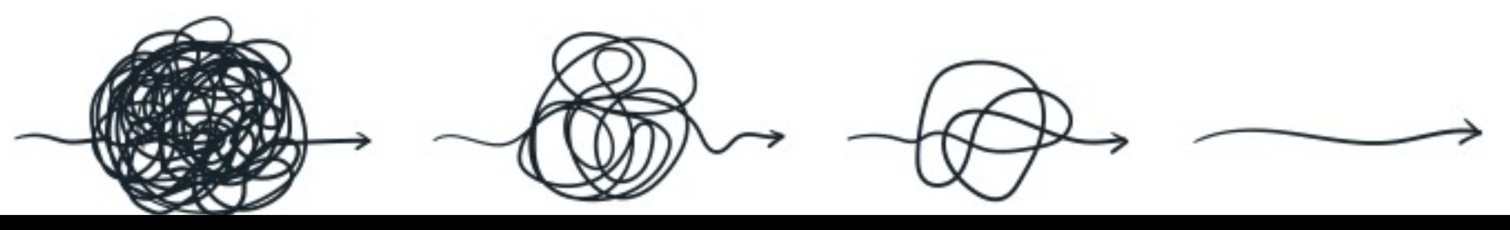

An inconveniently complex truth

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Roland Kupers tells how complexity characterises climate policy questions. And how it also provides answers.

The world's governments in 2015 made a radical shift in the principles that governed their near 30-year-old annual convention to consider how to allocate measures needed to curb global climate change. That shift was arguably the underlying but uncelebrated reason for the success of that conference which produced what became known as the Paris Agreement. But the real jewel in the Paris crown was a method that harnesses national self-interest to ratchet up emissions targets.

So what changed in the French capital five years ago?

Previous gatherings of the Conference of Parties (COP) for the United Nations Framework on Climate Change were based on an allocation regime, but results had fallen vastly short of what was required. They were based on ecologist Garrett Hardin's notion, published in 1968, of the Tragedy of the Commons. In summary Hardin said that unregulated consumption of commonly-available resources leads inevitably to depletion and shortage of the resource.

In Paris, 2015, COP21 adopted the ideas of Nobel Memorial Prizewinner, Elinor Ostrom. Ostrom had shown how communities have successfully managed their commons and she identified a set of principles for doing so. And many of her principles found their way into the core of COP21.

> *"A top-down allocation of emissions' allowances was jettisoned and replaced by bottom-up submissions from each country."*

A top-down allocation of emissions' allowances was jettisoned and replaced by bottom-up submissions from each country, in the form of a Nationally Determined Contributions. The UN then mirrored the sum of those commitments back to the countries and how they related to what needed to be done, in the light of the best science available.

Ostrom provided a compelling argument why the UN's traditional top-down approach was the wrong way to manage a global commons issue such as climate change. Indeed it was known – or at least could have been known – that highly-complex systems, such as the nexus between society and climate, are resistant to top-down attempts to force change.

This new approach led to jubilation among the delegates on reaching an agreement at the eleventh hour. In the process they added what is arguably the Paris agreement's most powerful element: the so-called ratcheting mechanism.

The idea behind the mechanism is that countries would, over time, see the opportunities rather than only the pain of low-carbon development and ratchet up their commitments, largely through self-interest.

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Formal ratcheting was agreed to take place every five years, starting at the now delayed COP26 in Glasgow. This fixed a common problem with such voluntary agreements, namely that the consensus target usually ends up being a lowly compromise.

Ratcheting goals is one of a suite of tools and methods that are small interventions that have a critical role to play in shaping the waves of complexity as seen in the COP. These interventions are best made clear through the lens of complexity – the science of interconnected systems (see box).

In complexity policy the goal is to influence the emergent behaviour of a system, rather than that of each individual. This is done through tweaking the rules that deliver this emergence.

Applying complexity more broadly to climate policy suggests new and complementary approaches to standard policies. So just as in dealing with a pandemic, exploring the dynamics of systems is key to accelerating the changes needed to meet the climate emergency.

Complex Relationships

The critical insight on collective behaviour is that it is not just shaped by what people do individually, but also by how they are interconnected. This is where the science of complexity offers a means to fashion policy to address compounded issues.

Viral contagion is a now all-too-familiar complex system. Ordering the viruses to change behaviour is clearly out of the question. Instead epidemiologists tell us that if we increase the distance between individuals to something like two metres for most of the time, we will change the system's emergent property from a pandemic to something less onerous.

So complexity has underpinned much of the narratives surrounding the current pandemic response, as a pandemic is characterised through a myriad of interconnections. The public has been rapidly familiarised with terms such as social distancing, contagion, exponential growth, herd immunity, path dependency – all complexity terms.

Similar recipes exist for other policy problems. For example in the COP, the idea was to adjust the rules of the system, to influence people's collective behaviour. Just like bird flocks are the result of a few simple rules that determine the behaviour of individual birds, but which have no obvious explanation for collective flocking. Instead it is the way the birds relate to each other, that determines how they flock.

Networks such as our energy system have a strong dependency on the past. Once it is launched on its path, it takes enormous effort to change its trajectory. Lots of products also have strong path dependencies and are hard to dislodge, even if they become societally undesirable. And another example of a complexity policy is purposefully breaking path dependencies.

Take fossil-fuelled cars. With road accidents taking millions of lives annually, fine particle pollution accounting for millions more and the climate devastation they bring, they are clearly a problem. Replacing them all with electric cars will improve things a bit, but not nearly as much as the climate – and our safety – requires.

> *"The "level-playing field" justification all too often obfuscates a choice for an evolution away from the status quo."*

Transitioning to an entirely new system such as autonomous vehicles will require policymakers to break path dependencies. For example the fallibility of human drivers demands that cars have heavy protective bodies. Autonomous cars could take out human fallibility and so dispense with the need for weighty, protective car bodies. This would improve the vehicle's energy efficiency.

Meanwhile, the incumbent car industry keeps adding incremental autonomy features to the existing design. So there is a danger that, through path dependency, we could end up with fossil- fuelled autonomous cars.

We could miss out on the climate revolution that light, on-demand, subscription-based autonomous cars could bring. To avoid travelling the default path, we would need to give the new path an advantage, such as dedicated, higher-speed lanes. The new vehicles could open the path to systemic change with radically-reduced power consumption, scores of avoided injuries and redefining consumer choice.

Another option could be to change laws so that heavy vehicles have greater liabilities. Some might object that this tilts the playing field against incumbents and that market forces should be allowed to decide. But path dependencies tilt the field in favour of the incumbents, and interventions are needed to compensate for this. The much-used "level-playing field" justification all too often obfuscates a choice for an evolution away from the status quo and effectively rules out systemic change.

Purposefully breaking path dependencies is not part of the current climate policy toolkit – but it needs to be.

In principle at least, top-down interventions to mitigate the climate emergency can work. The problem is that governments have simply been unwilling or unable to take the required measures outside immediate problems such as a financial crisis or a pandemic. Our insights into the functioning of complex systems suggest complementary strategies that we need to bring to bear, as time is rapidly running out.

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