GOATS AND SODA

In a hot room, you're told to play a vicious game. Will heat make you behave badly?

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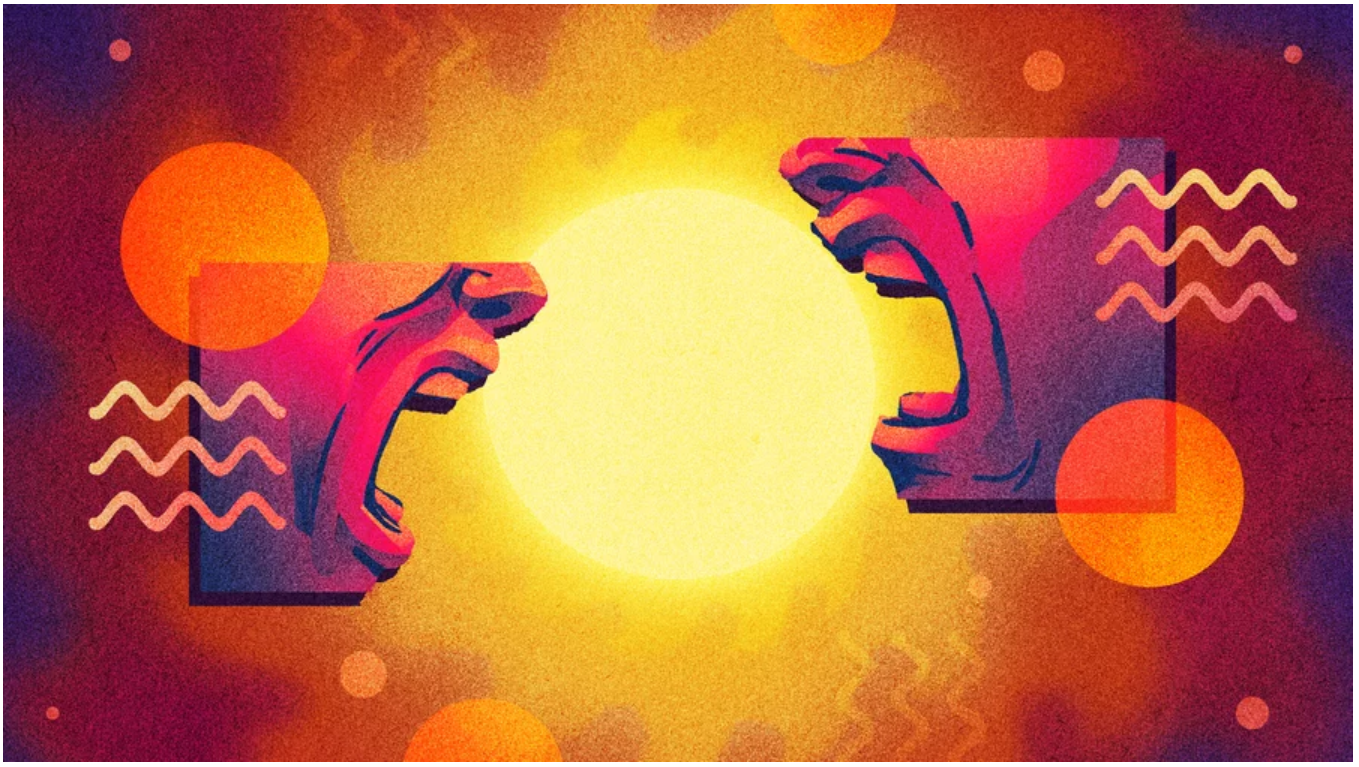
4-Minute Listen + PLAYLIST



Kaz Fantone/NPR

Here's an experiment that seems excruciating to imagine in the midst of the current global heat wave: Starting six years ago, researchers began putting thousands of people in baking hot rooms to find out if high temperatures may make us more violent. The findings surprised even the scientists – and could have major implications for world peace.

How to test for aggression

The subjects of this experiment included college students in Nairobi, Kenya. In groups of six they were ushered into one of two rooms. The first was a comfortable 68

degrees. The second was that hot room, cranked up to 86 degrees – as high as the researchers figured they could go without endangering people's health.

"It actually took a bit of work to set up," says study co-author Edward Miguel, an economist at University of California at Berkeley. "We set up measurement sensors to make sure we were keeping the temperature consistent. We also hid the heaters so that participants didn't know that we were actively heating the room."

Even so, Miguel says the effect was immediately palpable. "When you're in the hallway and you open the door to this room, you feel it. You're like, 'Oh wow. It's hot.' "

Of course the experiment's ethics rules barred them from forcing people to stay, adds Miguel. "In fact, in one of the sessions I was observing, somebody was like, 'I'm outta here!' "

Still, the vast majority sweated it out. And they spent the next hour playing a series of computer games with each other — including one called "The Joy of Destruction."

"This is a direct measure of aggressive, antisocial behavior," says Miguel.

A screen pops up and shows you how many points one of the other players – you don't know which – has just won playing their own game. Those points are redeemable for a valuable prize. Then you're given the option of anonymously erasing as much of that other person's payoff as you choose.

And here's the key, says Miguel: "It isn't like, 'Oh, I'm taking it away from them, I'm getting it myself.' I don't get the money."

Also, the prize you'd be preventing them from getting is real — as much as $30 worth of cellphone airtime credits. Lest there be any ambiguity, says Miguel with a chuckle, the research assistant explaining the game would hold up one of the paper airtime cards and literally rip it up and throw it in the garbage – "just to make it very graphic to people that [if you choose this option] this was what was going to happen."

In short, says Miguel, destroying the other person's winnings "is a supremely anti-social act" – and a good proxy for aggressive behavior in the real world.

"We weren't going to have people get violent with each other in our lab," says Miguel. " But [this game] was the closest thing we could get. You're really harming somebody and not benefiting yourself, other than the 'pleasure' of seeing other people do worse."

So did being in the hot room increase people's interest in behaving this way?

A link between poverty and conflict

Before we get to the answer, it's useful to consider why Miguel and his collaborators were so keen to find out.

Around the late 1990s, social scientists started compiling data demonstrating that the less income a country has, the more violent it's likely to be.

Today, says Miguel, "it is an incredibly robust social science fact. When I teach my undergrads, I put up that relationship between civil conflict, civil violence and country per capita income levels [on the board]. And it is just this incredibly strong downward sloping relationship. There is more violent crime in poor countries. There is more civil war and civil conflict in poor countries."

To remedy this situation, it's crucial to figure out what's causing it. But on that point, says Miguel, "there's been a big debate."

Initially, he notes, many political scientists looked to historical and policy explanations such as the weak governing institutions and fractious politics in many poor countries – often the legacy of colonialist rulers who had maintained power by fomenting internal divisions that reverberated long after independence.

But by the early 2000s economists such as Miguel had begun to posit another driver: The fact that in poor countries so many people eke out a living through activities like farming and herding that leave them highly vulnerable to climate shocks. For people who are extremely poor, a single bout of bad weather can wipe out their income, leading to the kind of desperation that, at least in theory, could fuel violence.

That hypothesis got a major boost in 2004, when Miguel and some collaborators published an analysis showing that during years of low rainfall in Africa there was a much higher risk of civil war.

"It was a seminal paper," says Nina Harari, an economist at University of Pennsylvania's Wharton School.

It suggested that with climate change, the world isn't just going to get hotter. It's probably going to get more violent.

"That is disheartening and concerning going forward," says Harari. And she adds that it's largely the reason that Miguel's 2004 findings "jump-started" a raft of additional research aimed at better understanding the apparent link between climate shocks and political violence in lower income countries.

This work has demonstrated that extreme heat has an even greater impact than low rainfall. It has also included a 2017 finding by Harari that bolstered the idea that extreme heat's *economic* impact is the reason it tracks with violence.

Specifically, Harari and a collaborator found that in Sub-Saharan Africa, if extreme heat – and consequent drought – hits during times of the year when it does not affect crops, there is actually no uptick in civil conflict. It's only when heat waves coincide with the growing season that the violence increases – a boost of about 8%.

"So the idea is, my agricultural yields are very low, so that makes me more likely to engage in conflict activity," says Harari.

She speculates that this could be because the loss of the harvest "worsens the extent of poverty and exacerbates existing inequalities." And also because "the opportunity cost of joining a rebellion becomes lower." Farming becomes so unprofitable that "you can just abandon your fields and turn to conflict" and possibly get more of a personal benefit.

But what about the psychological effect of heat?

Yet even as this and other evidence was piling up in favor of the economic hypothesis that had originally prompted Miguel to produce his 2004 analysis, Miguel himself was starting to question if there was yet another major factor at play.

He notes that other social science research had been finding that in countries of all income levels, including the United States, heat also correlates with many types of

aggression for which there's not an obvious economic spur – for instance more ranting on social media, car honking, fights on sports fields and higher murder rates.

"How much of this is internal to people when it gets hot?" Miguel says he wondered. "Do people's way of thinking and their mindset start to change?"

In other words, does extreme heat trigger a psychological effect that is driving up the violence?

To check for that, notes Harari, "You really need something like a lab experiment." She says Miguel's hot room study breaks new ground by setting up a particularly "rigorous" one.

What happened in the hot room

Which brings us back to the study's findings — first posted in a National Bureau of Economic Research working paper in 2019.

In Kenya's cool room, about 1 in 7 students chose to destroy the other player's winnings. That's in line with what's been found in many other studies using this game, including in the United States.

By contrast, in Kenya's hot room more than 1 in 5 students chose destruction. This was still within that normal global range. But it was nearing the top end. And most significantly, it was more than 50% higher than in the cool room.

"A very sharp increase in these antisocial behaviors," notes Miguel.

Then the researchers dug deeper. "And we found something really interesting," says Miguel. It wasn't all the Kenyan students who reacted this way.

The experiment had been done in the fall of 2017 amid a tumultuous election season in Kenya that was largely divided along ethnic lines. "The opposition felt really aggrieved and they felt the election was being stolen from them," says Miguel. "They were protesting. They boycotted the election."

And the hot room was most likely to drive up the aggression of students belonging to the ethnic group most closely aligned with that politically marginalized opposition. When in the cool room, these students had behaved no differently than the other students. Yet in the hot room, more than 1 out 4 chose destruction.

Meanwhile those students whose ethnic group was affiliated with the party then in power were completely unaffected by being in the hot room.

Miguel cautions that because the experiment was not originally designed to test whether people's ethnicity or political affiliations played a role in their response to the heat, there's a greater chance this finding was a coincidence. Still, he says, because the sample size was so large, "these are very statistically significant results."

The implication: Heat could be a kind of accelerant.

"For people who already feel a sense of grievance, experiencing extreme temperatures could really be the last straw," says Miguel – an additional psychological stress that tips them into violence.

James Habyarimana, an economist at Georgetown University, largely agrees.

"I think it's very plausible that the political situation affects and potentially drives the results they observed," says Habyarimana, who is originally from Uganda but who has specialized in research on Kenya.

For instance, Habyarimana notes that research on Kenyans working in a flower processing plant found that at the time of another, even more tense election season – in 2007 – people were less willing to cooperate with colleagues of a different ethnic group.

That said, Habyarimana says the hot room study raises some questions for further investigation.

For instance, he finds it surprising that the researchers found that the hot room had no impact when it came to people's performance on games that measured other mindsets, such as their risk aversion and their willingness to trust others.

And he says it's notable that the researchers had also tested students in the United States – and found no difference between their behaviors in the hot and cold rooms. But unlike in Kenya, the researchers were unable to drill down further to determine whether any of those U.S. students were likely to have felt politically marginalized at the time. So by leaving the U.S. group unexamined on this front at a time of the United States' own political tensions, "there's a gap," he says. "I would have liked a more balanced treatment."

Still, Habyarimana stresses that all of this simply adds up to an argument for doing more studies.

Climate change is pushing the world into a challenging era that will require more cooperation at a time when humanity is being pulled in the direction of less, he says.

"It requires us to understand what the effects of this new environment is going to be on how we behave," says Habyarimana. "So this is super critical research to nail down and hopefully mitigate those mechanisms."

Otherwise, he adds, "I don't see how we survive."

experiment | aggression | conflict | heat | violence | climate change