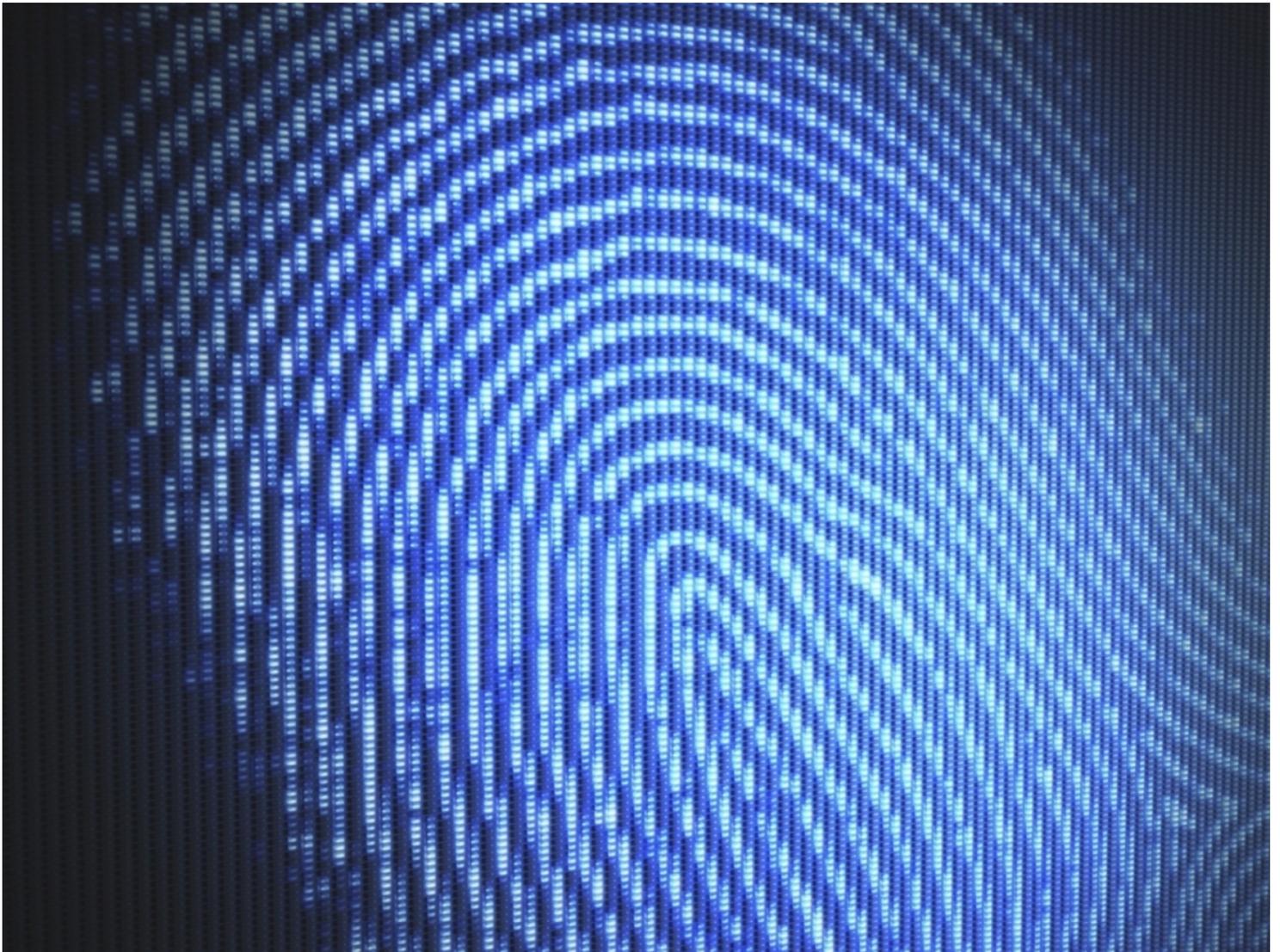


Cruz-Connected Data Miner Aims to Get Inside U.S. Voters' Heads

Funded and promoted by secretive hedge-funder Robert Mercer, employed by Ted Cruz's campaign, Cambridge Analytica promises a transformative new approach to identifying voters. Does it promise too much?



Photograph: KTSDESIGN

By **Sasha Issenberg**

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I had spent about a half hour in the headquarters of Cambridge Analytica before I realized why my arrival at the tech firm—in a low-rise office building lodged inconspicuously on a dead-end service alley behind the Japanese Embassy, a block from Piccadilly—had been greeted so warmly. The company's staff had been primed to attend to a psychological abnormality. "You're in the top half percent of openness for everyone in Pennsylvania, which is quite stark," marveled analytics director Alexander Tayler. "This is like a three-sigma event, to find someone that far out!"

I had traveled to London because the mysterious capability Tayler showcased with his welcome—to segment the American electorate not only by ideological predisposition but also by individual psychological characteristics—amounts to the most audacious new analytical innovation foisted on American politics this year. Of the thousands of companies making money off the presidential election, Cambridge Analytica also boasts the most compelling patrimony. Despite being a new arrival to American politics, it is an offshoot of an established British firm, SCL, which made its name advising governments and militaries on what it called “psy ops.” Even when it rebranded itself to compete for American political clients, as a specialist in profiling individuals’ personality characteristics in order to better tailor messages, SCL, curiously, chose not to obscure its foreign heritage. Instead, the company swathed itself in an exaggerated Anglophilia, calling itself Cambridge Analytica. The firm initially kept a low profile in the U.S., but was outed as a vendor to Ted Cruz’s campaign in July, when *Politico* reported that its investors included the family of Robert Mercer, a secretive hedge-fund investor who also happened to be one of the most generous donors to Cruz’s super-PAC. Mercer wasn’t talking publicly about his investment, but I could understand why someone with a background as a coder and a willingness to spend down his net worth, millions at a time, to support conservative causes was drawn to the company. Amid the appetite for high-tech innovations in Republican campaigns, Cambridge Analytica could claim it was not merely matching the Democrats—it was going where the opposition had not.

In my years of writing about the use of data in politics, other firms had developed a variety of profiles of me using public and private sources; each time I was told what campaigners who had never interacted with me assumed about my identity or attitudes. I had seen statistical models anticipating my likelihood of casting a ballot in various upcoming elections, of being married, of owning a gun. In an ideal world, campaigns would have access to this information from a less speculative source: my telling a canvasser how I intended to vote, a warranty form on which I had identified a spouse, or the inclusion of my name on a publicly available list of licensed hunters or private membership rolls shared by the National Rifle Association. But if those were not available, or out of date, statistical models could make inferences from facts that were available. Algorithms could trawl through as many of thousands of different variables—my past political behavior, consumer choices, the demographic composition of the Philadelphia neighborhood in which I was registered—and isolate the interaction of a few that would determine how much I statistically resembled people who were known to be married, or to own a gun. Campaigns could then communicate with me based on those calculated likelihoods.

Cambridge Analytica’s assessment differed in one crucial way: The firm promised to tell me things I might not even know about myself. It claimed to predict where I would fall on the five-factor personality model, which won widespread adoption by psychologists starting in the 1980s as a standard inventory of universal traits known as “the Big Five.” According to Cambridge Analytica, I fell in the middle range for extroversion. When it came to neuroticism, I was in the seventieth percentile. I scored very low on conscientiousness and agreeableness, a combination which, when paired with my high openness, defined my individualism. “Fanciful/Imaginative Types are unconventional nonconformists who pride themselves on being different from others,” read a potted description attached to my numerical assessment. “In extreme cases they might be regarded as eccentric, but in most cases they are perceived by others as complex, well-read, imaginative and industrious.”

Of all the microtargeting profiles of myself I had seen, none had flattered my self-concept like this one. Its predictions already seemed more plausible than those of the Democratic data warehouse that had my religion pegged as Lutheran—a prediction likely tethered to the only slightly less dubious profiling of my ethnicity as German. (I presume that was the result of an algorithm which heavily weighted my surname’s Teutonic build and the preponderance of white people in my census tract who report German ancestry.)

“And so you can imagine with that information as well as all the other information about your political orientation it is possible to put you with the like-minded people to receive a very, very specific communication,” Cambridge CEO Alexander Nix told me.

The next day, I met with two of the employees Nix identified as the firm’s “message people” to understand what that communication might look like. Tim Glister is a former copywriter and one-time literary agent from Newcastle; Harris MacLeod a Nova Scotian who worked as a political journalist in Ottawa. Both spent much of 2014 working for Cambridge Analytica’s marquee American clients. Harris worked for John Bolton’s super-PAC, which was attempting to bring more attention to national-security issues in three select Senate races ahead of a prospective presidential campaign by the hawkish former UN ambassador. Glister was dispatched to North Carolina, where he was tasked with helping the state Republican party on behalf of Thom Tillis’s ultimately successful campaign to defeat Senator Kay Hagan. “I was English enough to be an entertaining curiosity,” he said.

I showed them my personality scores, and they nodded knowledgeably as I read through the description. Cambridge Analytica’s standard client pitch uses the example of gun rights to illustrate how a campaign could shape its messaging to voters based on assumptions about their individual personalities. “If you are extroverted and conscientious, you understand the argument about the Second Amendment in terms of the responsibilities that accompany it,” Nix says. For “closed and agreeable people, this is really about

understanding these peoples' need for tradition and value and community and family." That made enough sense, but most campaigns were not trying to change voters' views on fundamental issues like gun control, or their intensity of feeling about them. I had a harder time imagining how a campaign would tailor its messaging about a candidate based on the awareness that I was likely to be an "Individualistic and Imaginative Type."

"If we were marketing Ted Cruz to you, we would emphasize the fact that he's in a new generation of Republican leaders, that he's not afraid to stand out from the crowd," MacLeod said. "He's got new ideas, fresh ideas, innovative ideas—you'll be able to file your taxes on a postcard, whatever, abolish the IRS."

"Pushing that even further, if you are low-conscientiousness," Glister added, "it's about being the Washington outsider, blowing through the received way of doing things."

"You're not the type of person where we'd say, *Well, we have a ten-point plan,*" he went on. "That's not going to resonate with you. It would be 'everything is bigger in Texas'—it would be bold visuals, bold statements."

As he made his way through an office in which the median attire fell somewhere between ad agency and hackathon, Nix—a bespectacled, lanky man with the angular affect of the comedian Stephen Merchant—stood out among his own employees for carrying himself like a City banker. Nix had worked as a financial analyst before joining Cambridge Analytica's parent company, SCL, a little more than a decade ago as a director helping to guide its global expansion. Since then, he has been the face of Cambridge Analytica to prospective clients in the U.S., and has a salesman's slick patter even if he often seems to be speaking a foreign language. When he deployed phrases like "the guys who've got guns under their pillows because they don't want to get burgled"—describing a potential Second Amendment constituency—I wondered how he would be received in often-insular campaign conference rooms, where I knew difference was not always prized. "He has no American political sense whatsoever," an experienced Republican consultant who has met with Nix told me.

Indeed, the fact that this London-based firm was already working for a well-funded American presidential campaign represented a dramatic inversion of the natural order. Political consulting, after all, has been among of the most durable of the United States' exports. The world's political class often maintains a conflicted view of American professionals: envious of the sophistication of their extravagant electoral pageants; resentful of the idea that the mere fact of their passport gives them standing to direct strategy in countries they are often visiting for the first time. The idea of the dispassionate political legionnaire has been a trope familiar enough to Hollywood at least since 1986, when Sidney Lumet's *Power* introduced its protagonist (played by Richard Gere) as a consultant who finds himself an unlikely *arriviste* in a Latin American political scrum. Little has changed: This fall, Sandra Bullock plays an operative who parachutes in to help a Bolivian presidential candidate in *Our Brand Is Crisis*, based on the 2005 documentary of the same name about the Bolivian adventures of James Carville, Stan Greenberg, and Bob Shrum.

In each case, the Americans play the same role: jet-set hirelings, alternately ruthless and naïve, imposing cookie-cutter strategies on campaigns worldwide. "Politics in country after country has become as similar as Starbucks—and about as surprising. The assumption underpinning the international consultancy business is that the same principles apply everywhere, that a foreign country is just like another swing state, just like Ohio," James Harding wrote in *Alpha Dogs*, his book about American consultants who pioneered cross-border political consulting. "The battle is ever more for hearts, not minds: America's winning and irresistible formula has been to repackage an intellectual argument inside an emotional appeal."

When he launched Strategic Communication Laboratories in 1993, Nigel Oakes embraced the image of the worldly mercenary, albeit with an English accent. If the Americans abroad justified their emotional appeals as the result of instincts honed in the world's most intense political environment, Oakes—a former Monte Carlo TV producer who had gained notoriety when he dated the daughter of the Queen's cousin—marketed the rigor of Britain's ancient universities. Oakes, who had also worked for the advertising agency Saatchi & Saatchi, argued that traditional advertising was incapable of effecting the type of mass opinion shifts necessary for social change. Instead, he marshaled scholarly research, much of it from psychologists and anthropologists filtered through the Behavioral Dynamics Institute, an affiliated non-profit that Oakes had established as "a research facility for understanding group behaviour."

Over the course of the 1990s, Oakes applied upon this academic foundation a gloss of new technology. When he advised Indonesian President Abdurrahman Wahid, the country's first credibly elected leader, Oakes set up a control room filled with computers, oversized monitors, and TV screens dubbed the Jakarta International Media Research Centre. A photograph of the high-tech installation still appears in the company's pitch presentation without any description of what exactly Oakes's team was monitoring on those screens. "It was fun and exciting, but also a bit dangerous because everything he did was so secretive," an Indonesian who

worked for Oakes told *The Independent* in 2000. "We didn't know the purpose of it all, we just did what he asked. We called him Mr. Bond because he is English, and because he is such a mystery."

In its early years, Oakes's company worked with the Conservative Party, according to an executive, but after the 1997 elections his firm pulled back from British politics. SCL tacticians had found that they were unable to maintain the same aloof sensibility that their London-based workforce brought to overseas politics. "It's difficult to ask people in their own country to work on a campaign they don't support," says Nix, who joined fellow Etonian Oakes's firm in 2003 as a director guiding its expansion. Over the next decade, SCL continued its international work, steering as many as ten campaigns for prime minister or president annually in countries as far-flung as South Africa, Argentina, Thailand, and Italy. "Literally everywhere around the world from first world to developing countries, from quite modern elections to really quiet complex rural communities that have very limited technologies and a lot more field work and grassroots consulting and so forth," Nix says. "Everywhere but the United States."

In 2010, Nix traveled to the United States to learn more about the country's political sector but left discouraged by the insularity of the consulting industry. Instead, seeing military and security budgets boosted by post-September 11 spending, SCL expanded the range of services it could sell to governments. With former British Defence Minister Sir Geoffrey Pattie installed as the firm's chairman, SCL in 2005 relaunched as a specialist in "psychological warfare," designing communication that could be deployed to demotivate military opponents or influence civilian populations in conflict areas. A few years later, the firm launched SCL Social, a non-profit division that focused on changing behavior for humanitarian ends, still under the rubric of what its employees casually call "psy ops." For both NGO and governmental clients, SCL analysts developed programs to increase condom use across the Caribbean, improve the effectiveness of tsunami warnings delivered by text message, and guide a Unicef project to discourage child marriage in South Sudan. "We used to be in the business of mindbending for political purposes, but now we are in the business of saving lives," Oakes said.

After the 2012 election, Nix found an American marketplace far more receptive to his entreaties. The overseas work in conflict zones amounted to a promising calling card, a new comparative advantage over entrenched American political firms. "This is really trying to use psychology to understand why hostile audiences do what they do, and to use this methodology to deconstruct that behavior and then use communication to try and change attitudes and ultimately behavior," Nix says. "Persuading somebody to vote in a certain way," he goes on, "is really very similar to persuading 14- to 25-year-old boys in Indonesia to not join Al Qaeda."

Among those apparently motivated by this pitch was the family of Robert Mercer, whom *Forbes* has repeatedly ranked among the country's highest-earning hedge-fund managers. Mercer made his fortune as co-CEO of Renaissance Technologies, a Long Island fund unusually proud of its appreciation for academic credentials over investing experience. In that respect, Mercer was a typical Renaissance man, having worked at IBM's Thomas J. Watson Center before entering finance, trying to teach computers to recognize human language. He remains uncommonly discreet: articles about him invariably note that few pictures of him exist and perhaps the only known detail about his personal life—that he is a toy-train hobbyist—emerged when he filed a \$2 million suit against a model-railroad builder for overcharging him on a project.

Mercer is the type of wealthy citizen most emboldened by the *Citizens United* decision, unlikely to engage in the greasy work of bundling others' contributions but happy to directly sponsor his preferred causes. Along with his wife, Diana, Mercer gave just shy of \$10 million to Republican campaigns and committees in 2014, making him the country's fourth-largest individual donor, according to the Center for Responsive Politics. Yet his public appearances are few, and even then detached from his political objectives. "What I am is simply a computer programmer," Mercer said in a speech last year to the Association for Computational Linguistics, after receiving a lifetime achievement award. "I've taken great pleasure in programs that do remarkable things."

Mercer emerged as a major financial force in conservative politics just as it became an ideal sphere in which to indulge his pursuit for interesting technical programs. In 2013, SCL Elections spun off its American operations into a district entity, Cambridge Analytica, while also removing the phrase "soccer mums" that appears in SCL Elections materials. "We want to look, feel like an American company," says Nix.

Just as significantly, it then became a Republican company. The Mercers have repackaged Cambridge Analytica as an ingenious cog in the GOP party machinery that can crank out votes using methods unavailable to Democrats. Earlier this fall, the firm moved its Washington office to Alexandria's Old Town, the seat of the Republican consulting sector. "It's pretty clear that in America you've got to pick a side in this business," says Nix. "It's not really our decision. The market makes our decision."

Nix crossed the Atlantic as though bearing a passel of Enlightenment-era insights about the ways the political profession had failed to appreciate the complexities of personal experience. "Your behavior is driven by your personality and actually the more you can

understand about people's personality as psychological drivers, the more you can actually start to really tap in to why and how they make their decisions," says Nix. "We call this behavioral microtargeting and this is really our secret sauce, if you like. This is what we're bringing to America."

Cambridge Analytica's trophy product is "psychographic profiles" of every potential voter in the U.S. interwoven with more conventional political data. The emphasis on psychology helps to differentiate the Brits from other companies that specialized in "microtargeting," a catch-all term typically used to describe any analysis that uses statistical modeling to predict voter intent at the individual level. Such models predicting an individual's attitudes or behavior are typically situational—many voters' likelihood of casting a ballot dropped off significantly from 2012 to 2014, after all, and their odds of supporting a Republican might change if the choice shifted from Mitt Romney to Scott Brown. Nix offered to layer atop those predictions of political behavior an assessment of innate attributes like extroversion that were unlikely to change with the electoral calendar.

Oakes may have cautioned against "focusing on individuals or audience segments," but Nix was doing exactly that, albeit disingenuously characterizing how other firms sorted through the electorate in order to make his approach appear more humanistic. Conventional microtargeting, he argues, "of course has to be flawed because you're making this presumption that all women think the same simply because they are women, or all African Americans likewise because of their skin color or whichever demographic you want to choose, which is archaic, really."

For a generation, pollsters have been attempting to move past simple demography by accounting for the psychological baggage that voters tote with them from one election to the next. As early as 1984, Ronald Reagan strategist Richard B. Wirthlin included batteries of abstract questions in his surveys, looking to identify relationships between what he called voters' "values" and the messages that could shift their political preferences. For Bill Clinton's 1996 reelection, Mark Penn conducted what he branded a "NeuroPersonality Poll."

What has changed is the range of data available about those voters whom a pollster didn't reach, which in the 1980s and 1990s included little beyond what was on the public electoral rolls. Campaigns already used algorithms to infer political and demographic attributes about voters they couldn't contact directly; why couldn't those same statistical models predict innate psychological characteristics, as well? While Wirthlin and Penn could isolate archetypes—Penn christened "soccer moms" as part of such an exercise—they lacked the data about the electorate to identify the individuals who comprised each of the clusters so they could be contacted directly. By 2012, such data—and the statistical tools necessary to sift through 200 million potential American voters along its terms—were widespread.

SCL began hiring Ph.Ds, many of them from the University of Cambridge, from fields where manipulating large data sets is routine. As a result, it is probably the only political consulting firm whose employee bios delineate sub-disciplines within the hard sciences, separating those who studied astrophysics from theoretical physics, condensed matter physics, theoretical solid state physics. Very few of them have ever before stepped near a campaign office, and they demonstrate little familiarity with political life in the United States. In casual conversations about the subject, Cambridge Analytica employees speak of "the Tea Party" and "conservative Christians" as distant oddities, in a manner typical of educated Europeans.

"For most people who work here, it's more about being professional and treating your clients as your clients," says Tayler, whose Cambridge doctorate is in nuclear magnetic resonance, and who previously worked for the oil-services company Schlumberger. "They have their beliefs and you're going to do your best for them, because that's what a professional does."

The associations with Cambridge serve to situate the company as heir to a specific scientific tradition. Starting in 1886, the University of Cambridge's Cavendish Laboratory—where James Watson and Francis Crick would later map the structure of DNA—became the site of the first lab devoted to a field known, alternately, as psychometrics and psychophysics. What one researcher who had lectured at Cambridge described as "the quantitative estimate of some of the less commonly and less easily measured of the human faculties" was initially done with weights and forceps, hallmarks of the eugenics movement.

In the century's second half, researchers found less ominous ways to sort individuals into categories based on innate psychological attributes, leeching out insights through confessional interviews. In the years after World War II, Isabel Briggs Myers isolated 172 questions that would reveal the internal architecture of an individual's mind. By the 1980s, the Myers-Briggs questionnaire was displaced by the personality battery that University of Oregon psychologist Lewis Goldberg dubbed "the Big Five." Yet even among the extroverted, any new self-knowledge was usually well guarded. "It's very difficult to get people to trust you to share psychological data with them," says Vess Popov, development strategist of the University of Cambridge's Psychometrics Centre.

A decade ago, the centre's David J. Stilwell and Michal Kosinski uncovered a new way to get people to part with personal data: social-media quizzes. Since their [MyPersonality app](#) was launched in 2007, six million people have completed the questionnaire—nearly half of them allowing the Cambridge's Psychometrics Centre to access their Facebook profiles as they did so. Once a user grants such access, algorithms trawl through likes and posts to train statistical models that use such “digital footprints” to predict personality types. Scholars are allowed to dip into that pool of anonymized data for worthy academic research, and the fruits of those models are promoted commercially as [Apply Magic Sauce](#), a data stream that allows online marketers to adjust their appeals to potential consumers based on their likely attributes.

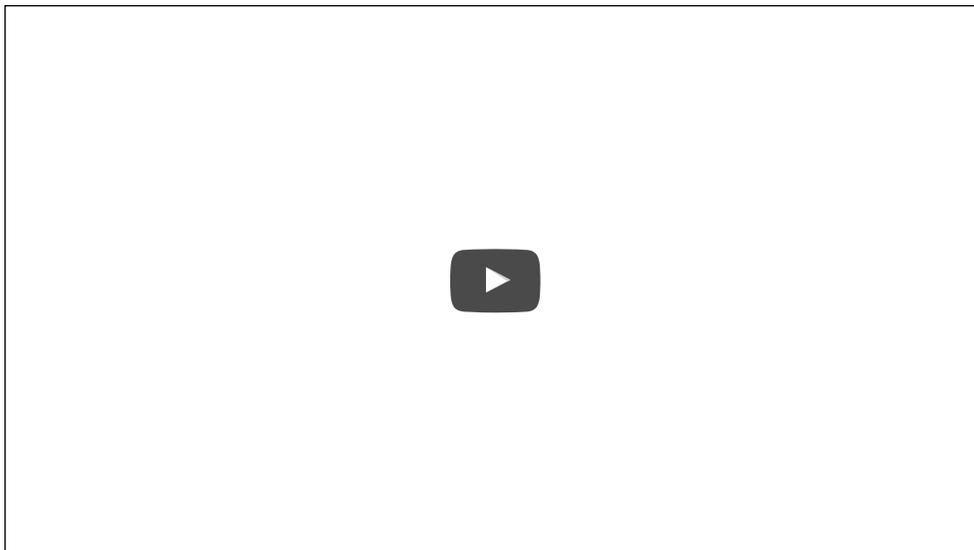
College ties may have shaped the company's intellectual heritage, but Cambridge Analytica's prospects are now determined by its links to American hedge-fund wealth. It is Robert Mercer's daughter, Rebekah, otherwise responsible for the Mercer Family Foundation, who said to be the biggest booster of Cambridge Analytica's methods. By all accounts, the company's business has become deeply intertwined with the family's political interests. In Manhattan, the company shares an address with the free-market advocacy group Reclaim New York, where Rebekah Mercer serves as treasurer. “To break into the U.S. political market you need more than just a good idea, you actually need to have people to believe in you,” says Nix, who refuses to specifically discuss any of the company's investors.

Yet as *Politico* noted in its story about the Mercer investment, all of [Cambridge Analytica's clients in 2014](#) were also recipients of contributions from the financier. In 2013, the company's only American client was the Middle Resolution PAC, a Virginia conservative group then working to elect Ken Cuccinelli as the state's governor, an unpaid pilot project to show how SCL might work.

“The traditional microtargeting vendors I've worked with, they were all waiting for me to call them, I guess,” says Paul Shumaker, a North Carolina general consultant who hired Cambridge Analytica to work for Thom Tillis's successful campaign for the Senate last year. “We were one of the top US Senate races in the country and I never got approached by anybody else—which told me they were either too busy or took me for granted.”

Cambridge Analytica might not have had to work so hard for one of its more lucrative 2014 accounts. With a \$1 million contribution, Robert Mercer was the largest single donor to the John Bolton super-PAC. The group had one objective—to convince voters to support Republican candidates based on national-security issues—and it served well to demonstrate a personality-driven theory of political persuasion. Bolton's committee agreed to [communicate over satellite-television systems](#) like Dish and DirecTV, which, unlike broadcast and most cable systems, permitted ads to be assigned differently to specific subscribers, allowing Cambridge Analytica to fully exploit the benefit of its individual-level modeling.

The firm, which was paid \$341,025 for its work, advised Bolton's team on the design of six ads, thirty seconds each, with wildly different creative approaches. One ad, targeted at voters modeled to be conscientious and agreeable, was set to upbeat music and showed Bolton standing outdoors on a bright day, matter-of-factly addressing the need to “leave a stronger, safer America for our children.”



In another, aimed at neurotics, the diplomat was invisible—replaced by storm clouds, foreigners burning American flags, and an admonition to “vote like your life depends on it,” intoned by an disembodied narrator. “That’s obviously something that’s quite emotive,” says Nix, “as we’re really looking to drive an emotional reaction from an audience who would be inclined to give you one.”

At the same time, Jobs, Growth & Freedom Fund, a leadership PAC launched by Ted Cruz in preparation for his presidential campaign, paid Cambridge Analytica just under \$400,000, most of it to support digital advertising on behalf of other candidates. (Over the course of the fall of 2014, Mercer donated \$1.75 million to another committee, the Ending Spending Action Fund, that has backed Cruz.) By the time the committee transitioned this spring into a full-fledged presidential campaign, Cambridge Analytica was fully integrated into the Texas senator’s political plans. Even before he formally announced his candidacy, opened his Houston office, or had a pollster in place, Cruz had a London-based firm on call to tell him which Iowans were introverted and which were neurotic.

Cruz for President has relied on Cambridge Analytica as a ready-made data-science department that spares the campaign the challenge of having to hire (and compensate) its members individually. This is already enough of a challenge for Republican campaigns, who have trouble identifying friendly quants from academia or the tech sector, even without sixteen different presidential campaigns all angling for the same talent. Finding astrophysics postdocs who will happily work for Ted Cruz may be easier in Cambridge, England, than Cambridge, Massachusetts. Rebekah Mercer is said to talk bullishly about the innovative potential of “psychographic” modeling, but her greatest gift to Republican analytics may be as an end run around a dispiritingly tight labor market: finding foreigners to do the analytics jobs that Americans just won’t do.

There is little evidence yet that Cruz’s campaign has determined if, or how, to use Cambridge Analytica’s “psychographics” at what the company depicts as their fullest potential. Chris Wilson, a pollster who had guided Cruz’s microtargeting efforts in his 2012 campaign, was unconvinced that predicting voters’ personalities was as universal a tool for unlocking their attitudes and behavior as Cambridge Analytica executives claimed. But if the method ever were to prove its utility, he thought it would happen in a fractured primary field, where—as opposed to a general election featuring stark choices between different parties—campaigns are constantly looking for ways to magnify ultimately minor differences among candidates into major distinctions in voters’ minds.

“In a primary composed of Republicans, there’s not a big gap of difference between where each of the candidates are on a single issue, so your ability to connect with a voter on an issue is very important,” says Wilson, who now serves as the campaign’s director of research and analytics. “You’re appreciating the reason they care about the issue.”

Indeed, few of Cambridge Analytica’s clients appear to be taking full advantage of what employees describes as its “bespoke” service, the tailoring of messages and targeting tactics to align with its personality profiles. “I’m not convinced it would make any difference whatsoever,” says one veteran consultant who has worked closely with the Republican party’s data infrastructure and has met with Nix. “Even if what they are pitching is tangible and legitimate and can really give you voters to talk to in a different tone no campaign has the bandwidth...There’s not the targeting ability to do it.”

In most cases, Cambridge Analytica appears to be functioning as the type of straightforward microtargeter that Nix considered insufficiently alert to the vagaries of human psychology. In North Carolina, where the company was paid \$150,000 by the state party and \$30,000 by Tillis’s campaign, Cambridge Analytica developed models to predict individual support, turnout likelihoods, and issues of concern that would recalibrate continuously based on interactions with voters. Shumaker says that dynamic process allowed Tillis’s campaign to identify a sizable cluster of North Carolinians who prioritized foreign affairs—which encouraged Tillis to shift the conversation from state-level debates over education policy to charges that incumbent Kay Hagan had failed to take ISIS’s rise seriously. “It gives you an edge in increasing the probability that voters would pay attention to your message,” says Shumaker.

In conference calls and pitch meetings, Cambridge executives and analysts have betrayed confusion, if not outright ignorance, about some basics of American campaigns—from the definition of precincts (the smallest unit at which voter data is collected) to the difference between turnout patterns in primaries and caucuses. When Nix and Tayler showed me my record, they seemed to suggest that a prediction that I had an infinitesimal chance of voting in the Republican primary reflected my ideology, rather than Pennsylvania laws that exclude those registered as independents (as I am) from participating in any primaries. When it comes to describing the process behind the psychological predictions, they seem even more deliberately obtuse. “Our conversations with the Cambridge guys left us befuddled,” says a Republican consultant who has been on the receiving end of their proposal. “Their team is enamored by the promises of psychometrics, but they were surprisingly vague about its specifics and too quick to dismissively cry ‘Analytics!’ in the hopes that would be enough to sell us. Their technical ambition is obvious, but they’ve got a ways to go before they impact the U.S. electoral space.”

A few weeks after I visited their London office, I went to the University of Cambridge Psychometrics Centre's website to see what I could learn about myself from a psychological assessment detached from political considerations. The centre's site shows users who sign in with their Facebook accounts the personality profile that Apply Magic Sauce generates from their digital footprints, but I hadn't liked or posted enough to adequately feed its algorithm. Instead I was directed to a familiar-looking series of agree-or-disagree questions that promised to plot me on both the Myers-Briggs and "Big Five" matrices.

It took nearly half an hour to complete the 100-item questionnaire before receiving a diagnosis. The modeled assessment I had been shown by the Cambridge Analytica team had been accurate in placing me in the middle range for extraversion and low on agreeableness. But on other personality traits, the company's prediction had been wildly off. I fell in the 16th percentile for neuroticism, while Cambridge Analytica had placed me in the 70th. The inverse was true on conscientiousness: the online test said I was in the 76th percentile, while Cambridge's model put me in the 11th. While I was more open than closed, I was not much of an outlier—in the 60th percentile—and far from the psychological curiosity that Cambridge Analytica's test had revealed.

The summary generated by these scores conjured an entirely different person. "You seem to describe yourself as someone who avoids foreseeable trouble through purposefully planning, and achieves success through persistence," the site told me. "From your responses it appears that you are reliable and prepared for life's challenges." This was far from the creative free spirit than I had been revealed to be in London, but it, too, managed to flatter me. How I would decide my vote for president remained a mystery to us all.

(Correction: A previous version of this story incorrectly described Mercer's involvement with Cruz's leadership PAC in 2014.)

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PHOTOGRAPHER: SARAH ANNE WARD FOR BLOOMBERG BUSINESSWEEK

Why We Can't Have the Male Pill

A condom alternative could be worth billions. What's taking so long?

By Emily Anthes

The trouble began, as it so often does, with a bottle of Chivas Regal.

Back in the 1950s, scientists at Sterling Drug, a now-defunct pharmaceutical company, synthesized a class of chemicals that made male rats temporarily infertile. They thought they might be onto something big: the first-ever birth control pill—for men. After identifying several promising compounds, including one known as WIN 18,446, a trio of researchers began testing them on a ready population, inmates at the Oregon State Penitentiary.

The results were astonishing. Within 12 weeks, the inmates' sperm counts had plummeted. When the men stopped taking the drugs, sperm production returned to normal. Better yet, they experienced few side effects.

Then one of the participants drank some contraband Scotch and became unusually, violently ill. He confessed his transgression to the researchers, and follow-up studies confirmed his account: WIN 18,446 didn't mix well with booze. Men who combined the two reported heart palpitations, sweating, nausea, and vomiting. The research was quietly abandoned.

For years, headlines have promised an imminent breakthrough in male contraception. Time and again, these efforts have fallen short. Last October, for instance, researchers reported that a hormone cocktail they'd been testing curbed sperm production and prevented pregnancies. But they'd had to halt the study early because men were reporting troubling side effects, including mood changes and depression.

“The joke in the field is that the male contraceptive has been five years away for the last 40 years,” says John Amory, a research physician at the University of Washington School of Medicine who has been working on the challenge for two decades. A new form of male birth control would be a public-health triumph and could snag a significant piece of the contraceptive market—which is expected to surpass \$33 billion by 2023, according to research firm Global Market Insights Inc.—or possibly expand it further. In a 2002 German survey of 9,000 men in nine countries, including Brazil, France, Germany, Mexico, and the U.S., more than 55 percent of the respondents said they'd be willing to use a new form of male birth control. A later study by Johns Hopkins University estimated that the demand could yield 44 million customers in those nine countries alone. And yet major pharmaceutical companies have mostly abandoned the chase.

That has left a scrappy tribe of scientists to fill the void. They've dreamed up a vast array of ideas, from the conventional—hormone gels, implants, and injections designed to temporarily suppress sperm production—to the decidedly unorthodox. (Men, prepare to have lasers beamed at your testes.)

For his part, Amory is trying to resurrect the drug that showed so much potential in prisoners. But turning WIN 18,446 into a contraceptive has, like other such quests, proven difficult—as stubbornly elusive as discovering alien life or harnessing energy from nuclear fusion. “When I was in high school, I thought I was going to become a physicist and work on developing fusion,” Amory says. “Then I started working on this, and now I wonder what we’re going to have first: workable fusion or a male pill?”

When it comes to preventing pregnancy, women have a multitude of choices. There are diaphragms and sponges; cervical caps and female condoms; spermicidal gels, foams, films, creams, and suppositories; hormone-delivery systems involving pills, implants, injections, patches, vaginal rings, and IUDs. These options are far from perfect—and they remain inaccessible and unaffordable for many women—but at least they exist.

Men have only two choices: condoms, which have a real-world failure rate of about 18 percent, and vasectomy, a surgical procedure that’s often permanent. A new contraceptive could give men more control over their reproductive futures, alleviate a burden that’s overwhelmingly borne by women, and reduce the rate of unintended pregnancies, which is about 40 percent worldwide, according to the nonprofit Guttmacher Institute. Women have sometimes argued—not

unconvincingly—that the lack of a male pill reflects a double standard, but the scientific and regulatory challenges involved in creating a viable male contraceptive are vexing on their own.

After the U.S. Food and Drug Administration approved the first female birth control pill, which used a mixture of hormones to suppress ovulation, in 1960, researchers explored taking a hormone-based approach to men. Clinical trials in the ensuing decades showed that dosing men with testosterone or combinations of testosterone and progestin temporarily inhibited sperm production, but that the strategy had drawbacks. Testosterone is rapidly cleared from the body when taken orally, so a hormonal contraceptive for men would likely have to be delivered via injection, implant, or topical gel, rather than as a pill. What's more, the hormones don't work in all men, and because they don't only affect the gonads, they can, as with the female pill, cause nasty side effects that have nothing to do with fertility.

Research into hormonal solutions continues, but the challenges have prompted some investigators to seek drugs that target sperm more directly. Scientists at the University of Kansas and the University of Minnesota are studying a compound called H2-gamendazole, which prevents sperm from maturing properly, while Eppin Pharma Inc., a small North Carolina company, is developing a drug that would stop sperm from swimming by binding to a protein on the surface of the cells.

And then there's Amory, who happened upon WIN 18,446 by accident. After arriving at the University of Washington in 1997, he began a practice that soon proved paradoxical. As a clinician, he often treated infertile men who desperately wanted children, while as a researcher he sought to develop a hormone cocktail that would prevent men from becoming fathers. Then, in the fall of 2006, he came across a paragraph about the Oregon prison experiments in a profile of two pioneering fertility scientists.

“It's a fascinating story,” he says one rainy March morning in his office at the university's labyrinthine health sciences building. Amory is a 50-year-old former rower and Eagle Scout, with the lanky build and cheerful, wholesome demeanor to match. He's also an unabashed history buff and enthusiastic storyteller, and he calls up a carefully curated series of graphs to help him narrate the saga of WIN 18,446.

Initially, he says, the Sterling Drug scientists created the compound to treat parasitic infections. But when they tested it in rats, they noticed that the animals became infertile. “Then they stopped the drug, and the rats regained their fertility,” he says. “So they're like, ‘Hey, maybe this could be a male contraceptive.’ This was before there was a pill for women.” Of course, rodents don't drink, so it wasn't until men started taking WIN 18,446 that researchers discovered it interacted dangerously with booze.

WIN's side effects sounded familiar to Amory. In his clinical practice, he'd occasionally prescribed Antabuse (disulfiram) to patients who struggled with alcohol addiction. The drug blocks a form of the enzyme acetaldehyde dehydrogenase (ALDH), which helps the body metabolize alcohol; drinking while taking disulfiram leads to an extremely unpleasant, and occasionally fatal,

constellation of hangover-like symptoms. But ALDH also plays a role in converting vitamin A to retinoic acid, which is required for sperm production. The pieces clicked into place: Amory realized that WIN 18,446 might inhibit ALDH, which would explain why it caused sperm counts to drop and why men taking it had adverse reactions to alcohol.

He tested his hypothesis in rabbits, dosing them with a WIN-laced banana-crème-flavored syrup. “Rabbits are brilliant, because their sperm counts are very similar to humans. They’re mammals just like humans, and you can train them to ejaculate into an artificial vagina,” he says, cuing up a video on his computer. “This is me making an artificial vagina.” (The faux orifice, it turns out, can be assembled from an ultrasound-probe cover and a thermos filled with water heated to about 100F, the approximate internal temperature of a female rabbit.)

After four weeks, the retinoic acid levels in the rabbits’ testes plummeted; sperm production soon followed. “You can see what happened to their sperm counts,” Amory says, whistling as he traces a plunging graph line with his finger. “They go right down to zero. And then we stop the drug, and they come right back up.” The results suggested he’d been right: WIN seemed to hobble sperm production by disrupting the synthesis of retinoic acid.

He concluded that WIN represented an elegant strategy for male contraception—it just needed to be better targeted. There are almost 20 different forms of ALDH; the liver relies primarily on ALDH2 to metabolize alcohol, while the testes use ALDH1A2 to make retinoic acid. WIN disrupted both forms of the enzyme; what they needed was a drug that blocked only ALDH1A2.

To help him tweak WIN, he turned to Alex Goldstein, a bespectacled, redheaded chemist who has become his collaborator and co-investigator. Over two years, Goldstein made about 100 versions of the compound, but none was selective enough. “So we went to plan B,” he says. With the help of a drug-screening robot, their team tested 55,000 additional chemical compounds, identifying about 300 that inhibited ALDH1A2. A leading contender soon emerged, with preliminary experiments suggesting it was more specific than WIN, and more potent.

Last year they put the compound, called CM-121, to the test, giving 10 mice daily doses for five weeks, measuring the animals’ retinoic acid levels, and counting the sperm in their testes. The results were disappointing. Within five hours of each dose, retinoic acid levels did indeed drop—then quickly returned to normal. Sperm production continued apace.

Fudge, Amory thought. (“I have two small boys, so I try not to swear,” he says.) He’d really thought it would work. But he understands the field too well to call it his biggest setback. “Oh, gosh,” he says, sighing, “it’s all setbacks.”

Drug development is an inherently difficult enterprise. Only 10 percent of the drugs that enter Phase I trials—the studies in which scientists evaluate dosing and basic safety in humans—ever make it to pharmacy shelves, and it can easily cost hundreds of millions of dollars to bring a drug to market. Male contraception is a particular challenge. Contraceptives have to be extraordinarily reliable.

Many drugs would be considered successes if they worked half the time, but few people would use birth control that failed so frequently.

Then there are the basic facts of reproductive biology. Most healthy women of reproductive age release one egg per month and stop ovulating when they're pregnant; they can suppress ovulation by taking hormones that mimic pregnancy, which is essentially what the pill does. But there's no natural off switch for sperm production; men make sperm from puberty until death.

"Spermatogenesis is a pretty formidable foe," Amory says. "Your body has evolved over eons to make a lot of sperm. In fact, most men make a thousand sperm every second."

If researchers do find a promising drug, they'll also need to persuade regulators to approve it. No one's quite sure what that will take. Male contraceptive drugs represent an entirely new product category, and the FDA hasn't yet laid out clear guidelines for them. Will regulators measure a male contraceptive drug against the female pill or simply compare it to the male-directed approaches now available? Will they want a male pill to be as effective as a vasectomy or simply more reliable than a condom? "Nobody really knows, because nobody's gotten to that point," says Zahed Subhan, chief executive officer of Eppin Pharma, the North Carolina company that's testing a drug that aims to interfere with sperm movement.

There's reason to believe it will prove tougher to win approval for the first male pill than it was for the female one. Research and regulatory standards have evolved considerably in the past 60 years—the Oregon prisoner tests likely wouldn't pass muster today, nor would some early trials for the first female pill. (In one crucial study performed with low-income women in Puerto Rico, participants weren't fully informed of the potential risks, and their reports of side effects were largely dismissed.) Some scientists have also speculated that the original formulation of the female pill, which contained much higher doses of hormones than current products do, wouldn't be approved today.

Moreover, while female contraceptives aren't without dangers, pregnancy entails serious health risks. This means regulators charged with making a risk-benefit calculation may conclude in some cases that unplanned pregnancies pose a greater hazard to women than the side effects of a new birth control product would. The female pill also has some noncontraceptive health benefits. The first birth control pill, Enovid, initially won FDA approval in 1957 to treat menstrual disorders; it wasn't approved as a contraceptive until three years later.

That men don't bear the medical risks of pregnancy may change the calculus for regulators assessing a male contraceptive. So might the fact that men, with their long reproductive lifespans, could find themselves using birth control for decades longer than women typically take the pill. Unless researchers manage to find a contraceptive with real health benefits for men, regulators will probably have a low tolerance for side effects. "A male contraceptive solution just has to be squeaky clean," Subhan says.

If a drug were approved and serious side effects popped up, pharmaceutical companies could face costly lawsuits. Litigation is always a risk for drugmakers, but medications designed to be taken by young, otherwise healthy patients for long periods of time, especially those affecting the reproductive system, could be particular targets. Women have filed, and sometimes won, high-profile lawsuits over female contraceptives, alleging that certain drugs and devices have caused a variety of serious injuries—including blood clots, uterine damage, birth defects, miscarriages, and infertility—or that contraceptive failures have left them with unwanted pregnancies.

The scale and spread of the challenges may explain why pharmaceutical companies that once had active research programs had dropped them by about a decade ago. “The drug company funding has kind of dried up,” says Amory, who previously received financing from Organon BioSciences, Schering, and Bayer. “It seemed to some that they decided that the risk-benefit wasn’t favorable.” Although surveys show that men are interested in male contraception, because they don’t get pregnant they may be less motivated to take on the attendant hassles and risks. It’s also not clear if a new male contraceptive would expand the contraceptives market or cannibalize it. Companies profiting from existing solutions might be reluctant to invest in competing products.

Scientists at universities, nonprofits, and startups aren’t scaring so easily. “Everybody in the male birth control area is an underdog,” Goldstein says. Amory and Goldstein’s work on WIN had been funded by the National Institutes of Health, but their grant—\$1.5 million over five years—ran out at the end of June, and they don’t have more money lined up yet. Even an identical grant wouldn’t be nearly enough to develop an FDA-approved drug ready for widespread use. Their plan is to find a better, more potent candidate, assemble evidence that it’s safe and effective, and approach pharmaceutical companies about a partnership.

But that will take time. “Science is tough that way,” Amory says. “Most things don’t work.”

Some entrepreneurs say the path forward requires wholly rethinking male birth control.

“What is a male contraceptive?” asks Kevin Eisenfrats, the 24-year-old co-founder and CEO of Contraline Inc., a startup based in Charlottesville, Va. “Is it a drug, or is it a medical device?” Just inside the front door of the company’s two-story brick building, not far from the University of Virginia, a custom mural—a silhouette of a man and woman walking into the sunset—is splashed across a side wall. A bowl of Contraline-branded, sperm-shaped foam stress balls sits on the reception counter.

Eisenfrats, who has long eyelashes and a spray of freckles on his nose, takes a seat at a cluttered conference table and delivers his elevator pitch. “What we’re developing is a nonsurgical and reversible alternative to a vasectomy,” he says. Contraline has created a hydrogel, called Echo-V, that can be injected into the vas deferens, the thin tube that transports sperm from the testes to the urethra. Upon injection, the gel solidifies, blocking the flow of sperm but allowing other fluid to pass through. Ideally, he says, when a man is ready to have children, a doctor would dissolve the gel.





▲ Eisenfrats at his desk at Contraline's Virginia headquarters. PHOTOGRAPHER: CHRISTOPHER GREGORY FOR BLOOMBERG BUSINESSWEEK

The idea isn't novel. It's inspired by a technique known as reversible inhibition of sperm under guidance (Risug), invented in India in the 1970s. The Parsemus Foundation, a nonprofit based in Berkeley, Calif., is developing a similar product, called Vasalgel. But while Risug requires doctors to make a small opening in the skin of the scrotum to access the vas deferens, Contraline has invented a procedure, which it has dubbed "vasintomy," that allows doctors to implant the gel nonsurgically, injecting it directly through the skin using an ultrasound to guide its placement. "No scalpels or sutures required," Eisenfrats says. "It's maybe a three-minute overall procedure."

He hatched the idea while he was a senior at the University of Virginia School of Engineering & Applied Science and initially planned to market Echo-V to pet owners as an alternative to neutering. The veterinarians he reached out to were enthusiastic about the idea—just not for their animal

patients. “They were saying, ‘Well, this is really cool. It sounds great, but can my husband get it?’ ” he says with a laugh.

Because Echo-V qualifies as a medical device, Contraline may have an advantage over rivals working on a male pill. The FDA typically requires more and larger clinical trials for drugs than it does for devices; it takes 12 years, on average, to bring a new drug to market, compared with three to seven years for a new medical device. The expense therefore tends to be much higher for drugs.

Contraline, which was launched in March 2015, hasn’t had trouble attracting investors, raising \$700,000 in a preliminary seed round last year, followed this spring by a second seed round of \$2.3 million led by Peter Thiel’s Founders Fund. (“At Contraline, we only do seeds,” Eisenfrats jokes.)

Other organizations are also exploring alternative funding models and research concepts. The Parsemus Foundation solicits tax-deductible donations from the public and accepts payment in bitcoin. Last year the foundation, which has 52,000 people on its mailing list, suggested supporters each donate “an hour’s wages” to raise the \$127,000 it needed to manufacture the gel for its first clinical trial. (The campaign closed with \$85,000, and a trial is planned for 2018.) The Male Contraception Initiative, a nonprofit, has also run a crowdfunding campaign for researchers.

As for more radical scientific approaches, British researchers are working on a so-called clean-sheets pill that would stop men from ejaculating during orgasm. A German company has devised an implantable valve—advertised to be “small as a gummy bear” and “100% vegan”—that would let men turn the flow of sperm on and off with the flick of an actual switch. And a Chinese team has piloted an approach that involves injecting gold nanoparticles into the testes and heating them with an infrared laser. None are likely to be commercially available soon—indeed, they haven’t yet been tested in humans, though Clemens Bimek, the German who developed the spermatic duct valve, reportedly had several prototypes implanted in his scrotum.

Contraline’s research team is racing to be one of the first to market with a viable solution. The company is tinkering with the gel’s formulation, assessing its efficacy and biocompatibility, designing an injection device, and refining the injection and reversal procedures. Eisenfrats says he plans to begin a preclinical trial in large animals next year, begin human trials in 2019, and earn FDA approval in 2021.

It’s an ambitious timeline. The developers of Risug and Vasalgel have been at it longer than Eisenfrats, and they’ve both faced setbacks and delays—hopes for Risug have been high for the past 15 years. Still, Eisenfrats is confident Contraline can pull it off. “Some people think it’s a little aggressive, but I wouldn’t say anyone has ever called bullshit on it,” he says. “It’s doable. The pathway we’re taking makes sense.”

On the back wall of Contraline’s first-floor laboratory, two posters depict artifacts from the strange and slightly horrifying history of contraception: a condom made from animal intestines, a screw-like device designed to be inserted into the uterus, a box of “anti-baby” tablets, a lemon. “This is what was in the past,” Eisenfrats says, pointing. “And this,” he adds, turning and gesturing at his gleaming new lab, still being stocked with equipment, “is where we’re going.”

One afternoon this spring, Amory and six members of his research team gather for a lab meeting in a small, windowless room down the hall from his office. Goldstein, the chemist, clicks through slides crammed with chemical names and structures. He’s been synthesizing new compounds, looking for

one more potent than CM-121, the former lead contender. Of the hundreds he's made so far, several seem strongly and selectively to inhibit ALDH1A2. "That's good," Amory says. "That's a bunch of good inhibitors."

He has stopped predicting when his team might be ready to start human trials, let alone have a pill ready for sale. And he's fine with the possibility that they won't be the first to break through—that Contraline or someone else might beat them to market. "I don't feel like we're in a race or that it's a competition," he says. Rather, he hopes that someday a wide variety of options will be available to men, including his two sons.

"My dream is to send them off to college with a five-year, reversible, male contraceptive implant," Amory jokes. But his boys seem to be growing up faster than the field is moving. "I have an eighth-grader now, so I'm not sure I'm going to make that deadline."

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