suffered at the hands of the 'other'. Yet the resulting conflict attractors are terribly real, he says, with psychological forces conspiring to "create simplistic narratives about conflicts that are devoid of nuance and keep us locked in".

To make this mathematical view of intractable conflicts into something more than a metaphor — and hopefully to turn it into a set of tools that could make a difference in the real world — Coleman, Vallacher and Nowak in 2004 formed the Dynamics of Conflict working group, which has since attracted four more members.

As a result of this collaboration, Nowak has started to create computational models that capture the dynamics of conflicts. These include 'agent-based' simulations that contain thousands of digital robots — the agents — each of which embodies some of the simple behaviours that social psychologists believe have a role in conflict. One such model,

developed with researchers outside the working group, features agents that vary in how competitive or cooperative they are, and adjust those proclivities according to how much hostility or aggression they experience from the other agents.

In this simulation[1], small conflagrations flare up and die down much as they do in real communities. Occasionally, however, the conflicts expand until they lock the whole virtual community into a cycle of recrimination — the classic sign of intractability. Working with Dean Pruitt of the School for Conflict Analysis and Resolution at George Mason University in Arlington, Virginia, Nowak has also developed mathematical models showing how attractors can explain the escalation of conflicts that tips them into an intractable state[2]. Now he and his colleagues are working on the next step: comparing the evolution of communities in these simple models with data from real-world conflicts such as the Israeli–Palestinian stand-off. "This is the first time we've added empirical data to a dynamical model, and we're getting promising results," says Nowak.

MAKING SENSE OF THE SYSTEM

Another line of research is to move from generalities to specifics, and develop visualization tools that can help mediators to untangle the complexities of real-world conflicts. The hope is that such 'conflict maps' will help researchers to keep track of the interconnections between players and events, and make clear the feedback loops and key networks that can escalate or inhibit conflict.
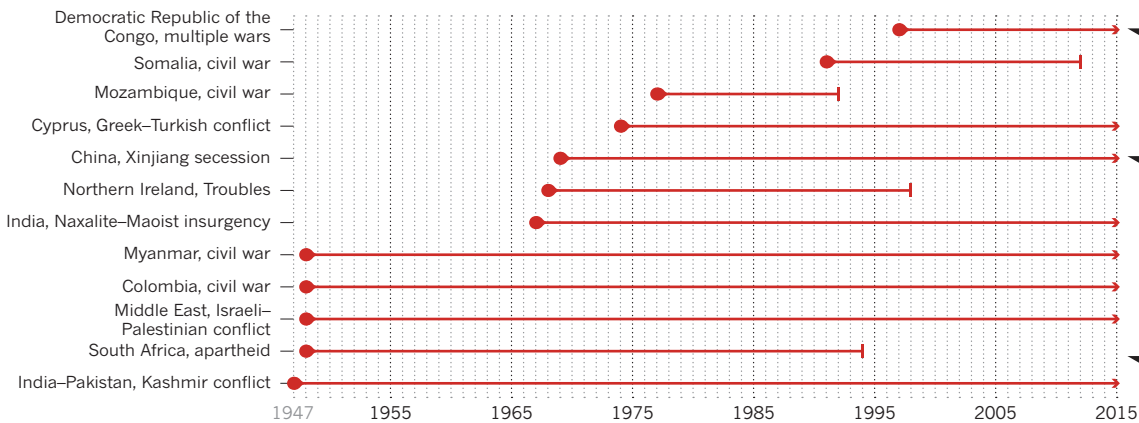
Conflict maps can take many forms, from hand-drawn sketches on a whiteboard to computer-generated networks based on real data. But whatever their form, they get strong endorsement from Ricigliano, who has worked on peace-building interventions in areas ranging from Colombia and South Africa to Iraq and Cambodia.

In 2000, for example, Ricigliano went to the DRC to try to find some resolution to the Second Congo War: a blood-drenched conflict between various rebel groups and Mai-Mai militias fighting for the government. Behind the scenes, he and his colleagues watched the unravelling of one hard-won peace agreement after another. "At best we were having a neutral impact," he says, "and maybe even a negative one."

But then in 2002, he and his colleagues began to map all the connections between warring parties and competing interests in the conflict. The maps made it clear that local groups were being manipulated by national rebel organizations, who wanted the conflict to continue because it allowed them to access valuable minerals. "So we shifted tactics, and began trying to break the links between the national-level actors who were manipulating local actors, and to facilitate local-level ceasefires of significance, says Ricigliano.

INTRACTABLE CONFLICTS

These maelstroms of grievance and mistrust can go on and on. Below is a sample of those that have emerged since the Second World War.

Democratic Republic of the Congo, multiple wars
Somalia, civil war
Mozambique, civil war
Cyprus, Greek–Turkish conflict
China, Xinjiang secession
Northern Ireland, Troubles
India, Naxalite–Maoist insurgency
Myanmar, civil war
Colombia, civil war
Middle East, Israeli–Palestinian conflict
South Africa, apartheid
India–Pakistan, Kashmir conflict

1947 1955 1965 1975 1985 1995 2005 2015

AFRICA Having contributed to around 3.8 million deaths, this relatively new series of conflicts is also one of the bloodiest.

CHINA The Uighur people are of Turkic descent and are trying to break free from China's rule.

SOUTH AFRICA The apartheid system ended when the government reached an agreement with the African National Congress.

By 2003, these dialogues had helped the United Nations to negotiate a transition government that included the major rebel groups, and violence declined. "It wasn't perfect," says Steve Smith, an independent conflict-resolution consultant who was in the DRC at the time. "Not everyone was in agreement, and little conflicts continued, but we had a structure in place and a direction to go."

STATE OF MIND

Beyond the models and the maps, advocates of systems thinking are hoping to spread a shift in perspective on intractable conflicts. One convert is Andrea Bartoli, dean of the School of Diplomacy and International Relations at Seton Hall University in South Orange, New Jersey, and a mediator who has worked in countries such as Mozambique and Kosovo. When he first learned about the dynamical systems perspective in discussions with Coleman a little over a decade ago, he says, "it provided a new language for talking about conflict, and opened up new ways to think about old problems". He has since joined the Dynamics of Conflict working group, and in 2009 joined with Coleman and Beth Yoshida-Fisher, director of the Negotiation and Conflict Resolution program at Columbia University, to set up the Advanced Consortium on Cooperation, Conflict, and Complexity (AC4) there.

That new language can be a revelation even to professionals, says Naira Musallam, a conflict researcher at New York University's Center for Global Affairs and a member of both the Dynamics of Conflict group and AC4. She tells the story of a course she teaches at the US Military Academy West Point in New York, in which she starts by running through a list of common mental shortcomings in how people think about conflict, poverty and other social problems. "We compare fluid situations to fixed things," she says, "we think in straight lines rather than loops, we focus on understanding problems and assume that this will lead to solutions, and often miss the unintended consequences of well-intentioned interventions."

After one class, says Musallam, an officer who had served in Iraq and Afghanistan wrote to her. "I know many good people who have died because of errors [highlighted] on this list," he wrote. "I also see several errors that I have made before … It's frustrating that this is the first time that I've seen this list in a way that challenges my world view around conflict."

These same straight-line assumptions are also built into the way in which many institutions operate, says Musallam — and not just those devoted to peace-building. "They want nice, tidy plans for interventions, and clear deliverables over the short term", she says. This often leads to plans to 'solve' complex problems through a series of discrete steps that are defined in advance by experts.

One of the key lessons of the systems mindset is to stop approaching conflicts as problems that need to be fixed, says Ricigliano, and instead think of them as systems with underlying dynamics that need to shift. "Success doesn't mean that we've ended the conflict," he says. "It means we've engaged a system so that violence declines over time."

This view is finding increasing support from outside allies. The non-profit Berlin-based Berghof Foundation, for example, has used systems thinking in its efforts to resolve political and ethnic violence in countries such as Sri Lanka, which has been torn by civil war since 1983.

But there is plenty of room for scepticism. Dan Smith, for one, is sympathetic to the complex systems view of conflict, but is wary of its sweeping generalizations. "Any analysis employing these principles is only going to be as good as the analyst doing it," he says. "You can have the best methodology, but if you have an uninformed or incurious analyst, you won't get good results."

Even advocates admit that specific recommendations are a work in progress. That is why in 2013, Coleman and Ricigliano joined with others to set up an annual five-day workshop known as the Dynamic Systems Theory Innovation Lab, which brings together biologists, economists, physicists, political scientists and other scholars and practitioners to talk about real-world applications. "We hope that five years out, we'll have a better idea of what matters most," says Coleman.

There is already a growing body of experiments they can draw on. In Israel, for example, a series of anti-conflict interventions being developed under the leadership of psychologist Eran Halperin at the Interdisciplinary Center Herzliya in Israel have proved effective in making people more open to seeing things from the other side's point of view[3–5].

Although the label 'intractable conflict' implies unending strife, no struggle lasts forever. As the 1980s drew to a close, South Africa had been locked in racial conflict for decades and was on the brink of a civil war between increasingly militant members of the African National Congress (ANC) and the government of President Frederik Willem De Klerk. Amid international condemnation of the apartheid system, and fearing that the country could become engulfed in a bloody street war, De Klerk began releasing imprisoned ANC members in late 1989. Finally, in February 1990, he freed ANC leader Nelson Mandela after 27 years in prison. That conciliatory move was the tipping point for the emergence of multiracial democracy within three years.

South Africa's long transition was a difficult journey, with many losses and setbacks along the way — par for the course for any intractable conflict. Yet as Mandela once famously said: "It always seems impossible until it's done." ∎

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