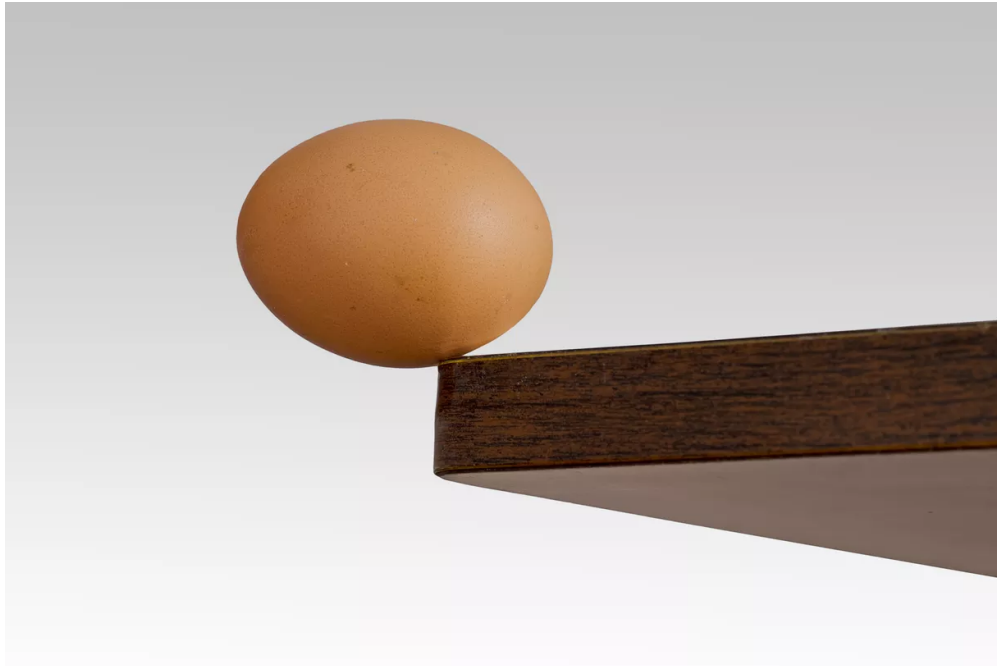*Vox*

Social tipping points are the only hope for the climate

A new paper explores how to trigger them.

By David Roberts | @drvox | david@vox.com | Jan 29, 2020, 10:10am EST

Climate action, one hopes. | Shutterstock

At this point, the targets enshrined in the **Paris climate agreement** — holding the rise in global average temperature to a maximum of **2 degrees Celsius, with efforts to limit to 1.5°C** — are beyond the reach of incrementalism. If the world's large economies had begun a slow, steady reduction in greenhouse gas emissions back in the 1990s, it might have sufficed. But action has been delayed so long now that only rapid, radical change can still do the job.

As I wrote in a somewhat **gloomy post** earlier this month, the world is not exactly filled with happy signs and portents these days. The chances of sudden, coordinated change in a positive direction seem … slim.

If there is any hope at all, it lies in the fact that social change is often nonlinear. Just as climate scientists warn of **tipping points** in biophysical systems, social scientists describe tipping points in social systems. Pressure can build beneath the surface over time, creating hairline fractures, until a precipitating incident triggers cascading changes that lead, often

irreversibly, to a new steady state. (Think of the straw that broke the camel's back.) It is less a matter of simple cause and effect than of emergent network effects that are unpredictable and somewhat mysterious even in retrospect.

The idea of social tipping points has long provided comfort to climate hawks dismayed at the slow pace of action. Al Gore, for example, has invoked social tipping points for decades, forever predicting them just around the corner. I have written about the **hope**, or at least **conditional optimism**, they allow us.

> **The Atlantic**
> @TheAtlantic
>
> Al Gore thinks America is 'extremely close to a political tipping point' on climate change, @isaacdovere reports:
> on.theatln.tc/CBEkURX
>
> **Al Gore: America Is Close to a 'Political Tipping Point' on Clim…**
> The former vice president discusses how the politics of the environment have changed considerably over his decades of
> theatlantic.com
>
> 159   9:58 AM - Jan 4, 2019
>
> 75 people are talking about this

Still, the whole notion has remained mostly at the level of analogy and inspiration, with little in the way of concrete or actionable understanding.

New research published in the *Proceedings of the National Academy of Science* (PNAS) — boasting 14(!) co-authors — attempts to remedy that. It constructs a framework for

understanding social tipping points, the systems where they might do the most good on climate, and the kinds of interventions that might trigger them.

It is a cogent contribution to a relatively fuzzy discussion. This topic badly needed some meat on its bones.

On the other hand, relative to the enormous stakes involved, the paper just reveals how dreadfully thin and tenuous our knowledge of social tipping points is. We might be getting better at thinking and talking about them, but we still have only a glimmer of a clue about when they might happen or what might hasten them. We are groping in the dark.

Let's take a closer look at the research.
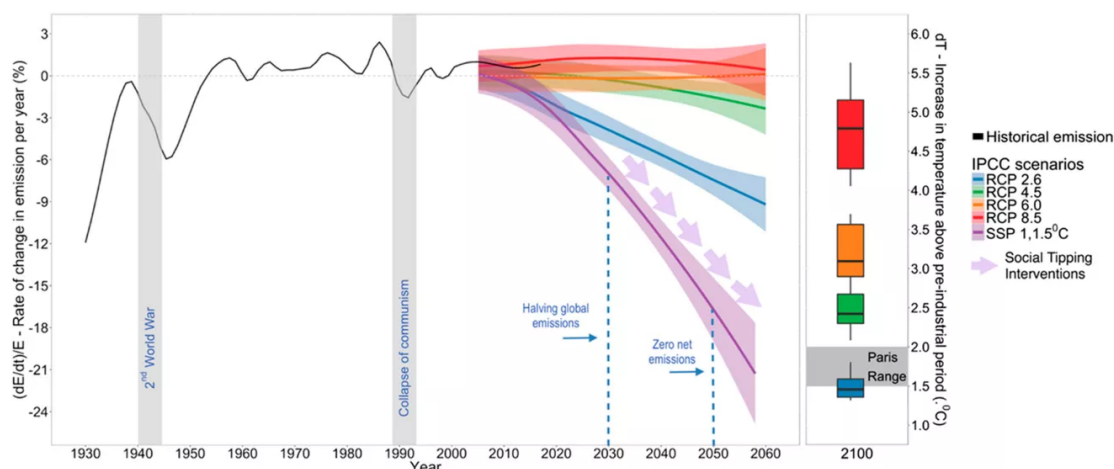
Behold the power of the STIs. | PNAS

STPs, STEs, and STIs, oh my

First, to define some key terms.

The authors borrow a definition of "social tipping point" (STP) from **this paper**, to wit: It is a point within a social system at which a small quantitative change can trigger rapid, nonlinear changes "driven by self-reinforcing positive-feedback mechanisms, that inevitably and often irreversibly lead to a qualitatively different state of the social system."

As examples, the authors cite the writings of Martin Luther, which are alleged to have prompted a worldwide explosion of Protestant churches, and "the introduction of tariffs, subsidies, and **mandates** to incentivize the growth of renewable energy production," which is said to have triggered exponential technology and cost improvements in wind and

solar. These examples are contestable at best — we will return to the lack of good historical precedents later.

With that in mind, the authors set out to identify a set of social tipping elements (STEs), i.e., particular socio-technical-economic subsystems in which a meaningful amount of greenhouse gases are at stake. To qualify, the systems must share a singular characteristic: "A small change or intervention in the subsystem can lead to large changes at the macroscopic level and drive the system into a new basin of attraction, making the transition difficult to reverse."

Those small quantitative changes are social tipping interventions (STIs).

There are two important qualifiers. The interventions must be able to tip the systems within the relevant time frame of 15 to 30 years, to match the schedule of the Intergovernmental Panel on Climate Change. And, by the way, "since abrupt social changes have historically often been associated with social unrest, war, or even collapse," it would be preferable if the interventions produced "positive social tipping dynamics," improving rather than reducing human welfare. (That's quite the caveat!)

The wrong kind of tipping point. | Wikipedia

So this is the only real hope for meeting the stated goals of climate policy: that small, targeted interventions can in turn trigger a cascade of bigger, faster changes in fossil fuel-based economies and cultures, within 30 years, and not inadvertently produce negative consequences.

No problem!

How does one identify STEs? There are no objective markers, no real empirical way of distinguishing a big system that is vulnerable to STIs from one that isn't. So the researchers sent out a survey to 1,000 experts; 133 were filled out. After that, 16 of the experts were brought in for a workshop. Once the STEs were identified, the researchers conducted an exhaustive literature review on each one. (There are nine pages of text and 172 footnotes.)

It is probably about the best you can do to formalize this process, but keep in mind that the root question here — which systems are most vulnerable to TPIs — comes down to the opinion of "experts" (mostly from the research community and from the Northern Hemisphere, as the researchers acknowledge). And since there are no real experts on tipping points, no reason to think energy researchers have a better feel for them than anybody else, all we can really know we are learning about is a slice of educated opinion.

With that caveat in mind, let's look at the STEs the researchers identified and the STIs that might tip them.
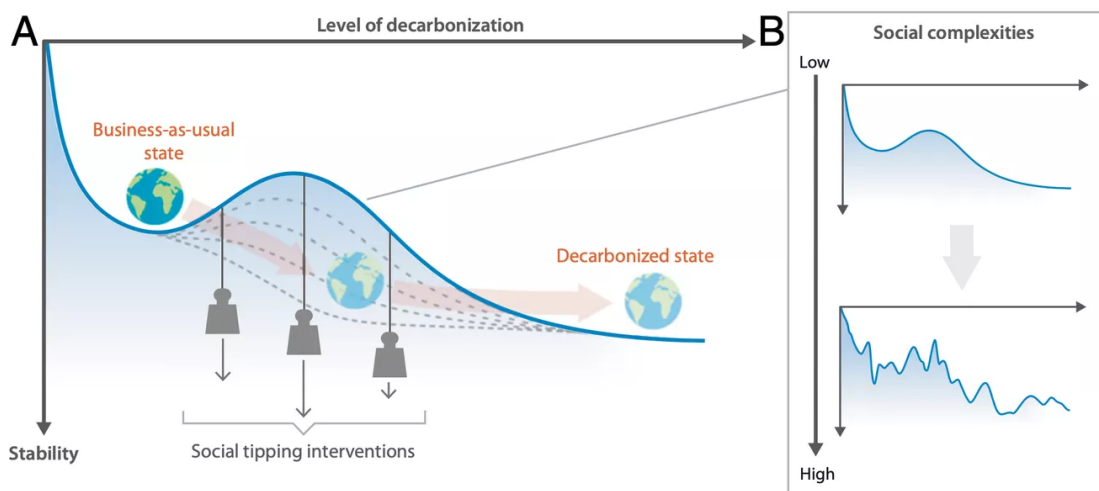
They're social science researchers, not artists. | PNAS

The systems that must change rapidly to address climate change

Sifting through the responses to their survey, the researchers looked for systems wherein a) a small change might precipitate larger cascading changes, b) in a positive direction, in a way that c) could reduce a substantial amount of greenhouse gas emissions. They found six.

1) The energy production system

This is probably the obvious one, given who was asked and the centrality of energy to climate change. The goal of interventions in this system is pretty simple: to increase the financial returns on clean energy investments. The interventions identified as potential STIs fall into two categories. First is removing all subsidies from fossil fuels. The second is redirecting government support to clean energy, particularly decentralized clean energy.

2) Human settlements

Buildings are the source of 20 percent of global emissions, and with the world furiously urbanizing, that number is likely to rise. A tipping point will have been reached in this system when fossil-fuel-free technologies become "the first choice for new construction and infrastructure projects." Recommended interventions include changes in building codes, large-scale carbon-free demonstration projects, local cleantech clusters, and large-scale public infrastructure projects.

Not gonna pass up a chance to use a mass timber picture. | CIRS

3) The financial system

The main lever for change in this system is risk perception. The idea is that there is a growing "**carbon bubble**" of assets that will lose their value under serious climate policy. If

large institutions can be convinced of that risk, they could begin withdrawing their investments from fossil fuel-heavy assets, sparking a self-reinforcing cycle, bringing rapid change. (Climate activists have recently begun a **coordinated campaign** focused on financial institutions.)

Naturally, the main STI identified is divestment, in all its forms. **Divestment campaigns** are a strong social signal to financial institutions that change is coming and they need to get ahead of it.

4) Norms and values

Human beings are strongly social creatures, their behavior shaped by the opinions and examples set by their peers. Social scientists have long observed that a sufficiently large and committed minority within a group can trigger tipping points in the larger group's social norms, causing rapid phase shifts in popular moral opinion. (America's experience with same-sex marriage is a good example.) Estimates for exactly how large that minority must be have ranged widely, but **recent experimental evidence** puts it at around 25 percent.

Recent examples of norms and values spreading from committed minorities include rooftop solar panels and electric vehicles (which have both been shown to be "**contagious**," spreading fastest where they are most visible) and the youth climate strikes, which seem to have sparked a **green mini-wave in EU politics**. As it happens, economist Robert H. Frank has a book coming out soon, *Under the Influence*, about just this kind of social contagion and how climate policymakers can use it.

The STI identified here is somewhat nebulous: "revealing the moral implications of the continued burning of fossil fuels," either through statements from leaders and groups or organized pressure campaigns from activists.

"There is recent anecdotal evidence that protests, such as the #FridaysForFuture climate strikes of school students around the world, the Extinction Rebellion protests in the United Kingdom, and initiatives such as the Green New Deal in the United States," they write, "might be indicators of this change in norms and values taking place right now."

League of American Bicyclists
@BikeLeague

Could small changes that improve bike infrastructure trigger a "tipping point" in the collective adoption of biking for

transportation? A new study suggests even minor changes that make it easier to choose sustainable behavior can have a big impact. phys.org/news/2020-01-o…

Increasing opportunities for sustainable behavior

To mitigate climate change and safeguard ecosystems, we need to make drastic changes in our consumption and transport behaviors. A phys.org

57   1:26 AM - Jan 28, 2020

27 people are talking about this

5) The education system

Research has shown that education plays a large role in social transformation. The intervention here is pretty simple, just increasing the quantity and quality of climate coverage in primary and secondary education. Such educational campaigns can, like the one against cigarettes in the US, "be strengthened by a supportive family and community context as well as by media campaigns, advertising bans, higher taxes, use prohibitions, and lawsuits against producers." (Vox's Umair Irfan has written about the **wave of recent lawsuits against fossil fuel companies**.)

6) Information feedbacks

This one is the most interesting to me because it best fits the criteria of being relatively easy to influence with small interventions and associated in the past with rapid social change. The idea is just to make carbon flows in the economy more visible to consumers, businesses, and governments, through better tracking, monitoring, and corporate disclosure.

(For a great example of this effect at work, consider the story of the Toxics Release Inventory in the US, which I described in **this post**. The TRI did nothing but reveal to US citizens which businesses were releasing toxic pollution, and where, but the resulting public blowback prompted enormous changes.)

The researchers stress that all these systems are interconnected and interrelated, operating on different time scales, and that cascading changes in one or more could help trigger similar changes in the others — which is good, because they are all going to need to transform eventually.
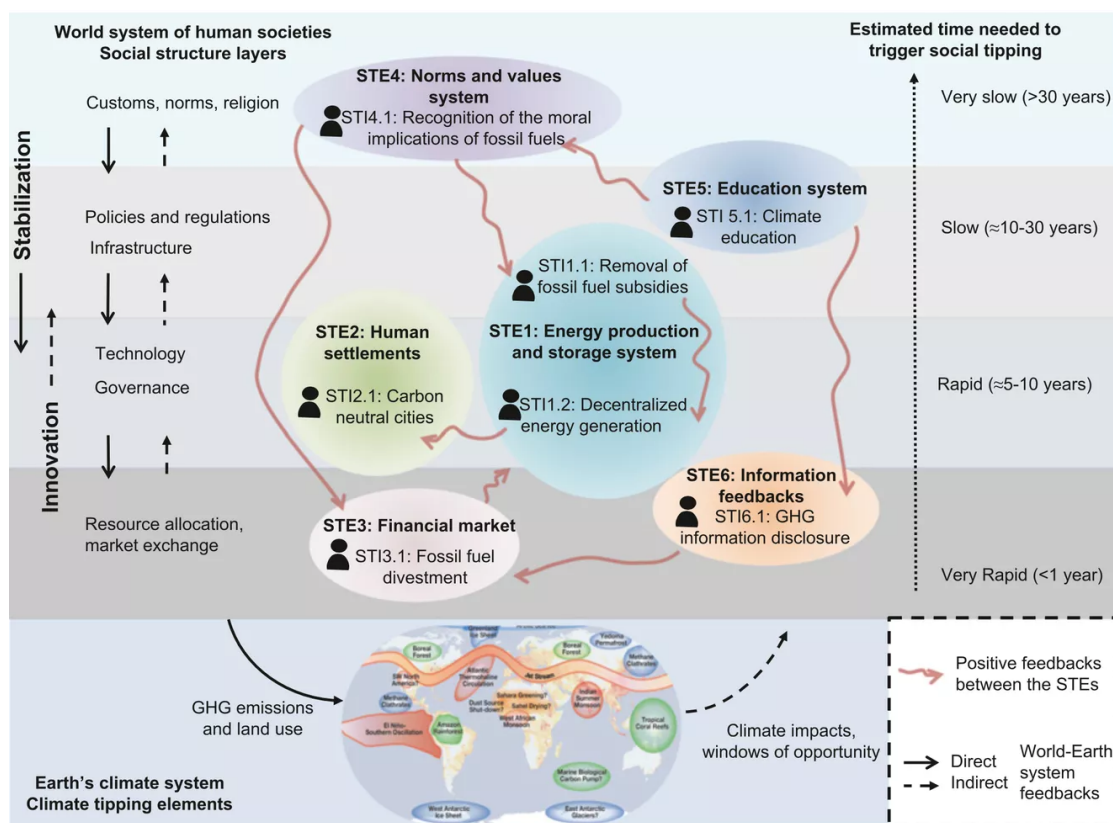
PNAS

There is no comfort to be had in social tipping points

For years, frustrated and terrified at the slow pace of change, climate hawks have clung to the notion that progress need not be linear and incremental. Sometimes change can build slowly and then happen all at once.

The problem is, climate change isn't much like same-sex marriage, or cigarettes, or the spread of Protestantism, or any of the historical precedents cited in the paper. It is more deeply rooted in economics, global, and irreversible in a way no previous problem has

been. The hoped-for changes are faster, greater in scope, and sustained for longer than any coordinated solution in memory. History isn't much of a guide.

For all the admirable and useful work this research does to put some parameters around the discussion of social tipping points, ultimately it only aggregates what are, in effect, hunches and educated guesses.

There are socioeconomic and socioecological systems that we can *imagine* changing quickly. We can construct narratives about how it could happen. We can guess at what kind of interventions might trigger those changes. If we squint and look around, we can find things that look like evidence of such changes underway — the paper cites IPCC reports, Pope Francis's encyclical *Laudato si',* youth climate activism, **"flight shaming,"** and the EU's recent green turn.

Tipping, maybe. | Sarah Silbiger/Getty Images

Could these events signal imminent cascading changes? Sure. Or not. We really have no idea.

The researchers conclude with a call for "both social and natural sciences to engage more intensively in collaborative interdisciplinary research to understand rapid social transformations, STEs, and their interactions with tipping elements in the Earth system."

Hallelujah. The more help concerned people can get in focusing their efforts where they might do the most good, the better. Insofar as science can help identify those areas — and this paper is a good start — it is to everyone's benefit.

But we probably don't have the brain or computing power to understand the logic of the collective behavior of 7 billion semi-rational people, or even the collective behavior of the US's half-billion. There have never been 7 billion people in the world, or half a billion people in the US, before. Everything humanity is doing now is happening for the first time, in unprecedented conditions. Every decade from here on out will be the warmest humanity has ever experienced and the coolest it is ever likely to experience again. Again, history is of little help.

Ultimately, there's an element of the miraculous to social tipping points, of intrinsic unpredictability. They can be hoped for, strived toward, but they cannot be planned, scheduled, or relied on. There's nothing anyone can really do with the knowledge that they might be out there except ... keep working.

If you'll indulge me, I'll conclude with some thoughts from **a post I wrote on this same subject way back in 2013**:

> Will unexpected, rapid changes in coming decades be good or bad, positive or negative? That depends on millions of individual choices made in the interim. Some of those choices, if they happen at just the right moment, could be just the perturbations that spark cascading changes in social, economic, or technological systems. Some of those choices, in other words, will be *incredibly significant*.
>
> Which ones? That we cannot know. It could be any of them, any time. Precisely *because* we cannot know — because any one of our choices might be the proverbial butterfly's wings — we must act. We must take advantage of every **affordance**, grasp every opportunity. We don't know when history might unlock the door, so we have no choice but to keep pushing on it.
>
> And really, what else are we going to do?

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