Inside the Wuhan Lab Leak Story

INTERNATIONAL

Newsweek

THE RISING RISK OF A CYBER PEARL HARBOR

Could a digital attack spark a real war with Russia?



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SATISFACTION
Online shopping has been a part of our lives for a long time now, but it is still growing very quickly. Both web traffic and sales are way up. The busiest sites are often the ones with the happiest customers.

COVER CREDIT
Illustrations by **Alex Fine** for *Newsweek*, Photo by Corbis/Getty

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A Cyber Pearl Harbor?

Online attacks are up. Hackers could accidentally push the U.S. and Russia into real war.

BY TOM O'CONNOR, NAVEED JAMALI AND FRED GUTERL

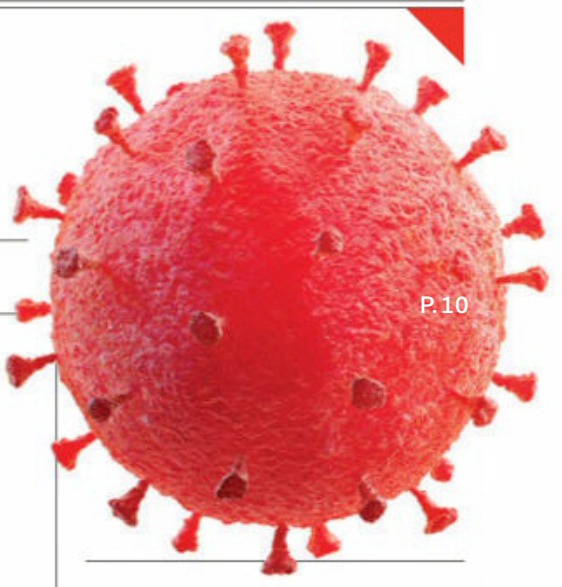
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America's Best Trending Online Shops 2021

Newsweek teamed up with respected data firm Statista to find the online retailers around the country in several categories who are growing the fastest.

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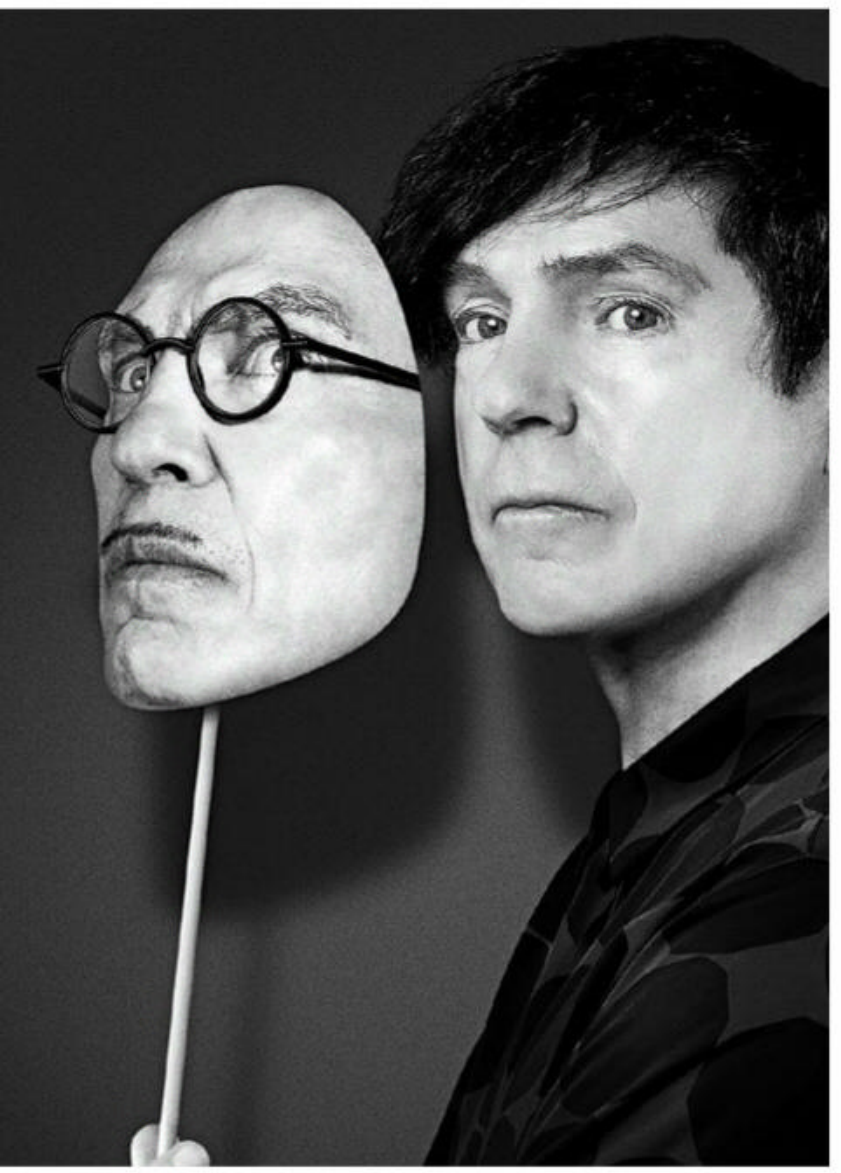
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"We both just have a really common vision of what Sparks is and should be."



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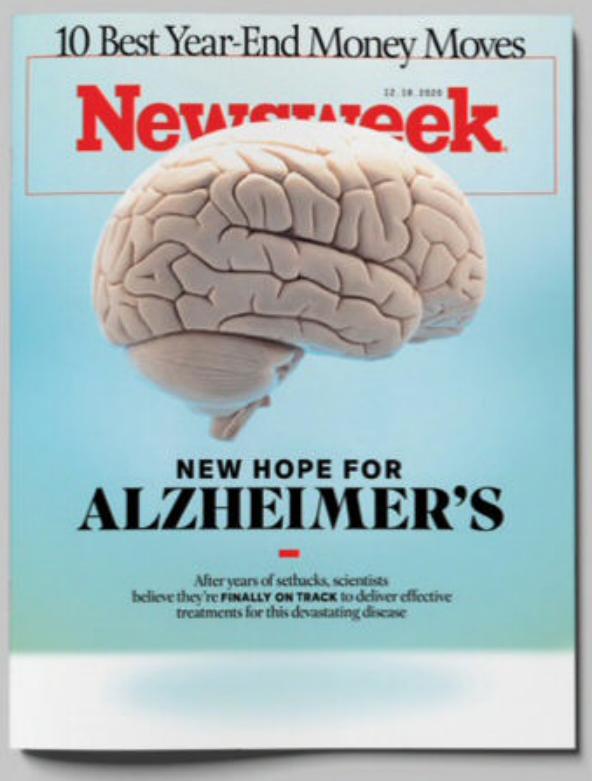
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“Journalism I don’t see elsewhere until later, if at all.”

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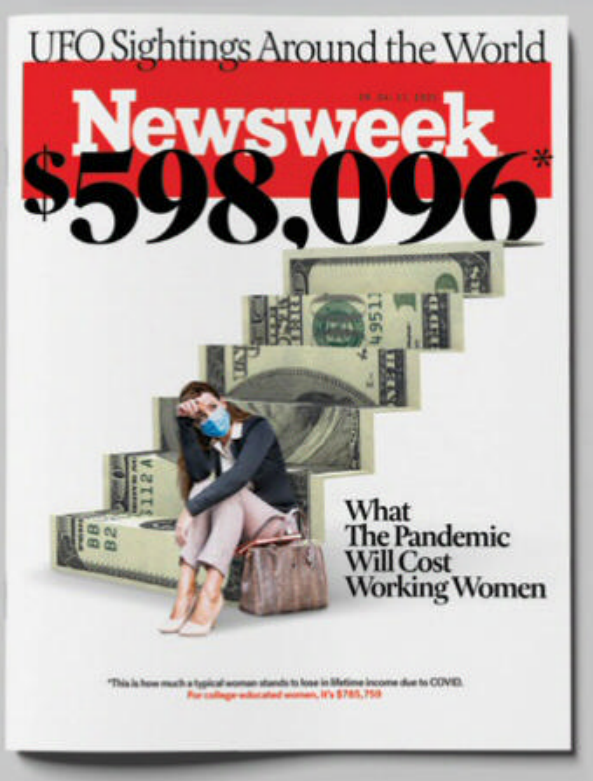












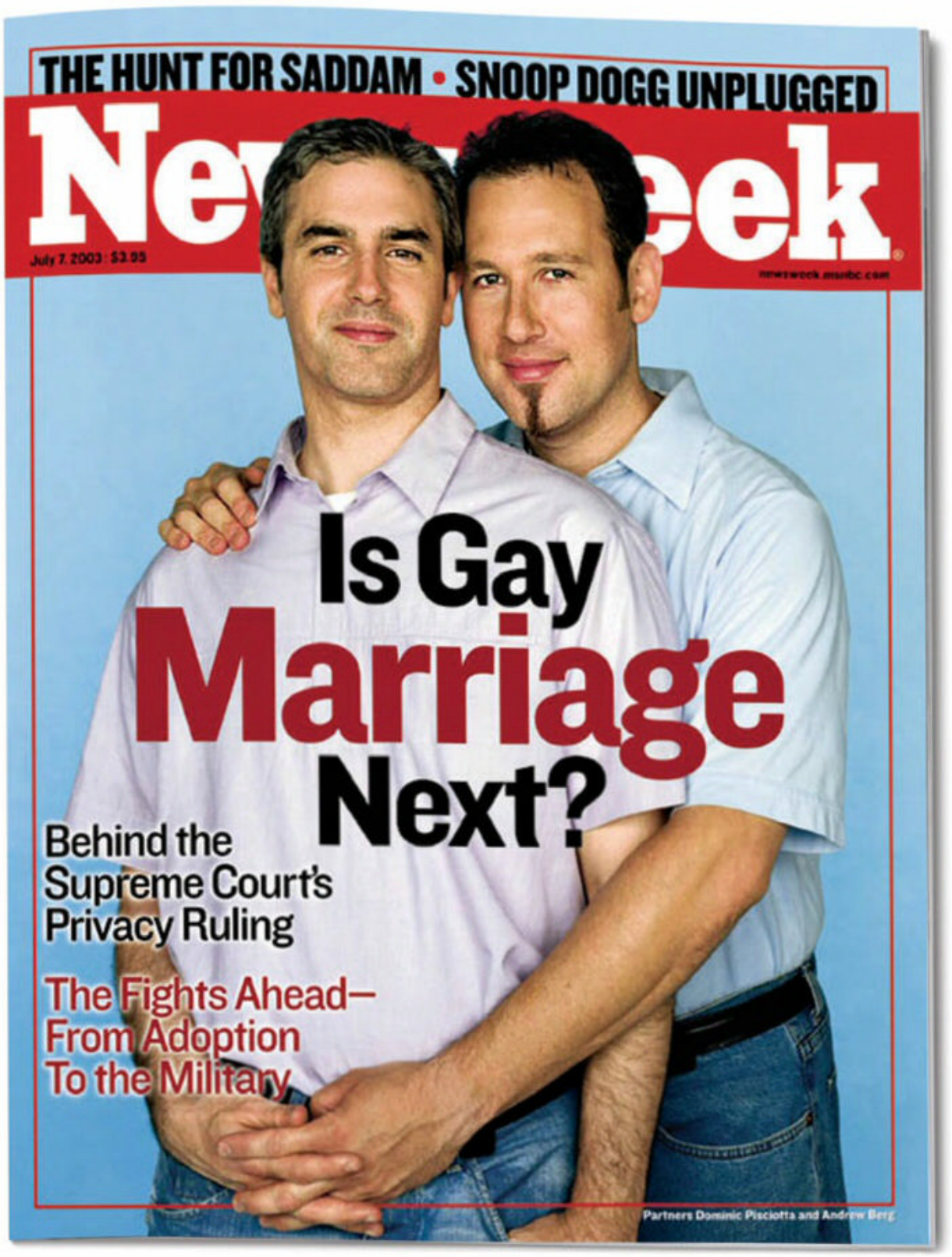
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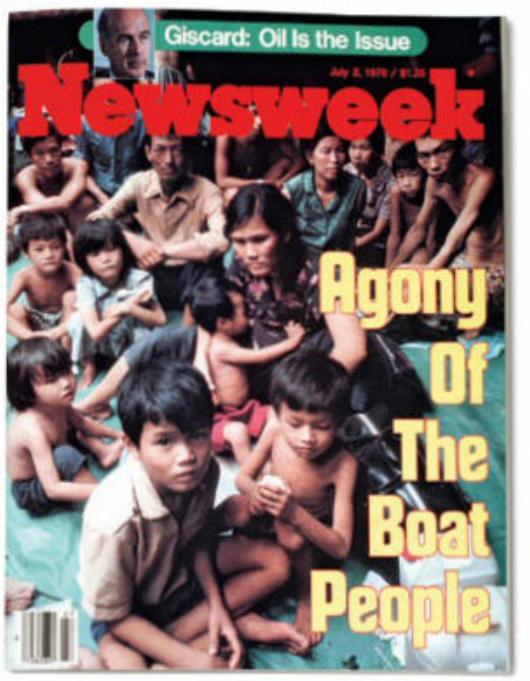
The Archives

2003 "The battle—over gay marriage, gay adoption, gays in the military and gays in the workplace—will be fought out court to court, state to state for years to come," *Newsweek* reported. "Nonetheless, there is no question that the *Lawrence* case represents a sea change, not just in the Supreme Court, a normally cautious institution, but also in society as a whole." Advocacy for LGBTQ+ civil rights legislation has since intensified. Twelve years later in 2015, *Obergefell v. Hodges* made gay marriage legal in all 50 states, and in June 2020, discrimination of LGBTQ+ workers was barred in the workplace.





1961 *Newsweek* wrote, "As summer burst across the land last week, millions of Americans were making plans to spend as much of it as possible out of doors." In 2020 the pandemic kept people inside. Attendance at national parks dropped almost 87 percent but is expected to rebound this summer.



1979 "They huddle in tattered fishing boats on the perilous swells of the South China Sea," said *Newsweek* of the "refugees from Vietnam, Cambodia and Laos." Today, in another refugee crisis in southeast Asia, more than 700,000 Rohingya—a stateless Muslim minority from Myanmar—have fled into neighboring Bangaladesh since 2017.

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GAZA CITY

Firefight

On June 15, a Palestinian protester throws a burning projectile toward Israeli armed forces during a demonstration by the border with Israel. He and others were objecting to the ultra-nationalist Flag March in Jerusalem's Old City celebrating the anniversary of Israel's 1967 annexation of Jerusalem's eastern sector.

MAHMUD HAMS



MAHMUD HAMS/AFP/GETTY







CLOCKWISE FROM LEFT: ALEXIS HUGUET/AFP/GETTY; CHRIS JACKSON/AFP/GETTY; SCOTT OLSON/GETTY

ROCKTON, ILLINOIS

Catastrophe

Smoke billows from an industrial fire at Chemtool Inc. on June 14. The chemical fire at the plant, which produces lubricants, grease products and other industrial fluids, triggered local evacuations. State officials, according to news reports, are looking into filing charges as a result of the accident.

→ SCOTT OLSON

WINDSOR, ENGLAND

Birthday(s)

Britain's Queen Elizabeth II watches a military ceremony to mark her "official" birthday at Windsor Castle on June 12. The Queen's 95th birthday was April 21, but a formal, public, celebration is always held on the second Saturday of June.

→ CHRIS JACKSON

GOMA, CONGO

Aftermath

A ranger from the Virunga National Park climbs the slopes of Mount Nyiragongo north of Goma, the provincial capital of North Kivu, on June 11, three weeks after the volcano's May 22 eruption. About 30 people died as a result and nearly half a million residents were evacuated.

→ ALEXIS HUGUET



COVID MYSTERY
What triggered the coronavirus pandemic? The once-discredited theory of a lab leak in Wuhan, China, is suddenly looking more plausible.



"What I really want is to simply *sound* like I can speak another language." »P.18

SCIENCE

Revenge of the Nerds

How amateur sleuths broke the Wuhan lab story

BY

ROWAN JACOBSEN
@rowanjacobsen

FOR MOST OF LAST YEAR, THE IDEA THAT THE coronavirus pandemic could have been triggered by a laboratory accident in Wuhan, China, was largely dismissed as a racist conspiracy theory of the alt-right. *The Washington Post* in early 2020 accused Senator Tom Cotton of "fanning the embers of a conspiracy theory that has been repeatedly debunked by experts." CNN jumped in with "How to debunk coronavirus conspiracy theories and misinformation from friends and family." Most other mainstream outlets, from *The New York Times* ("fringe theory") to NPR ("Scientists debunk lab accident theory"), were equally dismissive. (*Newsweek* and a few other media outlets were exceptions.)

Recently, however, the story has burst into the public discourse. President Joe Biden has demanded an investigation by U.S. intelligence. And the mainstream media, in an astonishing about-face, is treating the possibility with deadly seriousness.

The reason for the sudden shift in attitudes is clear: Over the weeks and months of the pandemic, the pileup of circumstantial evidence pointing to the Wuhan Institute of Virology (WIV) kept growing—until it became too substantial to ignore.

The people responsible for uncovering this evidence are not journalists or spies or scientists. They are a group of amateur sleuths, with few resources except curiosity and a willingness to spend days combing the internet for clues. Throughout the pandemic, about two dozen or so correspondents, many anonymous, working independently from many different countries, have uncovered obscure documents, pieced together the information, and explained it all in long threads on Twitter—in a kind of open-source, collective brainstorming session that was part forensic science, part citizen journalism and entirely new. They call themselves DRASTIC, for Decentralized Radical Autonomous Search Team Investigating COVID-19.

One of the sleuths, a young Indian man who calls himself "The Seeker," initially believed that the virus had jumped from wild animals to humans at a Wuhan wet market, because that's what the mainstream press told him. By early 2020, he was beginning to question that viewpoint. He had begun to interact with people who were poking holes in the conventional wisdom. "They helped me catch up on the debate, and I started to educate myself," he says. "Before I knew it, I got hooked into the mystery."

One important piece was an extensive Medium post by the Canadian longevity entrepreneur Yuri Deigin that discussed RaTG13, a virus Shi Zhengli, director of the WIV, had revealed to the world in a

GETTY; TOP RIGHT: SARA D. DAVIS/GETTY

Artwork by EUGENE MYMRIN

February 3 paper in the journal *Nature*. In that paper, Shi presented the first extensive analysis of SARS-CoV-2, which had seemed to come from nowhere—the virus was unlike any that had been seen before, including the first SARS, which had killed 774 people from 2002 to 2004. In her paper, however, Shi also introduced RaTG13, a virus that is similar in genetic makeup to SARS-CoV-2, making it the only known close relative at the time.

The paper was vague about where RaTG13 had come from. It didn't say exactly where or when RaTG13 had been found, just that it had previously been detected in a bat in Yunnan Province, in southern China.

The paper aroused Deigin's suspicions. He wondered if SARS-CoV-2 might have emerged through some genetic mixing and matching from a lab working with RaTG13 or related viruses. His post was cogent and comprehensive. The Seeker posted Deigin's theory on Reddit, which promptly suspended his account permanently.

That early whiff of censorship piqued The Seeker's curiosity, so he read more of the Twitter group's ideas. "I found a lively group of people eager to debate and explore the topic," he told *Newsweek* by email.

The Seeker and the rest of the group became increasingly convinced that RaTG13 might hold the key to some of those answers. The genetic sequence for RaTG13 perfectly matched a small piece of genetic code posted as part of a paper written by Shi Zhengli years earlier, but never mentioned again. The code came from a virus the WIV had found in a Yunnan bat. Connecting key details in the two papers with old news stories, the DRASTIC team determined that RaTG13 had come from a mineshaft in Mojiang County, in Yunnan Province, where six men shoveling bat guano in 2012 had developed pneumonia. Three of them died. DRASTIC wondered if that event marked the first cases of human beings being infected with a precursor of SARS-CoV-2—perhaps RaTG13.

In a profile in *Scientific American*, Shi Zhengli acknowledged working in a mineshaft in Mojiang County where miners had died. But she avoided connecting it to RaTG13 (an omission she had made in her scientific papers as well), claiming that a fungus in the cave had killed the miners.

That explanation didn't sit well with the DRASTIC group. They suspected a SARS-like virus, not a fungus, had killed the miners and that, for whatever reason, the WIV was trying to hide that fact. It was a hunch, and they had no way of proving it.

At this point, The Seeker wondered if the answer lay somewhere in a vast Chinese database of academic journals and theses called CNKI. After much searching, he found a 60-page master's thesis written by a student at Kunming Medical University in 2013. It described the conditions and step-by-step treatment of the miners and named the suspected culprit: "Caused by SARS-like [coronavirus] from the Chinese horseshoe bat or other bats."

The Seeker dropped the link, without fanfare, on May 18, 2020, then posted a second thesis from a Ph.D. student at the Chinese CDC confirming much of the information in the first. Four miners had tested positive for antibodies from a SARS-like infection. And the WIV had been looped in to test samples from them all. (Shortly after The Seeker's posts, China changed the access to CNKI so no one could do such a search again.)

If a SARS-like virus had emerged in 2012, was covered up, and the WIV had been sending people back to the mine to forage for more samples and bring them back to Wuhan, that should have been front-page news the next day. Instead, not a single story appeared for weeks. A few stories appeared in the U.K., including a feature in *The Sunday Times*. The U.S. media took a pass.

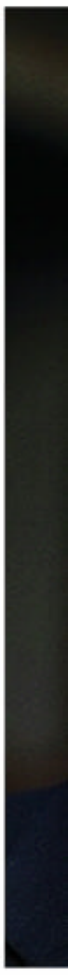
Within days, DRASTIC managed to locate the coordinates of the mysterious Mojiang mine, but it would not catch the attention of the media until late 2020, when a race to get there began. Eventually, a *Wall Street Journal* reporter reached the entrance to the mine by mountain bike—only to be detained for five hours of questioning. The mine's secrets remain.

"They helped me catch up on the debate, and I started to educate myself. Before I knew it, I got hooked into the mystery."

A Huge Sudoku Puzzle

Although the Mojiang mine revelation in May 2020 got nowhere in the media, it attracted new members to DRASTIC, which was able to expand its intelligence gathering to cover everything from viral genetics to biolab safety protocols. On May 21, 2020, Billy Bostickson, a member of the group, dubbed them "DRASTIC Research." He also began organizing the team into subgroups to focus on different aspects of the case. Soon, they were regularly posting discoveries that made lab involvement seem more likely.

A key team member was Francisco de Asis de Ribera, a Madrid data scientist who excels at mining big data sets. Over the years, the WIV had published a huge amount of information about



CLOCKWISE FROM TOP: HECTOR RETAMAL/AFP/GETTY; KEVIN FRAYER/GETTY; TOM WILLIAMS/CQ-ROLL CALL/GETTY





CONTROVERSY
Did the virus that causes COVID escape from a lab at the Wuhan Institute of Virology (left) or did it jump from animals to humans at a Chinese wet market (like the one below)? Senator Tom Cotton (below, left) was an early proponent of the lab-leak theory.



its virus-hunting projects in different outlets and formats. Ribera began assembling it all into "a huge Sudoku puzzle," searching for places where he could fill in some blanks, slowly assembling a comprehensive map of the WIV's entire virus program. He and The Seeker made a formidable team, The Seeker unearthing new puzzle pieces, Ribera fitting them into place.

Ribera was responsible for solving another piece of the RaTG13 puzzle. Had the WIV been actively working on RaTG13 during the seven years since they discovered it? Peter Daszak, the head of EcoHealth Alliance, which funneled U.S. research funds to the Wuhan lab, said no: They had never used the virus because it wasn't similar enough to the original SARS. "We thought it's interesting, but not high-risk," he told *Wired*. "So we didn't do anything and put it in the freezer."

Ribera disproved that account. When a new science paper on genetics is published, the authors must upload the accompanying genetic sequences to an international database. By examining some metadata tags that had been accidentally uploaded by the WIV along with its genetic sequences for RaTG13, Ribera discovered that scientists at the lab had indeed been actively studying the virus in 2017 and 2018—they hadn't stuck it in a freezer and forgotten about it, after all.

In fact, the WIV had been intensely interested in RaTG13 and everything else that had come from the Mojiang mineshaft. Ribera determined that they made at least seven different trips to the mine, over many years, collecting thousands of samples. Ribera's guess is that their technology had not been good enough in 2012 and 2013 to find the virus that had killed the miners, so they kept going back as the techniques improved.

He also made a bold prediction. Cross-referencing snippets of information from multiple sources, Ribera guessed, in a Twitter thread dated August 1, 2020, that a cluster of eight SARS-related viruses mentioned briefly in an obscure section of one WIV paper had actually also come from the Mojiang mine. In other words, they hadn't found one relative of SARS-CoV-2 in that mineshaft; they'd found nine. In November 2020, Shi Zhengli confirmed many of DRASTIC's suspicions about the Mojiang cave in an addendum to her original paper on RaTG13 and in a talk in February 2021.

Other databases yielded other clues. In the WIV's grant applications and awards, The Seeker found detailed descriptions of the Institute's research plans, and they were damning: Projects were underway to test the infectivity of novel SARS-like viruses they'd discovered in human cells and in lab animals, to see how they might mutate as they crossed species, and to genetically recombine pieces of different viruses—all being done at woefully inadequate biosecurity levels. All the elements for a disaster were on hand.

Alina Chan, a molecular biologist at the Broad Institute of MIT and Harvard, recognized the value of the infor-

mation DRASTIC was producing and began to interpret it for scientists and nonscientists alike in crisp explainers on Twitter that made her a star science communicator. Chan acknowledged the group's accomplishments in a long thread on Twitter. "Without the work done by the DRASTIC team, I don't really know where we would be today with the origins of COVID-19," she wrote, adding, "The work of these outsiders...has had a measurable impact on the scientific discourse."

That scientific discourse jumped tracks on January 6, 2021, when the University of Washington virologist Jesse Bloom, one of the country's most respected COVID-19 researchers, became the first major scientific figure to publicly legitimize DRASTIC's contributions. "Yes, I follow the work," he tweeted, sending tremors through the scientific establishment. "I don't agree [with] all of it, but some parts seem important & correct." Bloom singled out Mona Rahalkar's paper on the Mojiang mine, then added that in the early days of the pandemic, "I thought lab escape very unlikely. Based on subsequent work, I now say quite plausible."

In May, 17 scientists from Harvard, Yale, MIT and other leading institutions, including Chan, joined Bloom in a letter in *Science* calling for a thorough investigation of the Wuhan lab.

On nearly the same day, The Seeker struck again. Visiting a database hosted by China's Ministry of Science and Technology, he searched for all theses supervised by Shi Zhengli. If there had been any remaining doubt about the WIV's pattern of deception, these new theses put it to rest. They indicated that the WIV researchers had never believed a fungus had killed the Mojiang miners, contradicting Shi's remarks in *Scientific American* and elsewhere. In fact, WIV researchers had been so concerned about a new SARS-like outbreak that they'd tested the blood of neighboring villagers for other cases. And they had known the genetic sequences for the eight other SARS-like viruses from the mine—which could have helped researchers to understand more about SARS-CoV-2 in the early days —long before the pandemic started, and had kept the information to themselves, until DRASTIC called them out.

"I found a lively group of people eager to debate and explore the topic."

Within days of the new revelations and the *Science* letter, more academics, politicians and even the mainstream media began to take the lab leak seriously, culminating on May 26 when President Biden ordered U.S. intelligence agencies "to redouble their efforts to collect and analyze information that could bring us closer to a definitive conclusion."

So far China has been ice-cool to suggestions of further investigation, and it may never cooperate. But it's now clear that the question of whether a biolab could have caused this pandemic—and could cause the next—is going to be explored in a way that might never have happened if a radical and decentralized group of outsiders hadn't challenged the status quo. N



WHODUNNIT? Peter Daszak, a member of the World Health Organization team investigating the origins of COVID, arrives in Wuhan earlier this year.

HECTOR RETAMAL/AFP/GETTY

Talking Points

"Whenever the church gets in bed with politics, it gets pregnant. And the offspring does not look like our Father in heaven."

—OUTGOING SOUTHERN BAPTIST CONVENTION PRESIDENT J.D. GREEAR

GLAMOUR

"At the end of the day, we train for so long to compete for two, three minutes total. It's like, Where's the fun in that? If you're not having fun, it's not worth it."

—SIMONE BILES ON FINDING JOY IN GYMNASTICS

"THERE'S A HISTORY OF FOREIGN SUBSTANCES BEING USED ON THE BALL, BUT WHAT WE ARE SEEING TODAY IS OBJECTIVELY FAR DIFFERENT, WITH MUCH TACKIER SUBSTANCES BEING USED MORE FREQUENTLY."

—Commissioner of Baseball Rob Manfred in a statement announcing a crackdown on doctored baseballs

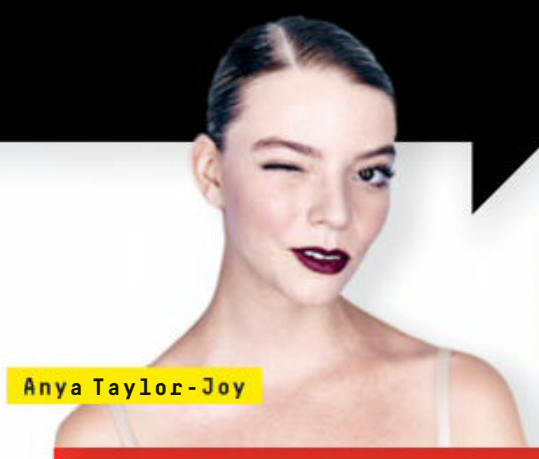


Rob Manfred

VARIETY

"I CRY ON PLANES."

—ACTOR ANYA TAYLOR-JOY ON WHAT SHE DOES BETWEEN ROLES



Anya Taylor-Joy

THE WALL STREET JOURNAL.

"When I look at my 19-year-old daughter's hair I'm like, 'You have my old hair; give it back.'"

—CINDY CRAWFORD

"Biden's message at these meetings has been simple: America's back. You know, like the McRib. America's back for a limited time only. Offer not valid in Florida."

—SETH MYERS ON THE PRESIDENT'S TRIP TO EUROPE

"THERE ARE WORDS THAT I HAVE SAID, REMARKS THAT I HAVE MADE, THAT I KNOW ARE OFFENSIVE, AND FOR THAT, I WANT TO APOLOGIZE."

—Rep. Marjorie Taylor Green on having compared Democrats to Nazis



Simone Biles

FROM LEFT: ROBBY KLEIN/CONTOUR/GETTY; ULRIK PEDERSEN/NURPHOTO/GETTY; ALEX TRAUTWIG/MLB/GETTY



WORKPLACES

Do Your Employees Love Your Company?

Find out this fall when *Newsweek* and the Best Practice Institute unveil the first "Most Loved Workplaces" list

BY

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THIS OCTOBER, *NEWSWEEK* AND my company, the Best Practice Institute, will unveil a group of companies—small, medium and large—that employees love working for. (Or where they may want to work.) We're calling it our "Most Loved Workplaces" list.

It doesn't take a genius to realize that it has never been more critical for companies to up their game. Because of the pandemic, employees and potential employees need to feel much more connected to their employers. Workers are starting to head back to the office, but many will continue to work remotely, at least for a while. Either way, it is clear that employees' personal and work lives are in some turmoil. They need to know three things: Do they stay with their current employers? Find another boss? Or, if unemployed, find a company that fits their new pandemic lifestyle?

So the bottom line is simply this: Job seekers and employees alike need to know which companies are loved and trusted. They also need to know which ones to steer clear of during this time of chaos. (And make no mistake, the work world will be an unsettling place for a while.)

Whether you are applying to, or already working for a company, what are the chances you can find accurate information on whether or not employees genuinely love their company? Where can bosses get such information so, if necessary, they can change their ways? With so much conflicting information on the web and lack of organizational transparency, your options are minimal.

That's what we are trying to accomplish with our Most Loved Workplaces list, which will be culled from a universe of more than 300 firms participating in our first-time assessment.

How do you know if your workplace makes the grade?

Based on the research in my book, *In Great Company*, there are five crucial factors that make up a company that is loved and admired by its employees. They are: Systemic Collaboration, Alignment of Values, Respect, Positive Future and Achievement.

Systemic Collaboration. Collaboration is a standard business buzzword. It could mean anything, really. And it can happen sporadically. But Systemic Collaboration is different. It's where collaboration becomes an everyday part of the organization—and its decision-making process.

Employees in such a setup work in small teams and produce concrete results using open communication channels. Information and advice are shared frequently and freely. This way of working creates an emotional con-

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"Employees love companies that emphasize qualities such as honesty, integrity and empowerment."

nection almost by definition.

For example: A multinational financial service company I studied took this idea to heart when they eliminated the traditional org chart over a two-year period. As part of their highly collaborative structure, the company has very few traditional managers and success depends heavily on trust and transparency within teams. Each team has a leader who is responsible for product delivery, and a "coach" to make sure the team collaborates effectively.

Alignment of Values. Employees love companies that emphasize qualities such as honesty, integrity and empowerment.

Love for your workplace happens when leaders and peers embrace common values and everyone holds each other equally accountable. Such practices include things as simple as doing what you say you will do or speaking the truth instead of avoiding it. Living your company's stated values makes a big difference, too.

If you don't think so, consider Wells Fargo. Its original mission statement included doing what's right for customers. Sounds great. But as many of you know, that lofty ideal was reduced to rubble when a whistleblower forced the bank to admit that thousands of Wells Fargo employees goosed sales by charging customers millions in fees for accounts they had not authorized.

Respect. Making respect a part of the organization's ethos and talent management process is essential to becoming a loved and respected company. According to my research, feeling genuinely respected is the top reason people feel passionate about their company—and want to perform their best. Respect is the glue that holds everything together.

For example: During his seven years as CEO of Home Depot, Frank Blake set aside time every Sunday to handwrite thank-you notes to employees. He estimates he wrote more than 25,000. And when Blake retired in 2015, employees returned the favor: Blake received hundreds of appreciative notes from Home Depot associates.

Former Campbell Soup CEO Doug Conant also employed this practice in 2001, when he was brought in to turn around the declining organization when it was reeling from layoffs. Over the course of his tenure, Conant wrote 30,000 thank-you notes to employees for everything from major accomplishments to small acts of kindness. They reeled no more—and felt a lot better about working for the company.

Creating a Positive Future. My research also shows that "positivity" about a purposeful future is a powerful catalyst for creating an emotionally connected culture. It's just not a Mister Rogers thing. It takes a very deliberate effort. People are far more likely to be passionate about work if they believe their actions are changing the world for the better.

One of the world's top steel companies stoked passion in its people by focusing corporate culture on things that deliver meaning: positive change in manufacturing, high quality standards, sustainability, empowerment and innovation. Other companies have charitable foundations dedicated to advancing causes from strengthening the community to addressing climate change. This combination of commerce and commitment allows people to work on behalf of their favorite causes under the umbrella of their own organization.

Achievement. A great workplace happens when employees have stated objectives and managers remove competing interests that block the path to success. A study in *The Journal of Happiness* showed that making progress toward goals might just bring as much satisfaction as actually achieving them.

In this case, it's the happiness that creates the achievement. We are more effective, creative and collaborative when we are happy at work. Achievement, then, is actually a set of behaviors and dynamics, not a single event or a moment in time. In other words, the joy is in the journey.

Employees who work for some of the top streaming entertainment companies may love their workplace. However, they love their workplace not because they signed 10 million or more new members in any particular quarter, but because the company sets ambitious but attainable goals that motivate people to work toward them as a team.

Skeptical? In our initial research, we found that respondents who love their company are up to four times more likely to perform at their best. This same group was three to four times more likely to stay longer at their employer.

Do your employees see you that way? If not, it is time to up your game. See you in October.

→ **Louis Carter**, *founder and CEO of Best Practice Institute, is the author of more than 10 books on best leadership and management practices, including* CHANGE CHAMPION'S FIELD GUIDE, IN GREAT COMPANY, *and* BEST PRACTICES IN TALENT MANAGEMENT. *Thought leaders and executives voted him one of Global Gurus Top 10 Organizational Culture thinkers worldwide.*

MY TURN

'I'm A Nobel Laureate, But I Still Have Regrets'

It's only human to feel sadness about the roads not taken in your life even if you're a big success



REGRETS—I'VE HAD A FEW. I wish I could say they're too few to mention, but that wouldn't be true. If you have ambition, you have regrets. It comes with the territory.

I recently made the mistake of writing a memoir recounting adventures from my life and career as a physician and scientist. Naturally, the writing process led me to also meditate on my many regrets, which unfortunately I didn't get a chance to detail in the book because my publisher wanted to "keep things positive."

One of my biggest regrets is that I never mastered a musical instrument. I played percussion as a student and also took piano lessons, but didn't stick with it. I was in such a hurry as a young man to achieve my dream of becoming a doctor that other ambitions, such as my musical aspirations, fell by the wayside.

I constantly have Walter Mitty-esque fantasies of being an elite musician. Sometimes I even act these fantasies out. A few years ago, I took a visiting professor to an upscale restaurant on the Duke Medical Center campus in North Carolina. We had to wait a few minutes for our table, so I sat down on a bench in front of a piano. Suddenly, the piano sprang to life and began playing itself. Without missing a beat, I put my fingers on the keys and began swaying along as if I were playing. Many of the diners looked over at me, nodding appreciatively in the belief that I was spontaneously regaling them with some dining music.

After a few minutes, I sensed the piece was building to a climactic crescendo, so I threw my hands up with a flourish just as the song ended. The dining room erupted in applause, and I stood to take a bow. As I basked in the adulation and began heading to my table, the piano jolted to life again and began playing another song on its own, causing the entire room to burst into laughter. I'm not sure which I enjoyed more: the applause for my musical "performance" or the huge laugh I got afterward when everyone realized that I was a complete phony.

Yet whenever people ask me what career I would have chosen if I hadn't become a doctor and scientist, I always say that I would've been a stand-up comic. As a college student in New York City in the 1960s, I regularly hit the clubs in Greenwich Village to catch performances by edgy comedians like Mort Sahl and Lenny Bruce.

Regrettably, I lack the level of wildfire talent to make it as a professional stand-up, but that hasn't stopped me from cracking jokes at every opportunity in my daily life. In fact, a core part of my philosophy of mentoring is that I believe humor and playfulness are great prods to creativity: the more people are laughing, the more creative they become. I am constantly joking around in meetings with the trainees in my research lab at Duke, with the humorous tone hopefully setting the stage for inspiration.

My inner stand-up comic comes out sometimes when I'm invited to give presentations to scientific audiences. Some years ago, I was asked to deliver an after-dinner speech to all the board members and current investigators of the Howard Hughes Medical Institute (HHMI), which has funded my lab's research for many decades. These days, HHMI is a well-run and

BY

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CHRIS SEWARD/RALEIGH NEWS & OBSERVER/TRIBUNE NEWS SERVICE/GETTY



buttoned-down organization, but my after-dinner talk focused on the wild early days of HHMI back in the 1970s.

The audience ate up my over-the-top stories, with every single joke slaying. Legendary neuroscientist Eric Kandel was laughing so hard that tears were streaming down his face. Forget about winning the Nobel Prize in Chemistry: the high point of my career came when my comedy killed.

I love giving talks to student groups, and students are rarely shy in asking about my regrets. A common question I get is, "Do you regret that it took so long for you to win a Nobel Prize?" Most of the work for which I won the Prize was done decades ago, but I didn't get the call from Stockholm until 2012. I tell the students that in some respects I do regret the long wait, especially because it meant that neither of my parents was alive to see me receive the Prize.

When I was a young man, I won many awards in school and in my early professional career, and invariably my mother would say, "Well that's nice, Bobby, but it's not the Nobel Prize." For my mom, it was apparently either Nobel or bust. Thus, when I ultimately won a Nobel, it would have been very satisfying to take my mom to Stockholm to show her that I had finally made good. I never got the chance, alas, but when I did attend the Nobel ceremony I remember having elaborate fantasies about my mother being there to share it with me, and somehow these imagined discussions with my mother were intensely satisfying.

"I believe humor and playfulness are great prods to creativity: the more people are laughing, the more creative they become."

A common theme of all my regrets is that fantasy has been an important coping mechanism for me. I'm never going to be a great musician or stand-up comic, and I certainly can't bring my parents back to have healing conversations, but I can use imagination as a sort of therapy for dealing with these regrets. I look forward in the coming years to addressing other regrets, such as my regret that I never learned a foreign language.

I've come to realize that what I really want is to simply *sound* like I can speak another language. My son Noah, a former professional actor, has suggested that I hire an accent coach. Why take years to learn a language if I can deploy an arsenal of accents with just a few weeks of training? One day soon you'll hear me engaging all the international trainees in my research laboratory in discussions where I match their melodious accents, shifting my accent in a Zelig-like manner as I move from person to person.

I still won't be multilingual, but the temporary fantasy that I am may be enough.

"THAT'S NICE, BOBBY"
Dr. Robert J. Lefkowitz, at Duke University, after being named a co-winner of Nobel Prize in Chemistry in October 2012.

→ **Dr. Robert Lefkowitz** *is a professor at Duke University and co-author of* A FUNNY THING HAPPENED ON THE WAY TO STOCKHOLM: THE ADRENALINE-FUELED ADVENTURES OF AN ACCIDENTAL SCIENTIST *(Pegasus Books, 2021). The book's co-author, Randy Hall, also contributed to this piece. All views expressed in this article are the author's own.*

ARE WE HEADED FOR A CYBER PE

by
TOM O'CONNOR,
NAVEED JAMALI
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MIKHAIL METZEL/TASS/GETTY

A LINE DRAWN
At their summit in Geneva on June 16, U.S. President Joe Biden handed Russian president Vladimir Putin a list of no-go targets that, if hit with a cyber attack, would be considered grounds for retaliation by America.

ARL HARBOR?

Digital attacks could push the U.S. and Russia into a **REAL WAR**







FROM TOP: BRENDAN SMIALOWSKI/AFP/GETTY; MARK KAUZLARICH/BLOOMBERG/GETTY; TOM WILLIAMS ROLL CALL/GETTY

TENSIONS GROW
(From top) Biden gave a solo news conference after the Putin summit, vs. the typical joint appearance, a sign of the strains following cyber attacks like the one that hit Colonial Pipeline. (Right) Former Deputy Assistant Secretary of Defense Evelyn Farkas advocates a strong stance.

JOE BIDEN TOOK OFFICE IN JANUARY in the wake of the SolarWinds attack, an unprecedented and potentially disastrous penetration of U.S. government computer systems by hackers believed to be directed by the Russian intelligence service, the SVR. The new American president promised to shore up the nation's cyber defenses against foreign foes. As if on cue, hackers struck with two major ransomware attacks, closing the Colonial Pipeline, which provides about 100 million gallons of gas a day to the southeastern U.S., and halting production at all U.S. facilities of the world's biggest beef producer, Brazil-based JBS. The events underscored the immense vulnerability of a trillion-dollar, internet-based economy for which security is an afterthought.

Most Americans seem to assume that a cyber attack, even by an avowed adversary like Russia or Iran, would be answered in kind—that the U.S. would cause an annoying power outage or a brief internet failure. But experts and former intelligence and cyber-security officials tell *Newsweek* that hackers linked to Russia have launched cyber attacks on the U.S. that have come frighteningly close to the red line: a digital incursion that would prompt a deadly real-life response.

As the U.S. continues to prove vulnerable to ransomware attacks from shadowy groups believed to be operating out of Russia or other former Soviet bloc countries, those with experience in advising the White House on challenges from the region urge Biden to take the opportunity to send a message.

"What I want is for Biden to very clearly explain what the risk is to Vladimir Putin, that we are not going to back down if we are attacked by Russia," Evelyn Farkas, who served as deputy assistant secretary of defense for Russia, Ukraine and Eurasia, "and that we're going to be the ones that decide what a 'cyber Pearl Harbor' is, which means Russia doesn't control the escalation dynamic."

At least Japanese leaders knew that bombing Pearl Harbor would inevitably provoke a military

> "If a nation-state adversary were to set foot on our homeland and physically destroy our infrastructure, we would view this **AS AN ACT OF WAR."**





response. It's not clear that Russia or the cyber-militants operating within its borders have that awareness now. A shooting war between Russia and the U.S., avoided for more than a half-century, would leave only losers. But cyber warfare is so new that there's no agreed upon, widely understood Rubicon, as was established during the Cold War with the use of traditional weapons of mass destruction. (Think: Cuban Missile Crisis. After that near-catastrophe, the two sides have played it safe.)

The lack of clarity—of a shared algorithm for escalation—is tinder that could easily turn into a deadly fire. In short, there's a growing danger of a response far more devastating than the temporary internet outage or compromised credit score or muddled train schedule that Americans might think would be the worst-case scenario.

Russian President Vladimir Putin doesn't directly run the hackers who've recently infiltrated high-level government networks and paralyzed critical infrastructure. U.S. intelligence believes the digital operatives behind those attacks work with the Russian president's blessing but stay at arm's length—the better to give Moscow plausible deniability. It's part of a familiar pattern: Russian-affiliated groups have long harassed U.S. companies and government agencies and even had a hand in swinging the 2016 election to Donald Trump. The Biden administration has not directly accused the Kremlin of sponsoring these attacks but blames the Russians for allowing such activity to continue.

The recent attacks seem to mark an intensification. They tend to be more focused on physical infrastructure like food, oil and gas pipelines, and hospitals, upon which Americans rely every day for their health and economic well-being. The trend has national security analysts worried. It's one thing to make Americans wait in line at the pump or to hit hospitals with ransom bills that drive up the cost of health care. It's something else entirely to cause real economic harm and even loss of life. And yet, hackers seem to be flirting with crossing what national security experts say is a "red line."

The red line was high on the agenda in the June 16 talks between Biden and Putin. Biden handed the Russian president a list of no-go targets upon which a cyber attack presumably might be considered an act of war that demands retaliation. Although it's not clear where that red line is—the White House

has not released the list—it's not hard to imagine how easy it would be for hackers acting with some degree of autonomy from Moscow, and not directly answerable to the consequences of their actions, to cross it. To take one example, it's become a truism in cyber-security circles that hackers working with the backing of the likes of Russia and China may have the ability to cause a shutdown of a large swath of the U.S. electrical grid, which could kill millions.

In other words, the next big cyber attack could trigger a war with Russia, and not the virtual kind, but one involving troops, tanks, missiles, aircraft carriers and possibly nuclear weapons. "If a nation-state adversary were to set foot on our homeland and physically destroy our infrastructure, we would view this as an act of war," Brian Harrell, former Assistant Director for Infrastructure Security at the U.S. Cybersecurity and Infrastructure Security Agency (CISA), told *Newsweek*.

Russian-affiliated hackers have not crossed the red line yet, of course. But they've come close enough to keep national security experts wondering where the escalating trail of destruction might be heading, and how much control the Kremlin truly has over the hackers that do its bidding.

Drawing the Line

ALTHOUGH THE SITUATION MAY SEEM RELATIVELY calm on the surface, hackers are testing the limits nearly every day. In February, a still-undisclosed group of hackers managed to take control of a water treatment center in Oldsmar, Florida. It increased levels of sodium hydroxide, a highly caustic chemical also known as lye, from a safe 100 parts per million to a dangerous 11,100 ppm. Operators noticed the change and acted quickly to lower the levels before any damage was done.

"The cyber red line—I think everybody is fairly clear on this—is loss of life," William Hurd, a former CIA clandestine officer who served in Congress as a Texas representative from 2015 to this January, told *Newsweek*. He said the incident in Florida could have elicited a "kinetic response"—in other words, military action—had U.S. lives been lost.

Conflicts are playing out with increasing velocity and viciousness inside some of the country's energy, water, banking and other essential infrastructure. The vast majority of such incidents are never publicized, cyber experts say. Private companies, which are notoriously reluctant to fess up to having been hacked, own and operate more than 85 percent of critical infrastructure, according to Harrell.

"Our critical infrastructure sectors are the modern day battlefield and cyberspace is the great equalizer," he says. "Hacker groups can essentially attack with little individual attribution and virtually no consequence. I anticipate more attacks focused on energy, water, and financial services happening in the future."

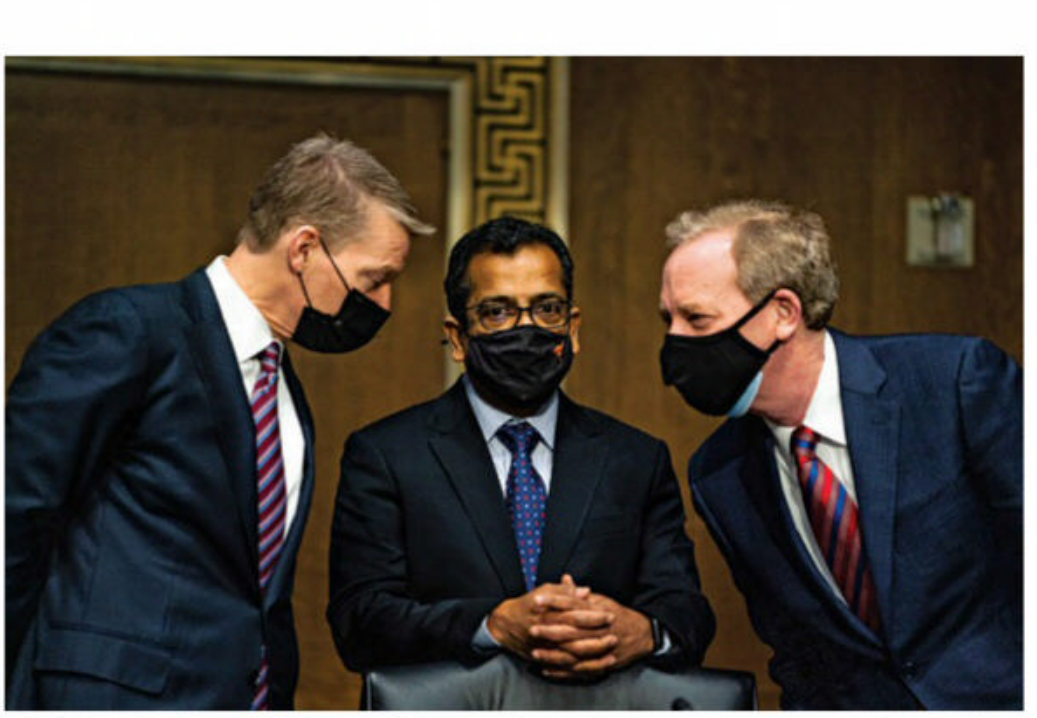
In 2018, the Trump administration created CISA within the Dept of Homeland Security. But even the cyber cops are hampered by a lack of information.



"Our critical infrastructure sectors are the modern day battlefield and cyberspace is the **GREAT EQUALIZER."**



A DANGEROUS PATH Experts warn of the rising risk that another major cyber attack against a U.S. target by Russian hackers could trigger armed conflict, much as the attack on Pearl Harbor (left) did with World War II. (From top to bottom) Putin, at his post-summit press conference; SolarWinds CEO Sudhakar Ramakrishna (middle) talking with other tech CEOs before a Congressional hearing on cyber threats last year; a JBS meat processing plant.





CLOCKWISE FROM LEFT: CORBIS/CORBIS/GETTY; SERGEI BOBYLEV/TASS/GETTY; DEMETRIUS FREEMAN/GETTY; DIEGO GIUDICE/BLOOMBERG/GETTY

Private operators are reluctant to report transgressions and often quietly pay ransom to get their systems back online with as little fuss—and publicity—as possible.

It's not entirely clear what an appropriate response to a cyber attack that crosses the red line would be. "It's ones and zeros and malware versus one-megaton warheads on Titans and on B-1's. How do you make that comparison so you can decide on proportional responses?" says Doug Wise, who served in the CIA as a member of the Senior Intelligence Service and was deputy director of the Defense Intelligence Agency. "That's the beauty of these cyber attacks, because we struggle at trying to compare the attack mechanism to the kinetic attack mechanism, particularly, strategic to strategic."

And then there's the question of whom to retaliate against. Although intelligence experts are pretty skilled at tracing the digital footprints of an attack to its source, the evidence is almost always highly technical and far less persuasive to military allies and the general public than, say, that of a bombing raid or an invading army. Any decision to retaliate risks looking to all the world like an unprovoked aggression. The Russians are skilled at confusing attribution, making it difficult to justify a proportional response, let alone an escalation.

The attribution problem complicates the question of where to draw the line. Some experts think it would make retaliation more difficult than it would be for a conventional strike. "It would take a significant cyber attack against the aviation infrastructure, power infrastructure, water distribution and the transportation infrastructure," Wise said. "I think it would take probably two to three simultaneous attacks against these targets, along with clear attribution. The attribution issue is always the stumbling block."

Cyber Diplomacy

STILL, IT'S A MISTAKE TO ASSUME THAT THE DIFFICULTY of attributing a cyber attack is insurance against a hasty retaliation. The element of uncertainty that the attribution problem adds to international affairs could also be destabilizing. Just as it's difficult to attribute an attack to an aggressor, it's also easy to mistakenly attribute an attack to an adversary—particularly one that, like Russia, is a constant thorn in the side of the U.S., and from which Americans are primed to expect aggression. Given the

“We’re going to be the ones that decide what a ‘cyber Pearl Harbor’

SHOW OF STRENGTH
An intercontinental ballistic missile rolls down Moscow’s Red Square during a Victory Day military parade this May marking the 76th anniversary of the win over Nazi Germany in World War II.

SERGEI BOBYLEV/TASS/GETTY

is, which means Russia doesn't control the **ESCALATION DYNAMIC."**





SPARKS OF WAR
Precedent? The attacks against the World Trade Center in 2001 (above, top) triggered the U.S. invasion of Afghanistan. The Cuban Missile Crisis in 1962 nearly provoked nuclear war, notes Raj Shah (above, bottom), chairman of Resilience, a cyber security insurance firm.

heightened tensions between the U.S. and Russia, it's not far-fetched to think that a third party could launch a cyber attack against the U.S. and make it look like it came from Russia. Even if U.S. intelligence officials were smart enough to suss out such a ruse, the mere appearance of aggression could provide a convenient pretext for war. After all, Iraq had nothing to do with the 9/11 attacks in 2001, but the George W. Bush administration still used them as justification for its disastrous invasion of Iraq in 2003.

Massive military strikes that start wars are baked into the American psyche. Japanese planes bombing the U.S. military base at Pearl Harbor in Hawaii on December 7, 1941, precipitated the U.S. entry into the Second World War. Hijacked passenger planes crashing into the World Trade Towers on September 11, 2001, triggered a U.S. invasion of Afghanistan that is only now ending. The 1962 Cuban Missile Crisis established a precedent for brinksmanship between the U.S. and Russia. "We almost went to nuclear war," as Raj Shah, chairman of the cybersecurity insurance firm Resilience, told *Newsweek.*

The prospect of cyber attacks leading to a full-scale war is commonly accepted in diplomatic circles. NATO members, in a joint June 14 statement, agreed that "the impact of significant malicious cumulative cyber activities might, in certain circumstances, be considered as amounting to an armed attack." The statement also said that NATO would intensify its focus in the cyber realm, including "sharing concerns about malicious cyber activities, and exchanging national approaches and responses, as well as considering possible collective responses."

"If necessary, we will impose costs on those who harm us," the statement added. "Our response need not be restricted to the cyber domain."

The alliance also confirmed that it was open to considering cyber-attacks to be on a par with conventional military operations, stating, "We reaffirm that a decision as to when a cyber attack would lead to the invocation of Article 5 would be taken by the North Atlantic Council on a case-by-case basis."

The prospect of a "physical" attack in response to cyber attacks already has a real-life precedent. The U.S. targeted the cyber capabilities of the Islamic State militant group (ISIS) with an August 2015 airstrike that killed jihadi hacker Junaid Hussain in the de facto caliphate capital of Raqqa, Syria.

One of the first publicly acknowledged examples of an immediate, kinetic reaction came nearly four years later elsewhere in the Middle East. In May 2019, the Israel Defense Forces reported that they "thwarted an attempted Hamas cyber offensive against Israeli targets" by conducting an airstrike on an alleged headquarters in the Palestinian-controlled Gaza Strip. Israeli forces similarly targeted Hamas cyber stations during May's 11-day confrontation with Hamas and allied Palestinian factions in Gaza. Although the fallout from both operations remained relatively contained, how such a response would play out on the state-versus-state level remains uncertain.

Playing Defense

THE U.S. AND ITS ALLIES ARE ALREADY TAKING STEPS to head off cyber attacks from Russian-affiliated groups. The U.S. Cyber Command is collaborating with allies to pool insights and intelligence on the

CLOCKWISE FROM BOTTOM LEFT: RICK KERN/FAST COMPANY/GETTY; ROBERT GIROUX/GETTY; HIROSHI WATANABE/GETTY

A TIMELINE OF TROUBLE

Over the past year, there have been more than a dozen significant cyber-incidents between the U.S. and Russian groups. They include:



MAY 30, 2021

Brazil-based JBS, the world's largest meat processing company, is the victim of a ransomware attack attributed to the Russian-speaking cybercrime group REvil. The attack shut down facilities in the U.S., Canada and Australia. Ransom: $11 million.

MAY 7, 2021

The Colonial Pipeline, the largest fuel pipeline in the U.S., is the target of a ransomware attack attributed to DarkSide, a Russian-speaking hacking group, causing a run on gasoline in the southeast. Ransom: $4.4 million, of which the Justice Department recovered $2.3 million.

APRIL 15, 2021

U.S. Cyber Command announces that it "released eight files attributed to the Russian Foreign Intelligence Service (SVR)/APT 29 to enable public defense against further compromise" during a "Hunt Forward" operation conducted in connection with the SolarWinds hack.

MARCH 2021

U.S.-based insurance company, CNA, is the victim of a ransomware attack that used a new ransomware named Phoenix CryptoLocker. It is reported to be the product of Evil Corp, another Russian speaking cybercrime organization potentially related to REvil and other groups like it.

MARCH 2021

Politico reports that suspected Russian hackers stole thousands of emails last year after breaching the server of the U.S. State Department, targeting the Bureau of European and Eurasian Affairs and the Bureau of East Asian and Pacific Affairs.

DECEMBER 2020

Over 200 organizations around the world, including multiple U.S. government agencies, are found to have been breached by suspected Russian hackers who compromised the software provider SolarWinds to monitor internal operations and exfiltrate data as part of an operation dating back at least as far as March 2020.

NOVEMBER 2020

The NATO Cyber Coalition deploys "honeypot" tools to lure adversaries, many of which originate in Russia, into attacking and inadvertently exposing their own codes.

OCTOBER 2020

The FBI and CISA announce that a Russian hacking group known as "Energetic Bear" breached U.S. state and local government networks, as well as aviation networks and exfiltrated data.

OCTOBER 2020

Microsoft and U.S. Cyber Command both independently undertake operations to take down a Russian botnet ahead of the U.S. election.

SEPTEMBER 2020

Russian hackers target government agencies in NATO member countries and nations who cooperate with NATO, using NATO training material as bait for a phishing scheme that infects target computers with malware that creates a persistent backdoor.

JULY 2020

Canada, the UK, and the U.S. announce that hackers associated with Russian intelligence had attempted to steal information related to COVID-19 vaccine development

JULY 2020

Media reports say a 2018 Presidential finding authorized the CIA to conduct cyber operations against Iran, North Korea, Russia and China. The operations included disruption and public leaking of information.

JULY 2020

President Trump confirms that he directly authorized a 2019 operation by U.S. Cyber Command taking the Russian Internet Research Agency offline. The Kremlin cast doubt on the news but alleged that "a huge number of cyber attacks are constantly being organized from the territory of the United States to various Russian organizations, legal entities and individuals."

MAY 2020

The NSA announces that Russian hackers associated with the Russian military intelligence agency GU, or GRU, had been exploiting a bug that could allow them to take remote control of U.S. servers

SOURCE → *Center for Strategic & International Studies, U.S. Cyber Command, public reporting*

activities of Russia and other cyber-adversaries in what a spokesperson called hunt-forward operations. "These operations are one part of our 'defend forward' strategy—where we see what our adversaries are doing, and share with our partners in the homeland to bolster defense," the spokesperson told *Newsweek*.

In one such mission targeting Russia's alleged cyber activities, U.S. forces "discovered and disclosed new malware associated with the SolarWinds incident, and then provided key mitigation of the malware, attributed to Russia's Foreign Intelligence Service," the U.S. Cyber Command spokesperson said. The department shares much of its intelligence with federal agencies and private companies in an effort to prevent successful attacks.

Biden has alluded to retaliation against Russia for cyber attacks, but the U.S. is mum on what steps it is taking. As NATO's joint communiqué asserted, the Biden administration has considered a range of options in response to major cyber attacks. "The way that I've consistently characterized our response when it came to SolarWinds and to other cyber attacks of that scope and scale is that we are prepared to take responsive actions that are seen and unseen," White House national security adviser Jake Sullivan told reporters in June, "and I'll leave it at that."

Even these vague statements have raised concern among Russian officials. "What people can be afraid of in America," Putin told NBC News, "the very same thing can be a danger to us. The U.S. is a high-tech country, NATO has declared cyberspace an area of combat. That means they are planning something; they are preparing something, so, obviously, this cannot but worry us."

After the summit, Putin asserted that the "majority" of cyber attacks came from the U.S. and its allies.

Avoiding Unintended War

ONE REASON CYBER-SECURITY WAS ON THE AGENDA for Biden and Putin is to avoid an unintended war. Both the U.S. and Russia have asserted their right to wage cyber operations offensively and defensively. Without international agreements in place, it's not clear what behavior is acceptable and what isn't.

"We can't allow this to continue to escalate," says Shawn Henry, president and chief security officer of cybersecurity company CrowdStrike. "It's the exact reason we had nuclear arms talks, because we realize things couldn't continue to escalate, they couldn't spiral out of control. We couldn't worry about an adversary launching a weapon mistakenly because we know what the response would be."

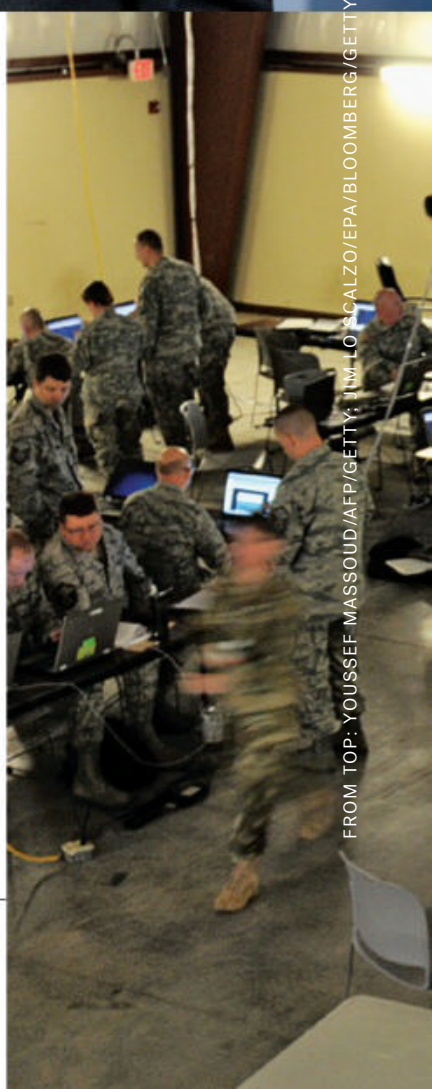
Henry, a former FBI executive assistant director, says the dialogue is overdue. "It takes us back to that exact point in the conversation where nation-states need to sit down and define what the red lines are and what the responses are going to be, so there is no misunderstanding."

Prospects for a Treaty

JUDGING FROM HIS RHETORIC, PUTIN SEEMS AMENABLE to an agreement to rein in the cyberwarfare shenanigans. In September, he asserted that "one of today's major strategic challenges is the risk of a large-scale confrontation in the digital field," as







FROM TOP: YOUSSEF MASSOUD/AFP/GETTY; TIM LOCALZO/EPA/BLOOMBERG/GETTY; U.S. ARMY/SGT. STEPHANIE A. HARGETT

"IT'S ONES AND ZEROS AND MALWARE versus one-megaton warheads on Titans and on B-1's. How do you make that comparison so you can decide on proportional responses?"





CYBER CONFLICT During the confrontation in Gaza in May (top), Israeli forces targeted Hamas cyber stations. (Left) White House national security adviser Jake Sullivan has said the U.S. is ready to take action against cyber threats as needed. (Below) Soldiers in Indiana train to defend against cyber attacks.

the Russian embassy in Washington conveyed to *Newsweek*.

Putin wants to establish high-level communication between Washington and Moscow on "international information security," using existing agencies that deal with nuclear and computer readiness. He is also in favor of establishing new rules along the lines of U.S.-Soviet agreements on avoiding maritime incidents and mutual "guarantees of non-intervention into internal affairs of each other."

In a reference to the nuclear weapons that dominated the Cold-War discourse on arms control, Putin is also seeking a global agreement on "no-first-strike" rules regarding cyber attacks against communications systems, the embassy said.

Sullivan told reporters nuclear talks remained the "starting point" for bilateral discussions with Russia. "Whether additional elements get added to strategic stability talks in the realm of space or cyber or other areas, that's something to be determined as we go forward." Indeed, the joint statement on "strategic stability" released by both sides after the meeting stuck strictly to nuclear arms.

Still, the talks made some progress on cyberwarfare. While the Biden administration has drawn no direct link between the recent ransomware assault and the Kremlin, U.S. officials have called on Russia to hold hackers within its borders accountable for any attacks originating there. Putin said during an interview with the Rossiya-1 outlet he would agree to extradition of those arrested in Russia if the U.S. does the same; Biden has vowed to reciprocate in the event such attacks were launched from U.S. soil.

In some ways, the Biden-Putin summit sends a signal that cyberwarfare has taken its place alongside other military technologies as an accepted part of a nation's arsenal and one that requires international agreements to keep in check. It also underscores the crucial importance of information technology to national defense.

"Domains of competition, it's not strictly military anymore," says Mike Madsen, director of strategic engagement for the Pentagon's Defense Innovation Unit. "It's economic, it's social, it's all these different things. We talked about air superiority and air supremacy, and there's a day when there's going to be concepts of cyber curiosity and cyber supremacy in a domain of competition."

"In this era of Great Power competition," he says, "the technology race is the most important front."

AMERICA'S BEST TRENDING ONLINE SHOPS 2021



GETTY



Illustrations by OKSANA GRIVINA

Growth: ↗ = High ↗↗ = Very High ↗↗↗ = Extremely High

ONLINE SHOPPING HAS BEEN A PART OF OUR LIVES FOR years now, but it is still growing—fast. According to figures from the U.S. Department of Commerce, last year Americans spent $791.7 billion online, an increase of 32.4 % from 2019.

In the U.S. there are more than 2 million online shops, so picking the best ones isn't always easy. To help, *Newsweek* teamed up with respected research and data firm Statista to compile for the first time our list of America's Best Trending Online Shops.

We looked at tens of thousands of online shops whose traffic and sales have been growing very quickly and selected the 1,000 best across eight general categories: fashion and accessories; food, health and personal care; garden and craft; home living; leisure, games and hobby; office, electronics and media; sport, outdoor and motor; and universal providers—retailers that sell everything.

We then broke them down into 36 more specific product subcategories. We ranked them on three criteria: revenue growth, traffic growth and technical details of their sites, things like loading time and mobile optimization, which indicate how easy a site is to use and how long customers spend on it. No matter what you're shopping for, we hope this first-ever ranking listing makes it easier to find the best shops online. → **Nancy Cooper,** *Global Editor in Chief*

METHODOLOGY

America's Trending Online Shops 2021 were chosen based on an evaluation of their sales, traffic and website technical details. More than 10,000 of the largest online shops were identified using Statista and online databases, online directories and price comparison websites. Online shops selling mainly digital goods (for example, airbnb.com, netflix.com), subscription-based shops, consumer-to-consumer marketplaces (e.g., ebay.com), business-to-business shops, showcase websites and online shops that do not display their sites in English were excluded. The shops had to meet the following criteria to be evaluated:

- At least 1,000,000 annual website visits in the U.S.
- Growth in both traffic and revenue
- More than half of sales coming from the U.S.

Growth was evaluated from period 1 (March 2019–February 2020) to period 2 (March 2020–February 2021). Shops were evaluated on revenue growth (both absolute and relative), traffic growth (both absolute and relative) and technical details showing the performance of their websites. Those include:

- Loading time
- Bounce rate (number of customers who leave the site without looking or buying)
- Page views per visit
- Average time on site
- Mobile optimization
- Cookies (too many make shopping difficult)

FASHION & ACCESSORIES

Accessories

baggu.com	↗↗
bestwigoutlet.com	↗
dooney.com	↗↗
eyemartexpress.com	↗
grip6.com	↗↗↗
hatclub.com	↗↗↗
lesportsac.com	↗↗↗
rebag.com	↗↗↗
verabradley.com	↗↗

Fashion (MULTI BRAND)

80stees.com	↗↗
beginningboutique.com	↗↗↗
belk.com	↗↗
betabrand.com	↗
bkstr.com	↗
bobstores.com	↗↗
bootbarn.com	↗
boxlunch.com	↗↗↗
brooklinen.com	↗
buckle.com	↗
cavenders.com	↗↗↗
childrensplace.com	↗
clothingshoponline.com	↗↗↗
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proozy.com	↗
puravidabracelets.com	↗
ragstock.com	↗
rockabilia.com	↗↗↗
saksfifthavenue.com	↗
saksoff5th.com	↗
shirtspace.com	↗↗↗
shopmyexchange.com	↗↗
spencersonline.com	↗
striderite.com	↗↗
supercasuals.com	↗↗
theory.com	↗
thetot.com	↗↗↗





thredup.com	↗
tillys.com	↗
undefeated.com	↗
uniformadvantage.com	↗↗↗
vincecamuto.com	↗
vonmaur.com	↗↗
workboots.com	↗↗
ycmc.com	↗↗↗

Fashion (SINGLE BRAND)

6dollarshirts.com	↗↗
abercrombie.com	↗↗
apc-us.com	↗↗
ariat.com	↗↗↗
ashro.com	↗
bombas.com	↗↗↗
calvinklein.us	↗
carbon2cobalt.com	↗
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ripcurl.com	↗
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tommyjohn.com	↗↗↗
unionlosangeles.com	↗↗↗
us.romwe.com	↗↗
vermontcountrystore.com	↗
wearpact.com	↗↗↗
wrangler.com	↗↗↗

Jewelry

allurez.com	↗↗
angara.com	↗↗↗
becharming.com	↗↗↗
bluenile.com	↗
bodyartforms.com	↗
bodycandy.com	↗↗
brighton.com	↗
brilliance.com	↗
catbirdnyc.com	↗
danburymint.com	↗
davidsw.com	↗↗↗
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reeds.com	↗↗↗
ross-simons.com	↗↗
sarraf.com	↗↗
shaneco.com	↗↗↗
thegldshop.com	↗
urbanbodyjewelry.com	↗↗
vancaro.com	↗↗↗

Shoes

chineselaundry.com	↗↗↗
colehaan.com	↗



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AMERICA'S BEST TRENDING ONLINE SHOPS 2021
Newsweek
statista

crocs.com	↗↗↗
dsw.com	↗
famousfootwear.com	↗↗
hokaoneone.com	↗↗↗
jimmyjazz.com	↗
journeys.com	↗
keds.com	↗
kswiss.com	↗↗↗
kurufootwear.com	↗↗↗
newbalance.com	↗
olukai.com	↗↗
oofos.com	↗↗↗
orthofeet.com	↗↗↗
rackroomshoes.com	↗↗↗
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shoemall.com	↗
shoesforcrews.com	↗
skechers.com	↗↗↗
sorel.com	↗↗
thursdayboots.com	↗↗
timberland.com	↗
travismathew.com	↗↗↗
ugg.com	↗
vans.com	↗
vionicshoes.com	↗↗
wolverine.com	↗

Women's Fashion

adoreme.com	↗↗
aliceandolivia.com	↗↗↗
altardstate.com	↗↗↗
bandier.com	↗↗↗
bostonproper.com	↗↗
catherines.com	↗
catofashions.com	↗↗
chicosofftherack.com	↗↗↗
christopherandbanks.com	↗↗
christydawn.com	↗↗↗
clothingunder10.com	↗↗
cosabella.com	↗
draperjames.com	↗↗↗
ellos.us	↗↗
eloquii.com	↗
especiallyyours.com	↗
goodamerican.com	↗
herroom.com	↗
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katespade.com	↗↗
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loft.com	↗
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lunya.co	↗↗↗
maidenform.com	↗↗↗
naturallife.com	↗↗↗
nyandcompany.com	↗
prettylittlething.us	↗↗
revolve.com	↗
roamans.com	↗↗
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sandcloud.com	↗↗↗
savedbythedress.com	↗
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soma.com	↗
spanx.com	↗
summersalt.com	↗
thedressoutlet.com	↗↗↗
torrid.com	↗
toryburch.com	↗↗↗
trueandco.com	↗↗
ullapopken.com	↗
victoriassecret.com	↗
whitehouseblackmarket.com	↗
womanwithin.com	↗↗
yandy.com	↗



FOOD, HEALTH & PERSONAL CARE

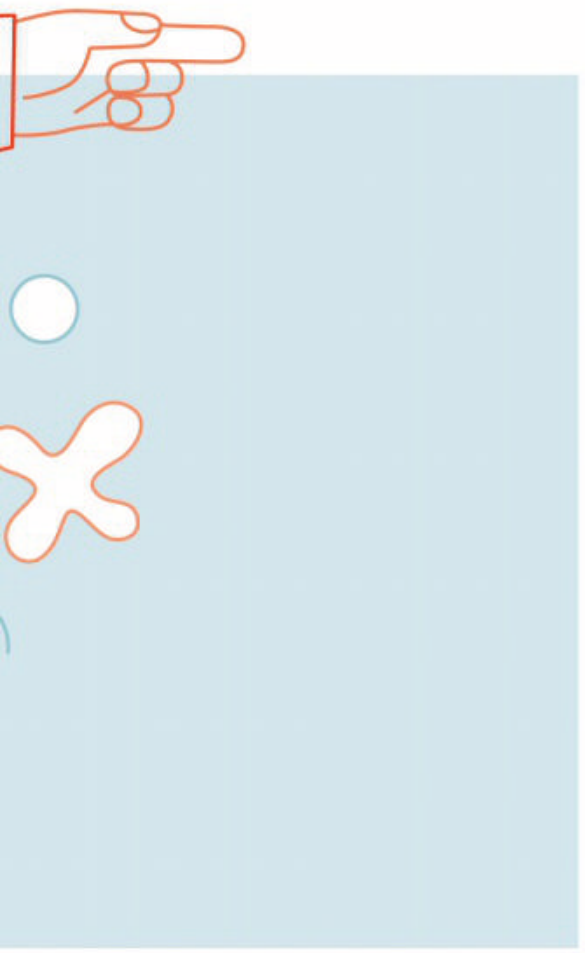
Care & Cosmetics (MULTI BRAND)

bluemercury.com	↗↗
brambleberry.com	↗
elevatestyles.com	↗↗↗
fragrancenet.com	↗↗
fsastore.com	↗↗↗
lovelyskin.com	↗↗↗
maxaroma.com	↗↗↗
naturesgardencandles.com	↗
pharmaca.com	↗
riteaid.com	↗↗
sallybeauty.com	↗↗
sephora.com	↗
ulta.com	↗↗
walgreens.com	↗↗

Care & Cosmetics (SINGLE BRAND)

amway.com	↗↗↗
arbonne.com	↗↗↗
aveda.com	↗
bathandbodyworks.com	↗↗↗
beautybakerie.com	↗
bobbibrowncosmetics.com	↗↗↗
briogeohair.com	↗
burtsbees.com	↗
cleancult.com	↗↗↗
clinique.com	↗
colourpop.com	↗
dermalogica.com	↗↗
dermstore.com	↗
dropps.com	↗↗↗
elfcosmetics.com	↗↗
elizabetharden.com	↗
esalon.com	↗↗↗
esteelauder.com	↗↗
fentybeauty.com	↗↗↗
forhims.com	↗
glossier.com	↗

Growth: ↗ = High | ↗↗ = Very High | ↗↗↗ = Extremely High



- grove.co ↗↗
- harrys.com ↗
- honest.com ↗↗
- iliabeauty.com ↗↗↗
- ipsy.com ↗↗
- itcosmetics.com ↗↗
- katesomerville.com ↗↗
- keranique.com ↗↗
- kiehls.com ↗
- lauramercier.com ↗
- lushusa.com ↗
- maccosmetics.com ↗
- madison-reed.com ↗↗↗
- manscaped.com ↗↗↗
- marcjacobsbeauty.com ↗↗
- marykay.com ↗↗↗
- meaningfulbeauty.com ↗↗
- mentedcosmetics.com ↗↗↗
- moxielash.com ↗↗↗
- murad.com ↗↗
- no7beauty.com ↗↗↗
- pacificabeauty.com ↗↗↗
- paulaschoice.com ↗↗
- paulayoung.com ↗
- physiciansformula.com ↗
- senreve.com ↗↗↗
- sheamoisture.com ↗
- shopmissa.com ↗
- skinceuticals.com ↗↗↗
- tatcha.com ↗↗
- thelipbar.com ↗↗↗
- thrivecausemetics.com ↗↗
- uniwigs.com ↗↗↗
- violetgrey.com ↗

Food

- 1800baskets.com ↗↗
- abcfws.com ↗↗↗
- adagio.com ↗↗
- albertsons.com ↗↗
- aldi.us ↗↗↗
- amigofoods.com ↗↗↗
- astorwines.com ↗↗
- bakemeawish.com ↗↗↗
- bevmo.com ↗↗↗
- binnys.com ↗↗
- cookiesbydesign.com ↗↗↗
- dartagnan.com ↗
- dinnerly.com ↗↗↗
- drizly.com ↗↗↗
- englishteastore.com ↗
- foodland.com ↗↗
- freshdirect.com ↗↗↗
- fruitbouquets.com ↗↗↗
- ghirardelli.com ↗
- godiva.com ↗↗
- goodeggs.com ↗↗↗
- gourmetgiftbaskets.com ↗↗
- hannaford.com ↗↗
- harney.com ↗↗
- harristeeter.com ↗↗↗
- harryanddavid.com ↗↗
- heb.com ↗↗↗
- hickoryfarms.com ↗↗
- hmart.com ↗↗↗
- hy-vee.com ↗↗↗
- igourmet.com ↗↗
- kansascitysteaks.com ↗↗↗
- klwines.com ↗↗
- kroger.com ↗↗
- lastbottlewines.com ↗↗
- lindtusa.com ↗↗
- mancrates.com ↗↗
- marleyspoon.com ↗↗↗
- martinsfoods.com ↗↗
- mrsfields.com ↗↗↗
- mychicagosteak.com ↗↗
- nuts.com ↗↗↗
- omahasteaks.com ↗↗↗
- pavilions.com ↗
- peapod.com ↗↗↗
- publix.com ↗↗
- qualityliquorstore.com ↗↗↗
- reservebar.com ↗↗
- russellstover.com ↗↗↗
- safeway.com ↗↗
- sees.com ↗↗↗
- simplychocolate.com ↗↗↗
- smartandfinal.com ↗↗
- specsonline.com ↗↗↗
- sprouts.com ↗↗
- stonewallkitchen.com ↗
- swisscolony.com ↗↗
- thepopcornfactory.com ↗↗
- totalwine.com ↗↗
- us.nakedwines.com ↗↗↗
- vons.com ↗↗
- water.com ↗↗
- wegmans.com ↗↗↗
- wholefoodsmarket.com ↗↗
- wine.com ↗↗↗
- winechateau.com ↗↗↗
- winecountrygiftbaskets.com ↗↗↗
- wineinsiders.com ↗↗↗

Health Products

- alldaychemist.com ↗
- allstarhealth.com ↗↗
- bulkapothecary.com ↗↗↗
- cbdmd.com ↗↗
- drleonards.com ↗↗
- healthwarehouse.com ↗↗
- healthydirections.com ↗↗↗
- itworks.com ↗↗
- johnsonfitness.com ↗
- medmartonline.com ↗↗↗
- mynavyexchange.com ↗
- newchapter.com ↗↗↗
- nhc.com ↗↗↗
- pureformulas.com ↗
- puritan.com ↗↗
- purityproducts.com ↗↗↗
- relaxtheback.com ↗↗
- rzmask.com ↗↗↗
- seekinghealth.com ↗↗↗
- shaklee.com ↗↗↗
- shop.womenshealth network.com ↗↗↗
- store.trimhealthymama.com ↗
- supplementhunt.com ↗↗↗
- swansonvitamins.com ↗↗
- wbmason.com ↗

Opticians & Eyewear

- 1800contacts.com ↗
- americasbest.com ↗↗
- contactlensking.com ↗↗↗
- designeroptics.com ↗↗↗
- discountcontactlenses.com ↗↗
- discountglasses.com ↗
- foreyes.com ↗↗
- glamourtress.com ↗↗
- glassesusa.com ↗↗
- opticontacts.com ↗↗
- readers.com ↗
- smartbuyglasses.com ↗↗
- sportrx.com ↗↗
- warbyparker.com ↗
- zeelool.com ↗↗↗
- zennioptical.com ↗

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Growth: ↗ = High | ↗↗ = Very High | ↗↗↗ = Extremely High



GARDEN & CRAFT

Building Services

build.com	↗↗
decorplanet.com	↗
flooranddecor.com	↗↗↗
kitchensource.com	↗↗
moen.com	↗↗
surlatable.com	↗
vintagetub.com	↗

DIY, Tools, Supplies

acehardware.com	↗↗↗
arbico-organics.com	↗↗↗
architecturaldepot.com	↗↗↗
builddirect.com	↗
craftoutlet.com	↗↗↗
cubcadet.com	↗
ereplacementparts.com	↗
fleetfarm.com	↗↗
garrettwade.com	↗
gemplers.com	↗
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grainger.com	↗
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northerntool.com	↗↗
ohiopowertool.com	↗
onlinefabricstore.net	↗↗↗
ruralking.com	↗↗↗
snowblowersdirect.com	↗↗
solutionsstores.com	↗
thepondguy.com	↗↗
tilebar.com	↗↗↗
toolup.com	↗
whateverworks.com	↗↗

Flowers, Plants

1800flowers.com	↗↗
aerogarden.com	↗↗↗
afloral.com	↗↗↗
avasflowers.net	↗↗
bloomstoday.com	↗↗
bluestoneperennials.com	↗↗↗
bouqs.com	↗↗↗
brecks.com	↗↗↗
brighterblooms.com	↗↗
burpee.com	↗↗
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fiftyflowers.com	↗↗
fromyouflowers.com	↗
globalrose.com	↗↗↗
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michiganbulb.com	↗↗
mountaincrestgardens.com	↗↗↗
naturehills.com	↗
parkseed.com	↗↗
rareseeds.com	↗↗
sendflowers.com	↗↗↗
springhillnursery.com	↗↗
tytyga.com	↗↗
willisorchards.com	↗↗↗

Garden Furniture & Supplies

doheny.com	↗↗↗
dripdepot.com	↗↗
duncraft.com	↗↗
fifthroom.com	↗↗↗
gardeners.com	↗↗
growace.com	↗↗
hydrobuilder.com	↗↗
intheswim.com	↗↗↗
lehmans.com	↗↗
lesliespool.com	↗↗
plowhearth.com	↗↗
shedsforlessdirect.com	↗↗
spadepot.com	↗
the-cover-store.com	↗

Spare Parts

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cyberweld.com	↗
discountfilters.com	↗↗
dkhardware.com	↗↗
freshwatersystems.com	↗↗↗
myknobs.com	↗↗↗
partselect.com	↗
pelicanwater.com	↗
repairclinic.com	↗
supplyhouse.com	↗↗
zoro.com	↗

HOME LIVING

Furniture

1stopbedrooms.com	↗↗↗
1stoplighting.com	↗↗
2modern.com	↗↗↗
aarons.com	↗↗
afastores.com	↗↗↗
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worldmarket.com ↗

Home Decor & Textiles

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Household Appliances

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bissell.com ↗↗↗
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dyson.com ↗



Growth: ↗ = High | ↗↗ = Very High | ↗↗↗ = Extremely High

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- ezvacuum.com ↗↗
- filterbuy.com ↗↗
- frigidaire.com ↗
- geappliances.com ↗
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- goedekers.com ↗
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- homedics.com ↗↗
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- prima-coffee.com ↗
- rugdoctor.com ↗↗
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- totalhomesupply.com ↗
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- warnersstellian.com ↗↗
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- wholelattelove.com ↗↗
- woodlanddirect.com ↗↗

Household Goods

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- harrietcarter.com ↗↗
- homewetbar.com ↗↗
- knifecenter.com ↗↗
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- oxo.com ↗↗
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LEISURE, GAMES & HOBBY

Arts & Crafts

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- candlescience.com ↗↗↗
- connectingthreads.com ↗↗
- crayola.com ↗
- createforless.com ↗↗
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- jerrysartarama.com ↗↗
- jewelrysupply.com ↗
- marymaxim.com ↗↗
- mixbook.com ↗↗
- sewingpartsonline.com ↗↗
- woodcraft.com ↗↗
- yarnspirations.com ↗↗

Collectibles

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- bigbadtoystore.com ↗
- blowoutcards.com ↗↗
- entertainmentearth.com ↗↗
- jmbullion.com ↗↗↗
- littletoncoin.com ↗
- moneymetals.com ↗↗↗
- providentmetals.com ↗
- rcsuperstore.com ↗↗↗
- sdbullion.com ↗↗
- silver.com ↗
- silvergoldbull.com ↗↗↗
- usmint.gov ↗↗
- walthers.com ↗↗

Hobby, Leisure Items

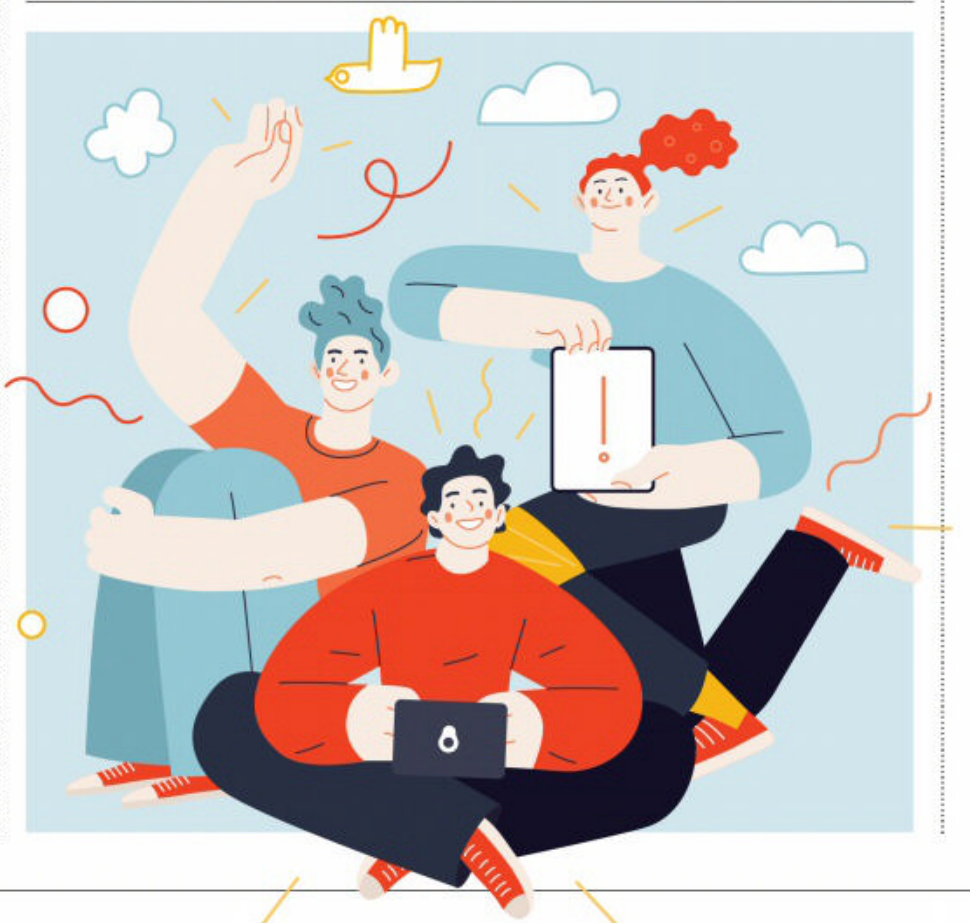
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- steelers.com ↗
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- telescope.com ↗↗
- thompsoncigar.com ↗↗
- traxxas.com ↗
- vapor4life.com ↗
- worldwidegolfshops.com ↗

Music Equipment

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- guitarcenter.com ↗
- proaudiostar.com ↗
- sweetwater.com ↗
- timelife.com ↗
- zzounds.com ↗

Pet Supply

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- chewy.com ↗↗↗
- entirelypets.com ↗
- horse.com ↗





OFFICE, ELECTRONICS & MEDIA

Consumer Electronics

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antonline.com	↗↗↗
bestbuy.com	↗
cdw.com	↗
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dellrefurbished.com	↗
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ring.com	↗↗↗
skaraudio.com	↗↗↗
staples.com	↗↗↗
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Accessories

case-mate.com	↗
digitalstorm.com	↗
flawlessvapeshop.com	↗↗↗
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ldproducts.com	↗
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otterbox.com	↗
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Media

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hpb.com	↗
powells.com	↗↗
rightstufanime.com	↗↗
scholastic.com	↗↗
sentaifilmworks.com	↗
shop.funimation.com	↗↗
thriftbooks.com	↗↗
tyndale.com	↗↗

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SPORT, OUTDOOR & MOTOR

Bicycle, E-Bike

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biketiresdirect.com	↗↗
citygrounds.com	↗↗↗
coloradocyclist.com	↗↗↗
competitivecyclist.com	↗↗
danscomp.com	↗↗↗
eriksbikeshop.com	↗
jensonusa.com	↗
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performancebike.com	↗
planetcyclery.com	↗↗↗
swagtron.com	↗
treefortbikes.com	↗↗↗

Car, Motorcycle, Boat

4wheelparts.com	↗
americantrucks.com	↗↗
autoaccessoriesgarage.com	↗
autoplicity.com	↗
carparts.com	↗↗↗
chapmoto.com	↗↗↗
cheapcycleparts.com	↗↗↗
chemicalguys.com	↗↗
cyclegear.com	↗↗↗
denniskirk.com	↗
eastwood.com	↗
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revivalanimal.com	↗
shop.smallpetselect.com	↗↗
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Photo, Print

canvasdiscount.com	↗↗↗
canvaspeople.com	↗↗↗
chatbooks.com	↗
currentcatalog.com	→ ↗
elephantstock.com	↗↗
forallgifts.com	↗↗↗
lifeisgood.com	↗↗↗
pictureframes.com	↗↗↗
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Toys, Baby

babylist.com	↗↗↗
buildabear.com	↗
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buybuybaby.com	↗↗
carters.com	↗
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Growth: ↗ = High ↗↗ = Very High ↗↗↗ = Extremely High

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sidebysidestuff.com	↗↗
speedwaymotors.com	↗↗
summitracing.com	↗
texas-speed.com	↗↗
weathertech.com	↗↗
westmarine.com	↗
wholesalemarine.com	↗

Outdoor

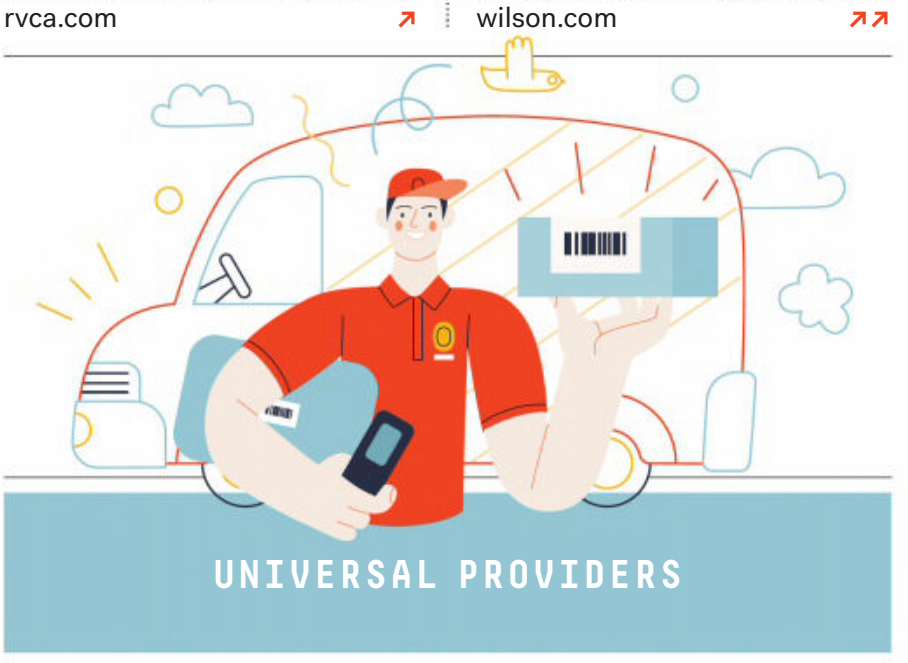
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yeti.com	↗↗

Sports Products (GENERAL)

academy.com	↗↗
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performbetter.com	↗↗↗
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soletreadmills.com	↗↗↗
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stadiumgoods.com	↗↗
underarmour.com	↗↗

Sports Products (SPECIALIZED)

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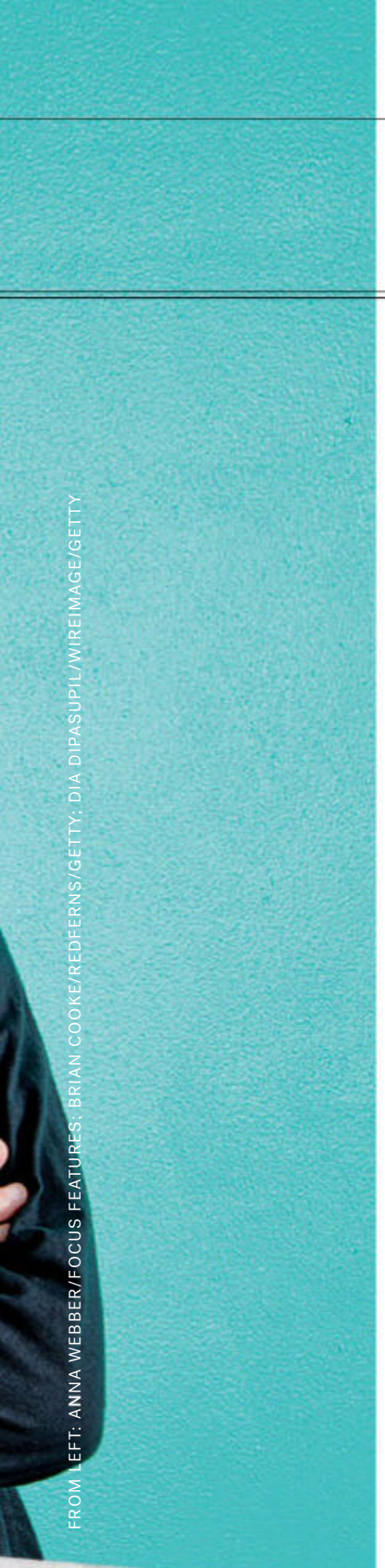
MOVIES

Sparks on the Screen

After decades of trying, the musical duo of Ron and Russell Mael are releasing two movies, a band documentary and an original musical



CONSISTENTLY DIFFERENT Ron (glasses) and Russell Mael now and in 1979 (inset). They've tried many styles while remaining recognizably Sparks.



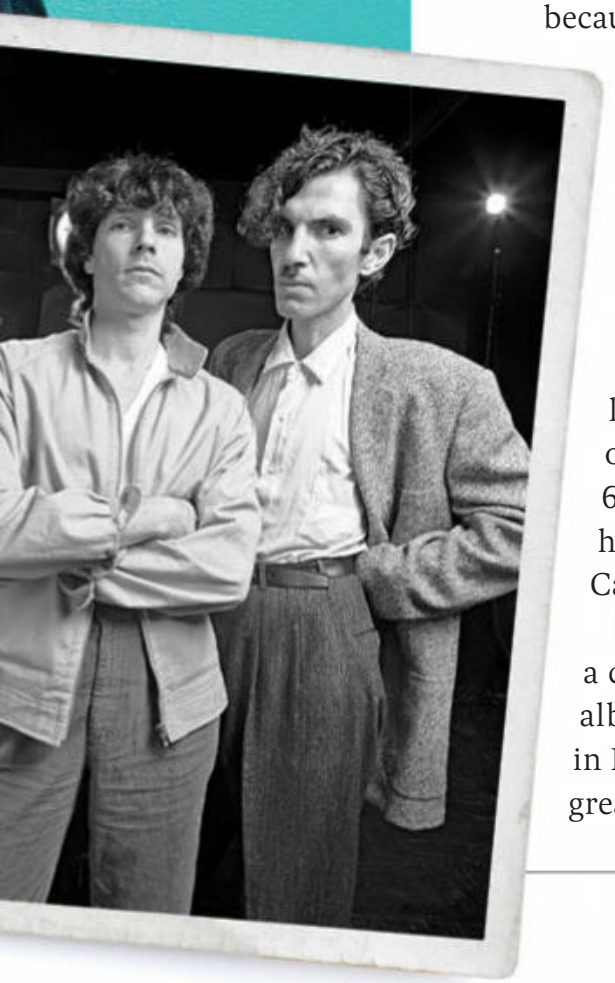
FROM LEFT: ANNA WEBBER/FOCUS FEATURES; BRIAN COOKE/REDFERNS/GETTY; DIA DIPASUPIL/WIREIMAGE/GETTY

RETURN TO THE EIGHTIES
"You look back at the pictures and you cannot believe how big the hair was." » P.48



OVER A CAREER THAT HAS LASTED MORE than 50 years, Sparks, the Los Angeles-based art-rock/pop outfit of brothers Ron and Russell Mael, have released 25 studio albums, scoring occasional chart success in various parts of the world and influencing countless other musical acts. Their idiosyncratic yet ruthlessly catchy music has encompassed various genres, among them glam rock, power pop, synthpop, techno and classical, with quirky and ironic lyrics, Russell's vocals and Ron's keyboards the only constants. On stage, they've cultivated two of the weirdest and most distinct personas in rock.

One thing they've aimed for that has eluded them till now: bringing their vision to the silver screen. The brothers had started out as film fans who studied cinema as students at UCLA during the late 1960s but their subsequent collaborations with directors Jacques Tati and Tim Burton never bore fruit (Sparks' only notable film credit was a cameo appearance in the 1977 disaster movie *Rollercoaster).* Russell recalls working with Tati over a period of several months in the 1970s. "At the time we were incredibly excited," he tells *Newsweek*. "Now looking back, it would have been even more of an amazing thing because Tati's legacy is so amazing. But *c'est la vie."*



This summer, Sparks have two movies out. The first is *The Sparks Brothers*, a documentary that opened in theaters on June 18 directed by British filmmaker and Sparks fan Edgar Wright (*Shaun of the Dead, Hot Fuzz, Baby Driver*). The second is *Annette*, a musical drama by the Maels directed by French filmmaker Leos Carax. "It's surreal and unbelievable, and also just the fact that *Annette* is opening up the Cannes Film Festival [on July 6]," Ron says. "We're such film geeks that to have in any small way our name connected with Cannes is kind of ridiculous."

Sparks are neither a mainstream band nor a cult act: they never had a gold or platinum album in their native U.S., but have had hits in Europe. To their very loyal fans, they are the greatest band that most people have only vaguely heard of. As addressed in the film, the dichotomy of the career of Sparks is that they have been acclaimed and productive for so many years and yet remain under the radar as far as wider recognition and greater commercial success go.

"The thing that's a mystery to us," Ron says, "is why we've had some commercial success, which usually was only in one country and not others. Record company people never seemed to really have a handle on it. But the one thing we do know is that if we were to put ourselves in the position of analyzing how to go about getting that more universal commercial appeal, it wouldn't work for us either."

Told through new interviews with the Maels accompanied by decades' worth of archival footage, *The Sparks Brothers* traces the band's history going back to their 1971 debut album when they recorded as Halfnelson. When the record didn't sell, their then-manager thought a new name would help and with Groucho, Chico and Harpo Marx in mind suggested "The Sparks Brothers." The Maels were cool to the idea and shortened it to "Sparks."

In 1974 they released their breakthrough record *Kimono My House* and its single "This Town Ain't Big Enough for Both of Us." Musically it's much closer to Kurt Weill or Gilbert and Sullivan than anything most American rock groups would attempt. The lyrics, sung in an oddly clipped falsetto by Russell, are (or at least seem to be) the tortured inner dialogue of a paranoid young man trying to make a good impression on the ladies. Some members of European TV audiences watching the group mime along to the recording at the time laughed, but most seemed a little stunned: Were these guys kidding or what? To the amazement of the Maels, the record became a hit and briefly made them superstars in the U.K. but they couldn't follow up on that success commercially. A recurring theme of the Sparks story is the duo periodically getting a taste of the mainstream big time and then slipping off the charts only to then reinvent their sound, resulting in such radically different albums as the pioneering electropop of *No. 1 in Heaven* (1979), the house/techno-sounding comeback of *Gratitutious Sax & Senseless Violins*

BY

DAVID CHIU
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(1994); and the classical influences of *Lil' Beethoven* (2002).

"I think part of the thesis that Edgar wanted to get across in the film," Russell says, "[is] that Sparks is doing some of their best work now, which is not consistent with the traditional career arc of bands that have 25 albums...Is [success] selling the most amount of records? Or is it having a creative body of work that you're really proud of and you feel is really vital now?"

Russell says he and his brother were initially skeptical about a documentary, doubting that such a project could capture the spirit of the band and its music. Throughout their careers, the Maels have been careful to cultivate and maintain a certain level of mystery: You get them or you don't, but either way they're not going to explain anything to you. Fortunately, they were fans of Wright's work just as he was of theirs. "We didn't want him holding back on his eccentricities," Ron says. "One thing that we really felt we had in common with Edgar was using the kitchen-sink approach and throwing in everything stylistically and somehow having it work. All of Edgar's films are really fast and kinetic. I think that sort of tone really matched the nature of Sparks as well."

The ultimate tribute paid to Sparks in Wright's film is the many interviews with numerous musical acts who consider themselves the band's fans, such as members of Duran Duran, Erasure, Faith No More, Franz Ferdinand and New Order, as well as non-musical admirers like Mike Myers and Patton Oswalt. "It was just so all over the map," says Russell about Sparks' diverse celebrity fanbase. "We had no idea that these people, the majority of them, even knew about Sparks, let alone were fans of Sparks. To see Neil Gaiman discussing the meaning of the artwork from the [1974] album *Propaganda*...it's kind of amazing."

Given the Maels' interest in filmmaking, it is no surprise that their songs have a cinematic and narrative quality to them with titles like "When Do I Get to Sing 'My Way'?" "Thank God It's Not Christmas," "Angst in My Pants," "What Are All These Bands So Angry About?" and "Sainthood Is Not in Your Future." Ron, the band's primary songwriter, says, "The songs are never based on a particular situation that happened. But obviously there's some kind of connection between your whole personality and what you're writing about. Even though maybe that they could be seen as imagined scenarios, it's really important for us to have a very real emotional side to at least most of the songs so that they're not just seen as a frivolous joke, that there is kind of another deeper side to it."

As detailed in the film, through a long professional partnership, the brothers have never had a public spat or falling out. It may help that their roles and stage personas are so sharply defined. Especially during the 1970s and 1980s, Russell was the pretty, long-haired rock idol while Ron cut a sinister figure with his '30s wardrobe and Charlie Chaplin/Adolf Hitler mustache. "Our roles don't overlap," Russell says. "I sing, and Ron doesn't want to be the singer of the band; he's the keyboard player and predominant writer of the band. There's not an ego thing about one getting more of the limelight. We both have just a really common vision about what Sparks is and should be."

"We're such film geeks that to have in any small way our name connected with Cannes is kind of ridiculous."

Their first narrative film project *Annette* stars Adam Driver and Marion Cotillard and tells the story of a couple—he's a comedian, she's a famous singer—whose lives are upended by the birth of their child, Annette. "Not only have we finally gotten a film musical made that was initiated by us, but that in the end, it really is uncompromising as well," Ron says. "Leos [Carax], to his credit, shares a sensibility about not necessarily following the rules. We had a discussion very early on about the sensibility of movie musicals, and sincerity was really an important thing. Maybe that sounds strange—some people don't link sincerity with Sparks necessarily—but it is the case that we really were not trying to distance ourselves from the emotions of the film. We couldn't be prouder."

Whether the two new films will change or heighten Sparks' profile is uncertain. According to Russell, "The early reaction we're getting from both films has been really positive. What's really satisfying is to get feedback from people that have had no knowledge of Sparks. They're going, 'Well, I love music, but how did I not know about this band?' And so they have to take this huge, deep dive into our repertoire. It's kind of surprising to them, going, 'Wow, it's really consistent, uncompromising and cool...I'm now a huge fan.' For us, that's kind of the best reward."

"We do hope that it opens up other areas that we can work on in a musical sense," Ron adds about the movies, "perhaps other film musicals or other projects. But we will continue, despite doing any of the extra things, to make Sparks albums."

JIM STEINFELDT/MICHAEL OCHS ARCHIVES/GETTY



MUSIC

SPARKS FOR BEGINNERS

Sparks has produced 25 albums in five decades. Every Sparks fan is going to have their favorites. I tend to lean toward the Mael brothers' later productions because I have been on and off with them for years depending on their style at the time. (Pitchfork's description of their music: "operatic art-rock, new wave, house music, classical, metal...") If you're new to the band, though, you can't go wrong with these. *—Hank Gilman*



Kimono My House

POLYGRAM, 1974

Contains the band's biggest hit "This Town Ain't Big Enough for Both of Us." The songwriting, from "Amateur Hour" to "Here in Heaven," make it one of my desert island LPs. Still dominates their live shows because it's that good.



Lil' Beethoven

PALM, 2002

They kind of lost me with the Giorgio Moroder pop-synth stuff, but this brought me back into the fold with its piano-centrism, lyrical twists and general weirdness. With characters like "Miss Missy Tannenbaum" from "the projects in St. Tropez," how can you go wrong?



Hello Young Lovers

IN THE RED RECORDINGS, 2006

My kids loved "Perfume," which Sparks performed on *Gilmore Girls* and "Metaphor." I loved "Dick Around," in which Sparks rock and roll. In a way. One of the coolest videos ever, too.



Hippopotamus

BMG, 2017

From beginning to end, one of the great Sparks albums. It actually charted in England. Great playing and songwriting from "Edith Piaf (Said it Better Than Me)" and "Missionary Position" to "Life with the Macbeths."



A Steady Drip, Drip, Drip

BMG. 2020

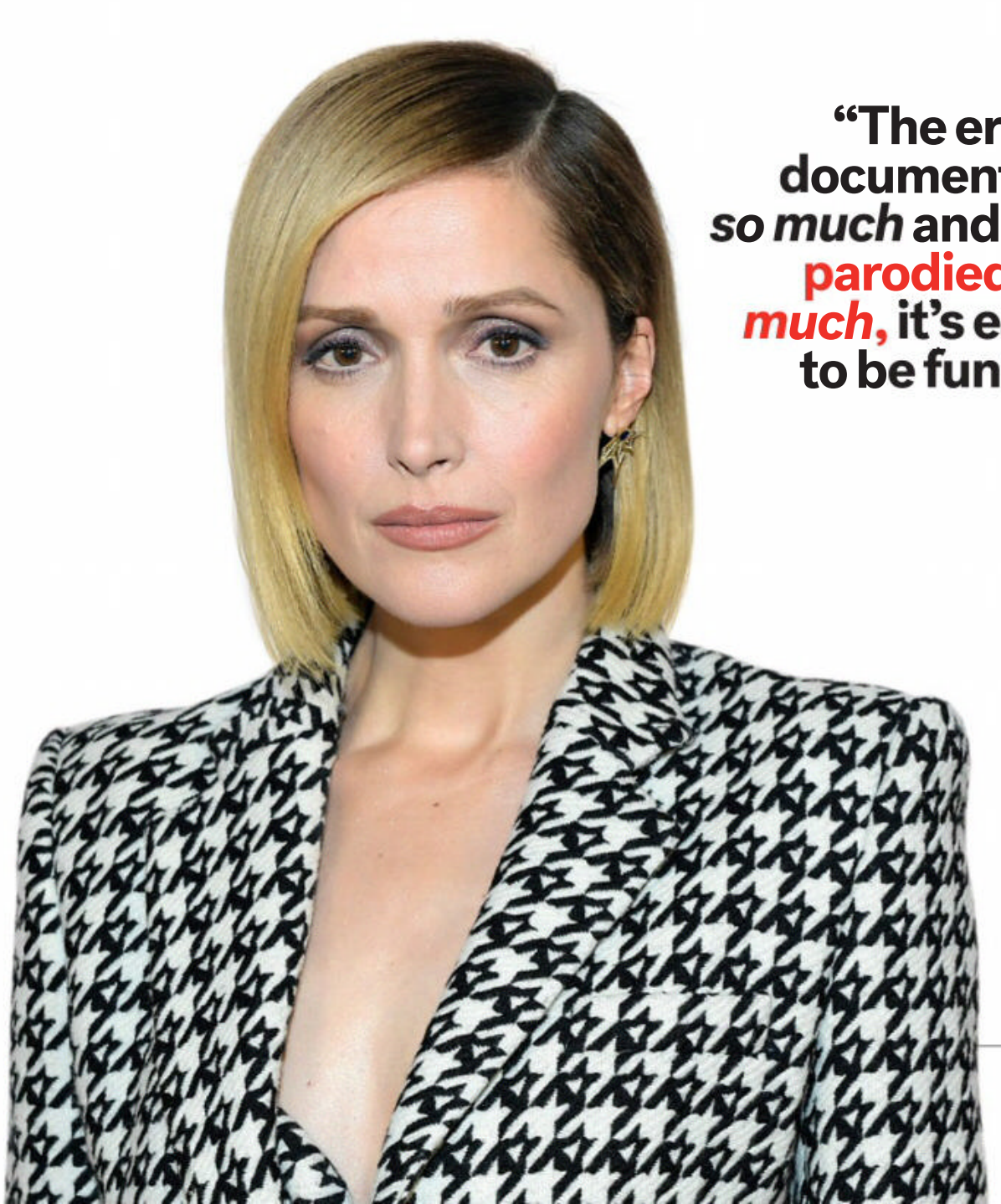
The latest and the continuation of a long winning streak. Both brothers are in their 70s now. I don't know how much longer they'll grind it out, but try and catch them in your town when they next tour the U.S. "All That" has got to wrap up the set.

Extras: Here are some other favorite tracks off various albums: "Sex Town U.S.A," "Never Turn Your Back on Mother Earth" (Greatest environmental protest song ever?), "Angst in My Pants," "The Number One Song in Heaven" (Thanks, Moroder, I guess), "Good Morning," "Sherlock Holmes" and "Johnny Delusional" with Franz Ferdinand.

PARTING SHOT

Rose Byrne

IF YOU HAD TO PICK ONE THING THAT DEFINED THE 1980S, YOU'D LIKELY include aerobics. From leotards to Olivia Newton-John's "Let's Get Physical" to Jane Fonda's iconic fitness videos, aerobics became a cult-like obsession, and Rose Byrne's new Apple TV+ series *Physical* (June 18) recreates that time. "The era is documented *so much* and it's parodied *so much,* it's easy to be funny." Byrne plays Sheila, a wife and mother who finds purpose in her life, and eventually fame and fortune, through the world of aerobics. "She has ideas, she has ambition, she wants to sit at the table. Yet she's also harboring a horrible illness and an addiction and this secret life full of lies. We meet her at a breaking point." As for whether Byrne was influenced by any of the icons of aerobics in the '80s, Byrne says she was more focused on the world that writer Annie Weisman created. "I really wanted to just have a clean eye about that, and I didn't want to sort of lean on any particular exercise queen, if you will."



"The era is documented *so much* and it's parodied *so much*, it's easy to be funny."

What first attracted you to *Physical*?
I was in the middle of shooting *Mrs. America*, and I realized *Physical* was a kind of a chronological companion piece in many ways. Sheila would have been a child of that movement; she would have looked up to the Betty Friedans and Gloria Steinems.

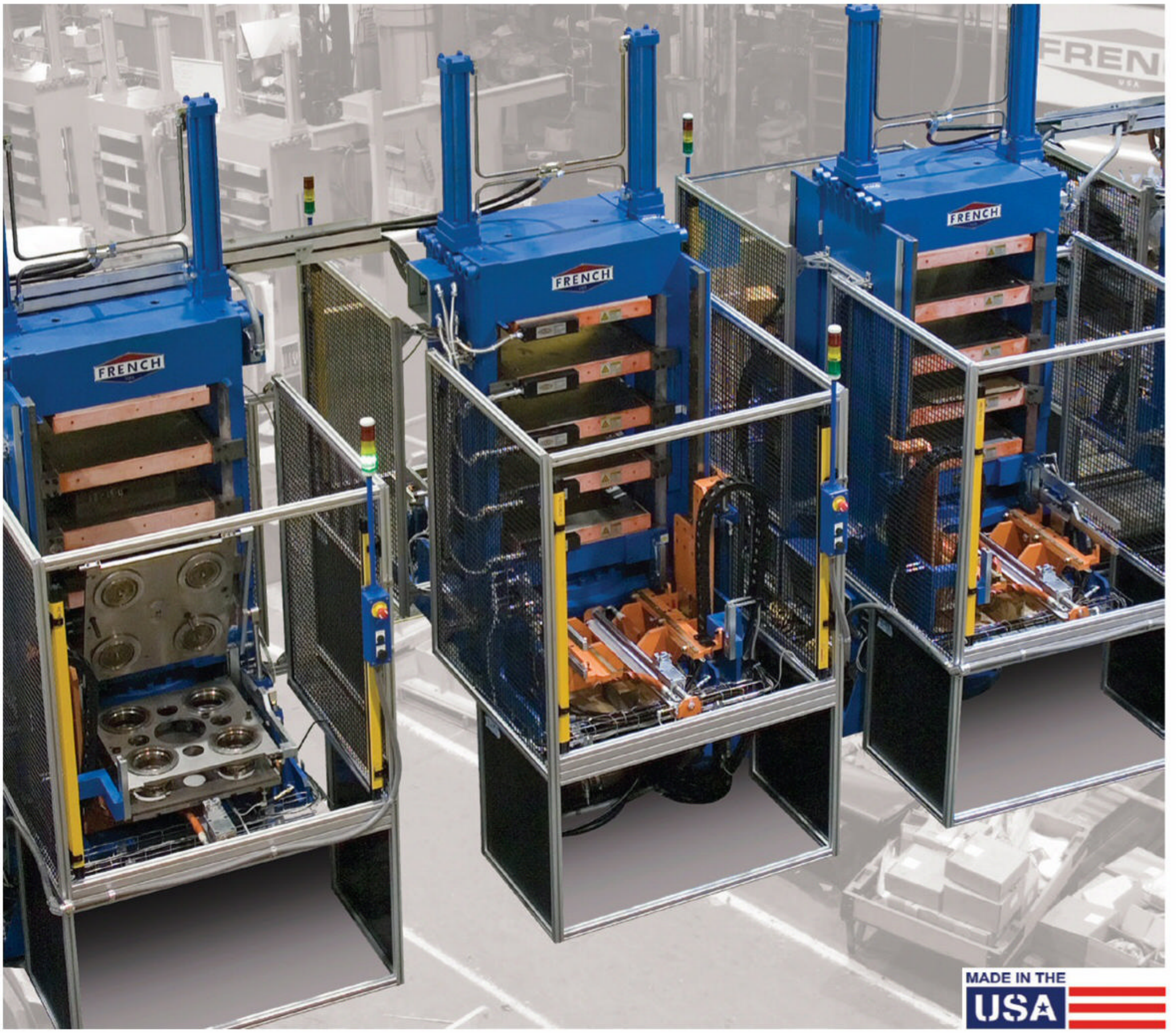
In what way does *Physical* show the advancement of women's rights in the '80s?
The ERA was not ratified. The movement splintered off. Ronald Reagan was elected president. [The '80s] were a backlash from all of those values of the '60s and '70s. The change I think for women specifically was a lot of women were really seeking empowerment through economic independence.

Did you love the '80s fashion on full display?
You look at the pictures and you cannot believe how big the hair was. Back then women made their leotards and fit it within a millimeter. You'd think I was doing a Marvel film with the amount of fittings I had. But as a result, it just feels authentic.

It's *Bridesmaids*' 10th anniversary. Are you surprised at its impact?
It was such a wonderful experience. I hadn't had an experience like that since I did *Mrs. America* just recently, working with an all-female cast. That alone is so huge. It's become so beloved. It tickles me that people still really delight in it. —*H. Alan Scott*

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