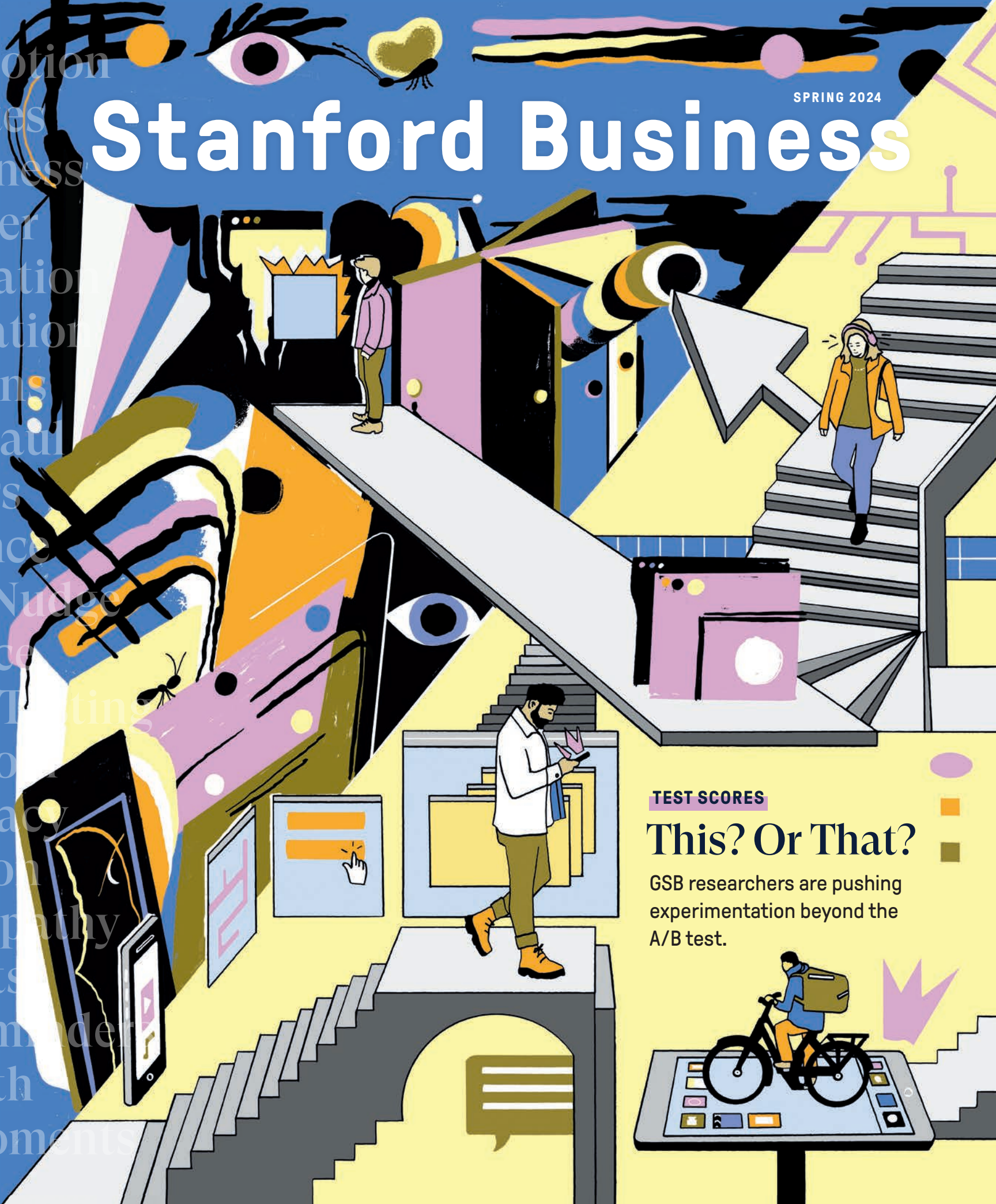


SPRING 2024

Stanford Business

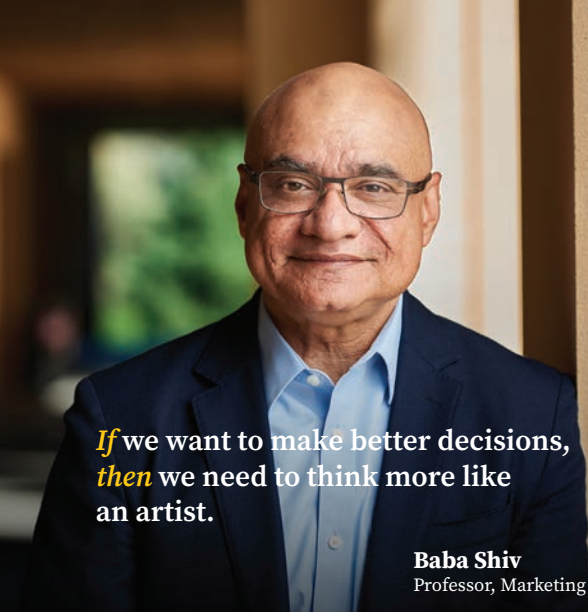


TEST SCORES

This? Or That?

GSB researchers are pushing experimentation beyond the A/B test.





If we want to make better decisions,
then we need to think more like
an artist.

Baba Shiv
Professor, Marketing



Daniela Saban



Bill Barnett



Darrell Duffie



Kuang Xu



Andy Hall



Deb Gruenfeld



Ed deHaan



If we create good institutions,
then we can live up to our good
intentions.

Ken Shotts
Professor, Political Economy



**Mohammad
Akbarpour**



If the United States
wants to remain a
global hub of
innovation,
then we need to
understand the
role of immigrants.

Rebecca Diamond
Professor, Economics



Szu-chi Huang



Jonathan Levav

if/then

Business • Leadership • Society

Professors from across the GSB share research findings that can help us navigate the complex issues we face in business, leadership, and society.

Listen now wherever you get your podcasts.

Be sure to check out If/Then, Think Fast Talk Smart, and other Stanford Business podcasts at gsb.stanford.edu/business-podcasts

A MESSAGE TO THE GSB COMMUNITY

Congratulations, Dean Jon Levin!

On April 4, Jerry Yang, the chair of the Stanford University Board of Trustees, announced that GSB Dean Jonathan Levin had been named the university's next president.

"It has been an extraordinary experience and a joy to lead the GSB as your dean," Levin wrote in a message to the GSB community. "The GSB is an unparalleled institution, combining the highest level of academic excellence with the energy and talent of future leaders who aspire to change the world."

"I'm exceptionally proud of what the school has accomplished during my tenure," wrote Levin, who joined the Stanford faculty in 2000 and became dean of the GSB in 2016. "I also know that the GSB is an inherently forward-looking place — as our cornerstone says, we are 'dedicated to the things that haven't happened yet' — so I am even more excited about the school's future." His tenure as university president begins on August 1.

Congratulations, Jon — and thanks for everything!



Read more about Levin's appointment as Stanford's next president



ANASTASIA SAPON, SAUL BROWBERGER, TONI BIRD, SF PHOTO AGENCY, ELENA ZHUKOVA

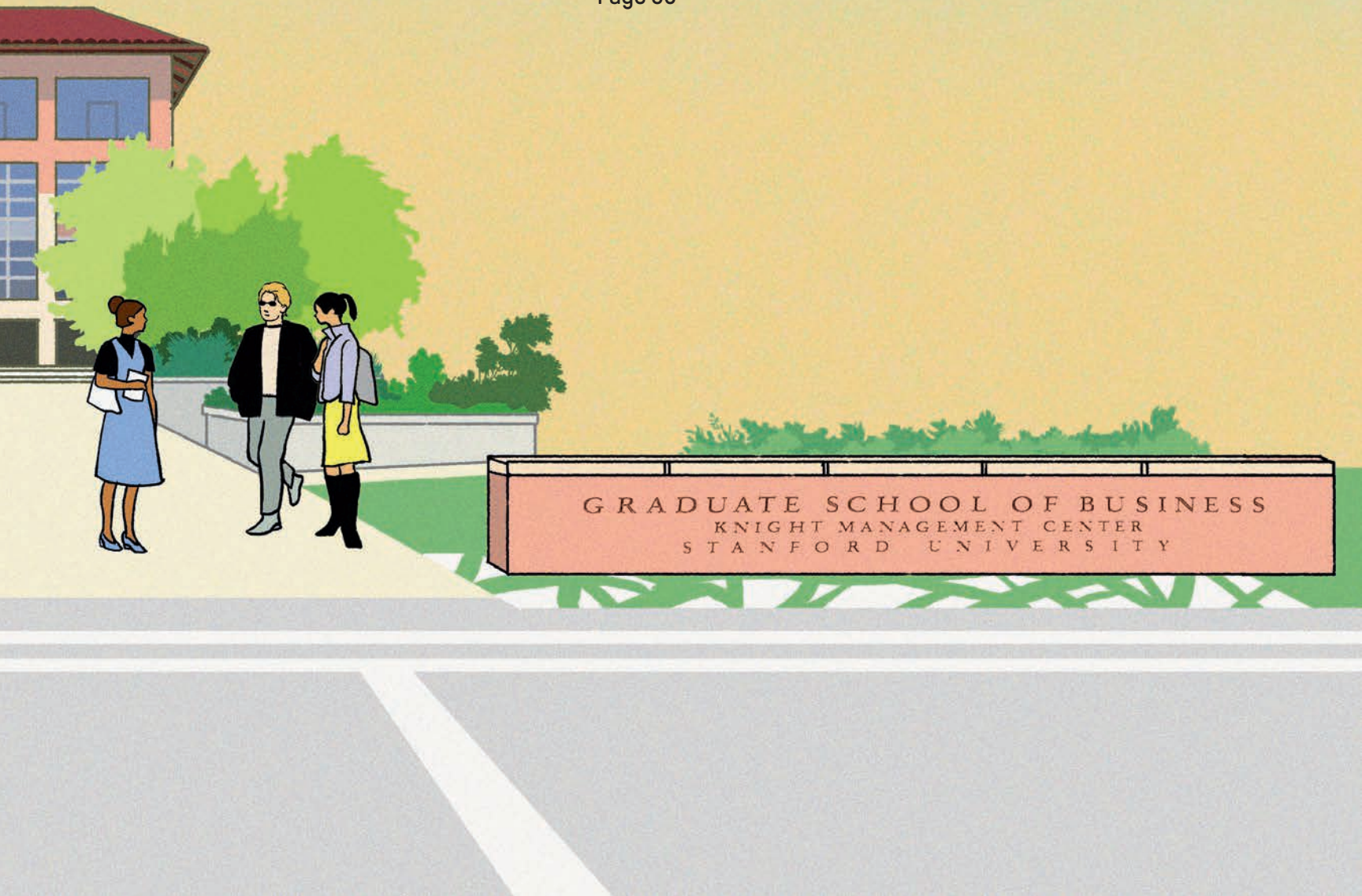
"It has been an extraordinary experience and a joy to lead the GSB as your dean."



Illustration by Manshen Lo

“How do you rise above the fray and find the solution that’s going to optimize and maximize for all parties? I got that fundamental way of thinking from business school.”

– Monifa Porter, MBA '03, on the “entrepreneurial spirit” that drew her to the GSB
Page 56





MAKE AN IMPACT.

Since 1987, over 1,750 alumni have conducted nearly 1,000 pro bono projects with nonprofits through the Stanford Alumni Consulting Team (ACT). **GSB alumni are changing the world, one project at a time.**

01

Determine your Best Fit

In the Spring, **two-hour** Springboard sessions are offered. In the Fall, deeper consulting projects are offered, including **2-3 month** Fast Tracks and **6 month** Full Projects.

02

Align with your Passion

Partner with a non-profit that aligns with your interests. Recent projects have included The Nature Conservancy (environment), Summer Search (youth development), and I Have a Dream Foundation (racial equity).

03

Leverage your Business Skills

ACT teams collaborate with nonprofit executives to tackle their most pressing challenges. Channel your talents, whether in strategy and planning, marketing, financial management, operations, or organizational development.

04

Connect & Build Relationships

(Re)connect with the GSB, build relationships with nonprofits, and make an imp**ACT**!



A MESSAGE TO THE GSB COMMUNITY ¹

EDITOR'S NOTE ⁷

ON CAMPUS ⁹

BRIEFINGS ¹⁰

- Undergrads... at the GSB?
- Tech titans talk
- Paying attention to ADHD
- VCs thrive on rejection
- Chenzi Xu's war bonds leaflet
- Ending absenteeism begins at home
- Negotiating win-wins
- A new non-friction book
- Students eat up faculty research
- Pressing matters

INSIGHTS ²⁰

BULL MARKETS

Public Pensions Are Mixing Risky Bets with Sunny Predictions

PERSONAL VALUES

How Much Is Your Favorite App Worth to You?

CRITICAL MATH

Back to the Basics of Personal Finance

PRACTICE SPACE

Getting Into "The Zone" Isn't About Perfection, It's About Uncertainty

DEBT TRAP

The Hidden Costs of Clicking "Buy Now, Pay Later"

VOICES ⁵⁴

Jennifer Aaker, PHD '95, THE GENERAL ATLANTIC PROFESSOR

Monifa Porter, MBA '03

Mohamed A. Hussein, PHD '24

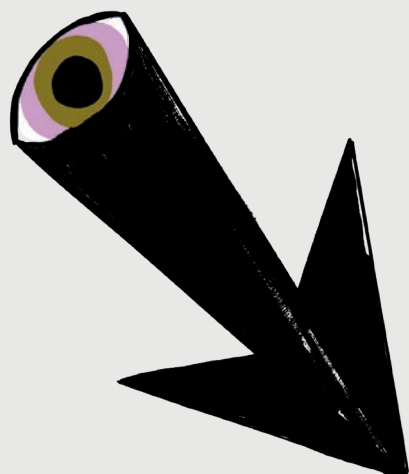
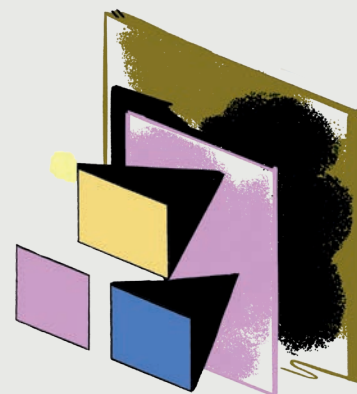
Lauren Cooks Levitan, MBA '92

Nand Mulchandani, MS '18

WHAT MATTERS TO ME NOW AND WHY ¹¹⁹

Alyssa Rapp, MBA '05

CLASS NOTES ⁶⁵



FEATURES

Multiple-Choice Problems ³²

GSB researchers are upgrading A/B testing to keep up with new technology and help solve real-world challenges.

Katie Gilbert

Curious Conversations ⁴⁰

If you're looking for smart answers to complex questions, then you should check out this new podcast.

Growing Pains ⁴⁸

No longer illicit, but not fully legit, the cannabis industry operates in a gray area. But it can't be ignored.

Dave Gilson

ON THE COVER

Illustrations by Fien Jorissen and Franz Lang



Connect with GSB Women in your Community

Women's Circles' mission is to grow a community of thriving GSB alumnae. We gather monthly in small groups to connect, reflect, support, and inspire one another to live our best lives.

Our vision is to build a global community to nurture alumnae in the arc of their lives after the GSB. We value diversity across many aspects, including age, work experience, life decisions, ethnicities and cultures.

Join the Stanford Alumni Group, GSB Women, or email GSB_Women@gsb.stanford.edu to receive information about our fall kickoffs.

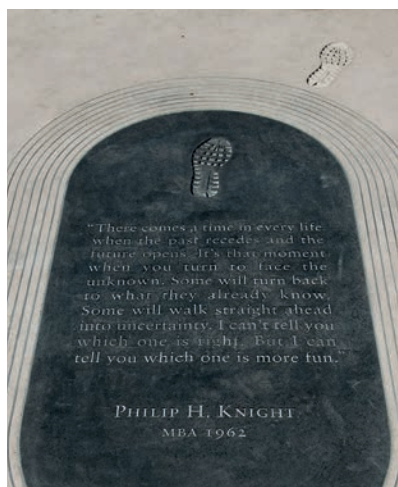


EDITOR'S NOTE

Serious Fun

TALK TO US

Have some constructive criticism? Praise? Story ideas? We welcome your input. Please email the editors at stanfordbusiness@stanford.edu.



FIND PRINT

Spot this footprint (above) somewhere in this issue and you may get some free stuff.

Preconceptions are hard to shake. They can hold people back — and sometimes businesses. Consider cannabis — a product and industry that are not always associated with productivity or industriousness. Yet the market for legal marijuana in the United States is currently in a phase of intense competition, relentless innovation, and explosive growth. In “Growing Pains” (page 48), I speak with several GSB alums who are leading the evolution of this industry. You might be surprised by their sense of purpose. “It’s the hardest thing I’ve ever done,” Kim Sanchez Rael, MBA ’91, told me. “But it’s the most fun thing I’ve ever done because it’s so hard.”

If you’re looking for a fun challenge, here’s a listening recommendation: *If/Then*, a newly launched GSB podcast that digs into the amazing array of research produced here. This issue features a sampling of ideas from the show’s first season (page 40), including Mohammad Akbarpour discussing the economics of Taylor Swift tickets and Bill Barnett explaining the fine line between genius and foolishness.

Research is also the focus of our cover story (page 32). For nearly a century, the A/B test has been the go-to for everything from middle-school science projects to vaccine development. The digital era revealed that these tests needed an upgrade. That’s where the GSB comes in: It’s become a hub for professors who are pioneering new kinds of experiments — a synergy that’s anything but incidental. “It’s not an accident that we’re all here,” says Professor Susan Athey.

And speaking of experiments, in this issue we’re launching a new feature that we call Footnote. It’s inspired by the imprint of a running shoe belonging to Phil Knight, MBA ’62, that greets visitors to the GSB (left) along with his encouragement to choose the “fun” of walking “straight ahead into uncertainty.” An image of that footprint is hidden somewhere in these pages. If you spot it, send us an email noting where you found it. We’ll send some GSB swag to three keen-eyed readers — selected randomly, of course.

— Dave Gilson

Stanford Business

What We've Learned Lately



**Experts. Insights. Know-How.
Delivered straight to your phone.**

Subscribe to our biweekly newsletter for the latest takeaways from Stanford GSB researchers.

ON CAMPUS

Making an Entrance



There are many ways to enter the Knight Management Center, but none is as iconic as the main pathway that comes off Serra Street and leads into Town Square. In her opening illustration (right), Manshen Lo evokes the palette and perspective that draw in those in search of answers – or just an Instaworthy backdrop.



ABOUT THE COVER

For our story on A/B testing, we ran a split test of sorts, asking two artists to design two images for our cover. The result: Fien Jorissen and Franz Lang's playful collaboration, which continues on page 32.

EDITORIAL

EDITOR **Dave Gilson**
CREATIVE DIRECTOR **Tricia Seibold**
SENIOR EDITOR **Kevin Cool**
DIRECTOR OF CONTENT & DESIGN **Sorel Denholtz**
OPERATIONS **Elizabeth Wyleczuk-Stern**
CLASS NOTES EDITOR **Gabrielle Karamelas**
ASSOCIATE EDITOR **Jenny Luna**
EDITORIAL ASSISTANT **Audrey Kim**
COPY EDITORS **Noelia Arteaga, Heidi Beck, Kate Kimelman, Jonathan Mindes, Malinda Petersen, Pat Truman**

ART

ART DIRECTION & DESIGN **Point Five**
CLASS NOTES LAYOUT **Jill Kadlec**
DIGITAL DESIGN **Cory Hall**

PRODUCTION

PREPRESS & PRINTING **Allied Printing**
DIGITAL MAGAZINE OPERATIONS **Ali Enthoven, Shannon Fries, Elizabeth Wyleczuk-Stern**

We also acknowledge and thank our contributors, including colleagues at Stanford GSB, writers, photographers, illustrators, and class secretaries.

Stanford Business magazine (ISSN 1094-5423) is published twice annually by Stanford Graduate School of Business.

Copyright by the Board of Trustees of Leland Stanford Junior University. All rights reserved. Volume 92, Number 1. Printed in the United States.

Contact us:

For address changes and other information, email stanfordbusiness@stanford.edu, or write to *Stanford Business* magazine, 655 Knight Way, Stanford, CA 94305-7298.

Follow us:


@StanfordGSB



Read online:
stanford.io/magazine

Back to Class¹⁰ Panelists¹¹ Recognition¹²
 Hard Lesson¹² How To¹³ Office Artifact¹⁴ Catalyst¹⁵
 Class Takeaways¹⁶ After Hours¹⁷ Career Advice¹⁷ Maker¹⁸

Briefings



BACK TO CLASS

The Kids Are Alright

The Pathfinder program opens the GSB to Stanford undergraduates for the first time.

On a recent afternoon, Darrell Duffie handed the reins of America's monetary infrastructure to Generation Z. "If you were a policymaker and you had to set the course of the future of the U.S. payment system, what kind of money would you use?" the finance professor asked the 35 undergraduates seated inside a GSB lecture hall. "You can't give a wrong answer," he assured them. "These are ideas for policy options."

His reassurance was unnecessary. The students jumped right in, confidently discussing the pros and cons of dollar-backed stablecoins, blockchain-based payment systems, and federally issued digital currency.

This sophisticated discussion kicked off the third week of *The Future of Money and Payments*, one of the first undergrad-level courses ever taught at the GSB. It's part of Pathfinder, a pilot program offering classes to juniors, seniors, and undergraduates in coterminal master's programs.

Stanford does not offer an undergraduate business major, and

Darrell Duffie (left) and Joseph Piotroski (right) teach undergraduates in their Pathfinder classes.

COURSE NAMES

BUSGEN 100: Triple Bottom Line: Managing Sustainable Value Creation
BUSGEN 102: The Future of Money and Payments

INSTRUCTORS

Joseph Piotroski
 Darrell Duffie

Pathfinder isn't meant as a substitute. Instead, explains Jesper Sørensen, the GSB's senior associate dean for academic affairs, the goal is to help students with a wide array of academic and professional interests "prepare themselves for what stands at the other side of graduation day."

"That's where the name Pathfinder came from," he says. "The idea is to help students explore the world of organizations and markets and management so that they have a clear sense of where it is they might want to go." The concept originated with Dean Jonathan Levin, who was "very interested in trying to find ways to create more connections between the business school and the rest of the university."

The program launched last fall with two courses taught by former GSB dean Garth Saloner and finance professor Anat Admati. Ayesha Dhall, a senior majoring

LISTEN

Five Common Finance Mistakes. Shareholder vs. Stakeholder Capitalism. Why Good Stocks Are Not Good Buys. Those are a few of the recent topics discussed on *All Else Equal*, a podcast where finance professors Jonathan Berk (GSB) and Jules van Binsbergen (The Wharton School) explore the science and strategy of better decision-making. Listen at stanford.io/all-else-equal.

in symbolic systems, says the “GSB-style” discussions in Saloner’s course were “a breath of fresh air in comparison to the large undergrad lectures I usually take.” The experience helped her envision her next step: “I realized through this class that success — whether in entrepreneurship or careers in general — is not a straight path from A to B.”

While Pathfinder students may not be as well versed in the workings of the business or financial world as MBA students, Duffie says this is not a disadvantage. “They’re learning content and ideas from a fresh start. And so the pace of learning is fast. That’s very rewarding as a teacher.”

Professor of accounting Joseph Piotroski taught the winter quarter’s other Pathfinder course, *Triple Bottom Line: Managing Sustainable Value Creation*. Like Duffie, he didn’t water down his curriculum. “Obviously, I need to make sure that basic concepts and first principles are well understood. With that said, these are Stanford undergrads,” he says. “They’re as sharp as they come.”

In a recent class, Piotroski led students through the finer points of decomposing corporate performance, illustrated with real data from Prada, The Gap, and a Botswanan supermarket chain. His course culminated with teams doing a complete analysis of a company of their choice and then offering strategic recommendations on its financial, environmental, and social performance.

Pathfinder will return in the fall with more courses and sessions designed to draw in students from all corners of campus. “Our hope is that the appeal of Pathfinder will broaden,” Sørensen says.

It already seems to have connected with its participants’ sense of purpose. “It is heartening to see a group of people who want to make the world a better place,” Piotroski says of his students. “At the end of the day, they’ll have a toolkit that they can apply.”

— Dave Gilson

PANELISTS

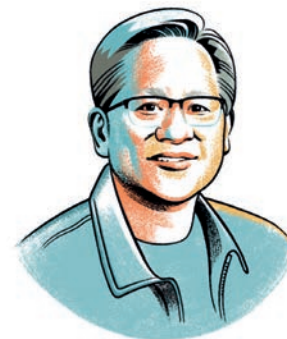
Tech Execs Talk About Change, Content, and Clean Dishes

Voices from the 2023–24 season of View From the Top



“Every time there’s been a big disruption like this, there’s a period of transition. But on the other side of that transition is also a new ecosystem where new jobs are created and where societies move up.... And the thing with autonomous vehicles and the industry at large is the transition actually is much slower than everybody anticipated.”

— Aicha Evans, CEO of Zoox



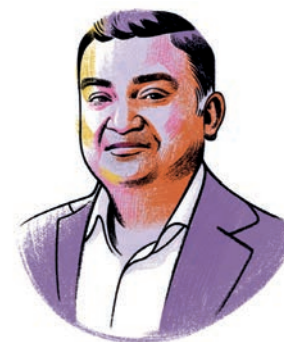
“I was probably Denny’s best dishwasher. I planned my work, I was organized, I was *mise en place*. And then I washed the living daylight out of the dishes and then they promoted me to busboy.... Anyways, eventually I became a CEO. I’m still working on being a good CEO.”

— Jensen Huang, MS Engineering '92, founder and CEO of Nvidia



“I actually think the worst thing you can do is close down the conversation. In a lot of platforms, they move to moderation, removing content. I’m really trying to nudge people to say, ‘Here’s how we can have those tough conversations,’ but have them in a way where maybe we’re more open to listening.”

— Sarah Friar, MBA '00, CEO of Nextdoor



“What is the secret sauce of being a successful creator on the platform? It really is to be true to yourself. And that sounds sort of very cliché, but I wish somebody had given me that advice early in my career because nothing rings more true. And I can tell you for a fact that it’s not the algorithm.”

— Neal Mohan, MBA '05, CEO of YouTube

CHRISTIAN FOWLE

SEEN AND HEARD

“The recent data do not, however, materially change the overall picture, which continues to be one of solid growth, a strong but rebalancing labor market, and inflation moving down toward 2% on a sometimes bumpy path.”

— Jerome Powell, chair of the Board of Directors of the Federal Reserve System, speaking at the Business, Government & Society Forum held at the GSB on April 3. Watch his remarks and conversation with finance professor Arvind Krishnamurthy at stanford.io/powell.

RECOGNITION



Jennifer Aaker, PhD '95, the General Atlantic Professor, received the Paul D. Converse Award from the American Marketing Association.

The Stanford Governor's Award was given to **Jeffrey Barnett**, MBA '95, **Jonathan Garfinkel**, MBA '05, **Russ Hill**, MBA '70, **David Mount**, MBA '08, and **David Yoon**, MBA '00.

Mary Barra, MBA '90, received the Ernest C. Arbuckle Award for excellence in management leadership.

Cynthia Cardona, MBA '04, received the Porras Latino Leadership Award.

Michelle Landrey Cline, MBA '98, and **Phil Pompa**, MBA '82, received the Stanford Medal.

Francis Flynn, the Paul E. Holden Professor of Organizational Behavior, received the 2023 Robert K. Jaedicke Faculty Award for his service to GSB alumni.

Debra Gore-Mann, MBA '87, received the Tapestry Award, honoring a Black GSB alum for inspirational leadership and service to others.

The Degree of Uncommon Citizen Award, Stanford's highest honor for volunteer service, was presented to **Phil Knight**, MBA '62.

Hal Louchheim, MBA '64, received the John W. Gardner Lifetime Service Award.

The Japanese Economic Association gave **Takuo Sugaya**, associate professor of economics, its Nakahara Prize.

Zakary Tormala, the Laurence W. Lane Professor of Behavioral Science and Marketing, received the Distinguished Scientific Contribution Award from the Society for Consumer Psychology.

HARD LESSON

A Friend's Insight Changed My Life

An overdue diagnosis helped Ronan McGovern, MS '96, understand himself – and his purpose.

It was late April 1996. My brilliant classmate, Dr. Ina Bendis, MS '96, pulled me aside and asked if we could have a chat. We stood under an imposing cedar tree on the outer corner of the Quad near the business school.

"Ronan," Ina started, "I've been observing you for some time in class and I think you might have ADHD. Have you heard that term before?"

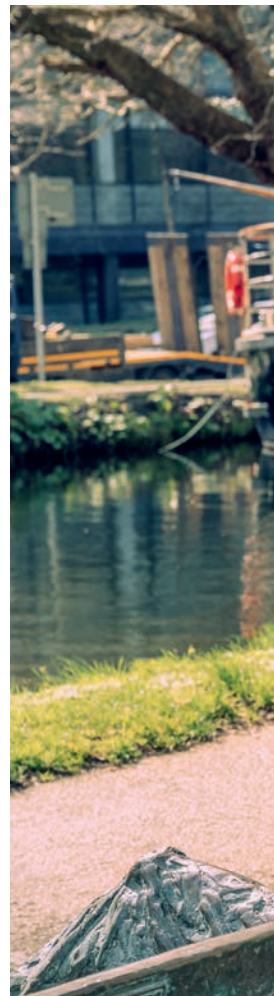
I had no idea what she meant. "No," I blurted out. "What's that?"

"It stands for attention deficit hyperactivity disorder. Basically, your mind has a greater processing power than most people's, but you have a harder time keeping it in check."

I didn't know what to say, but something began to fall into place. Looking back now, it seems so obvious. At home and school, I was giddy, impulsive, and always in trouble. As my father recalled, I'd been "a disturber of the peace." I can't tell you how many times my name was connected to phrases such as *You should have paid more attention. He struggles with attention.*

The factor most commonly associated with ADHD, of course, is lack of attention. This aspect manifests itself in occasionally contradictory ways. Early in my career, I would hyperfocus, full of anxiety that I might not deliver a good outcome, and spend hours on a project, forgetting to eat, change my clothes, or sleep. When a professor at the GSB asked a question or asked for comments, I often would raise my hand at shoulder-disjointing speed and patter out a series of remarks which, to the general observer, would have seemed loosely related at best.

Following Ina's astute observation, I underwent a series of tests. The day the report arrived, I opened the manila envelope with trembling hands. The summary was undramatic and full of dry technical phrases. It was helpful to learn about my condition from the neutral perspective of a medical evaluation: *Ronan exhibited numerous fidgety behaviors, such as shaking his leg. When asked questions, Ronan looked off to the side to enhance his attention and minimize distractibility.* It didn't feel like a judgment, in the way that my report cards or employee examinations had; it was just like a systems engineering assessment.



SERGIO MEMBRILLAS

BY THE NUMBERS

Executive Functions

1952

Year that Stanford GSB launched the Stanford Executive Program (SEP) to accelerate senior-level leaders' professional and personal growth

120

Executive Education programs ran during the 2022–23 academic year.

6,540

people took part in an Executive Education program in 2022–23.

109

countries were represented by participants.





RONAN McGOVERN, MS '96

is a strategy manager, real estate, at Allied Irish Banks. He is writing a memoir, *Twice Exceptional*.

I was lucky to get a diagnosis of ADHD at the age of 35. That might seem quite late, but even today, despite significant breakthroughs, diagnosis and treatment are slow and difficult. It came at an important time. I was one month from graduating and was trying to figure out my next step. My diagnosis helped ground the emotions that were impeding my ability to make decisions.

The poet Mary Oliver said, “Things take the time they take.” Thanks to a classmate’s insightfulness, I have been able to discover and follow my purpose in life — bringing awareness of the strengths and struggles of neurodivergent people to organizations and corporations and working to make these environments more inclusive for everyone.

STEPHEN ST BRADLEY; SERGIO MEMBRILLAS



HOW TO

Why VCs Just Say No

Venture capitalists are deluged with hundreds, even thousands, of pitches. So how do they pick great deals out of the pile? For a start, they get very good at saying no. They know exactly what will cause them to reject an idea without hesitation and move on without regret. As GSB finance professor Ilya Strebulaev and Alex Dang, MS '14, explain in their new book *The Venture Mindset*:

How to Make Smarter Bets and Achieve Extraordinary Growth, “‘Reject’ is a keyword and a distinct feature of the VC mindset, for VCs start by looking not for a compelling reason to invest, but for a way out.”

That might seem counterintuitive — aren’t VCs laser-focused on finding promising ideas? Yes, and that’s why they know the red flags and critical flaws they’re looking for. Early in their selection process, they quickly screen ideas and clear out any that don’t click. That gives them more time to spend with ideas they’re really interested in. “Sometimes it’s better to speed up the decision process and find efficient ways to say no early so that you can evaluate more ideas rapidly,” Strebulaev and Dang write.

To see this approach in action, look no further than *Shark Tank*. Watching the show closely, Strebulaev and Dang observed that the “sharks” fire questions at the contestants until the moment they hear something that scares them off. “If you analyze their responses carefully, you realize that when each one identifies a factor that they believe to be a ‘critical flaw,’ they immediately lose interest.”

Not sure how you’d adopt a “fast rejection mindset”? You’ve probably already used it when confronted with too many options. As Strebulaev and Dang note, we’re pretty good at making snappy choices when scrolling through restaurant reviews or scanning shopping sites. With practice, you can learn to apply this mindset to situations with bigger risks and bigger potential payoffs. “Being selective and systematically rejecting most of the opportunities that come your way is not a privilege limited to venture investors,” they write, “but a skill that anyone can master.” — *Dave Gilson*

Read an interview with Strebulaev and Dang at stanford.io/vc-mindset.

44

industries were represented by participants.

49%

of participants in the 2023 SEP full-time cohort held C-suite or related titles.

7

of the 7 GSB academic areas are represented by faculty who teach in Executive Education.

2001

Year that award-winning chef Raul Lacara joined the Executive Education team

3,000+

meals are prepared annually by Chef Raul and his crew.

OFFICE ARTIFACT

Chenzi Xu's Civil War bond advertisement

Chenzi Xu is an assistant professor of finance at Stanford GSB.

My view of the importance of history is twofold: One is that sometimes we just don't have enough data points. Big events only happen every now and then. And so you have to turn to history to validate your models of the world.

The other is that there's a lot of path dependence in the world. Economies don't transition very quickly from one regime to another. To understand the way the world is today, you necessarily have to know a bit about where it came from because things that happened in the past have such a long legacy.

When I went to graduate school, I was very interested in understanding how countries funded themselves over long periods and how sovereign

bond markets developed and operated. I wrote a paper about the U.S. banking and financial system during the Civil War and how it was created hand in hand with federal debt.

This ad is basically like an FAQ – frequently asked questions about one of the largest and most successful U.S. federal debt issuances in the 19th century. During the Civil War, the North had to fund itself, and it did so by offering these bonds. One was called the 7-30 because it was a 7% bond – which is a fairly high yield – that would be repaid in 30 years max.

The ad is half nationalistic propaganda and half educational. Most of the population wasn't really familiar with how bonds worked and the risk

associated with them. So the U.S. government had to go out there and be like, "Let us educate you on what a bond is and why lending to the government makes sense and is actually a really good way to invest your money during this uncertain time."

It was very successful, in part due to Jay Cooke. Today, any sovereign country that is trying to borrow usually does it through a big bank. Cooke was the banker-financier who did this for the U.S. government. He would ride the trains all around the country and hand out these flyers and make a big pitch for why you should invest in these bonds. The first time he did this, bonds sold out very quickly.

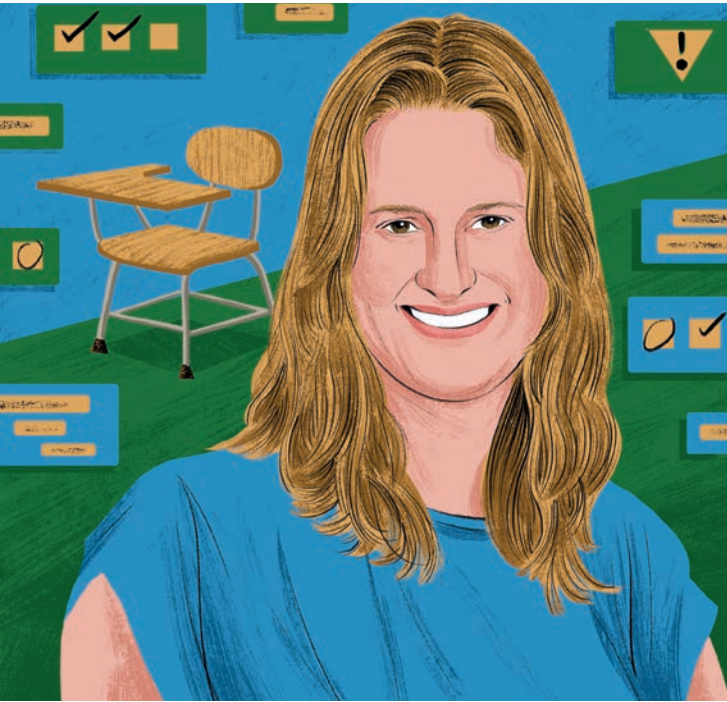
Cooke would continue to be one of the most important

banker-financiers in the U.S., but in the early 1870s, he invested heavily in what was supposed to be the second transcontinental railroad. The railroad went bankrupt, and his firm also went bankrupt, and this triggered a major wave of bank failures and the largest financial crisis in the U.S. until the Great Depression.

Many issues in finance come up over and over. We're constantly trying to basically make alchemy – generating a really safe asset that will pay off even when the underlying income streams might not be that safe. That's basically how we got into the 2008 financial crisis and how we ended up with the recent bank runs. You see it over and over in the past as well.

– Told to Dave Gilson





CATALYST

Emily Bailard, MBA '09

THE PROBLEM

Absentee rates among K-12 students are soaring.

THE PLAN

Promote attendance with nudges and support for parents.

Even when children are chronically absent — missing 10% of school days — parents assume their attendance is better than their peers'. That delusion is simply human nature, says Emily Bailard, MBA '09, CEO of EveryDay Labs. "We all think we're better than average, and we have zero context because we never have conversations with friends about attendance. We have no idea what's normal."

For too many children and teens, lackluster attendance is the norm. Absences have surged post-pandemic and remain high, with as many as a third of kindergarten through 12th grade learners missing 1 out of every 10 school days. Students who are regularly absent typically lag in reading and math, score worse on tests, and have lower graduation rates. In states where attendance rates affect funding, chronic absenteeism can mean less revenue for districts. Kids miss school for a variety of reasons, including food and housing insecurity, academic struggles, and parents' mistaken belief that being absent a few days a month doesn't affect learning.

EveryDay Labs combats absenteeism with software that deploys a blend of behavioral science and data analytics to prompt parents to make attendance a priority. They receive routine "nudges," including personalized texts, snail-mail reminders, easy-to-read attendance charts, access to 24/7 chatbots with links to resources such as transportation access, and phone

calls from the company's family support team. For many moms and dads, those communications are a wake-up call: 43% say they didn't realize their child's attendance was an issue until they began receiving truancy notices. "Parents are driving attendance," Bailard says, "and when parent behavior changes, attendance improves."

Attendance rates typically tick up about two months after districts begin using EveryDay Labs' software suite. Multiple randomized controlled trials in 14 districts showed it reduced chronic absenteeism by 11% to 15%, Bailard says — a success rate that helped clinch her decision to join the company. EveryDay Labs serves more than a million students in over 40 school districts, including Atlanta, Cleveland, Dallas, Portland, San Francisco, and Wichita. They pay EveryDay Labs \$5 to \$10 per student per year, and the company says its annual revenue has tripled since 2019.

Todd Rogers, a professor of public policy at Harvard's Kennedy School, launched EveryDay Labs in 2015 to apply his research in behavioral science and data analytics on a larger scale. He and University of California, Berkeley, public policy researcher Avi Feller reported encouraging results when they studied young learners in 10 San Mateo County school districts. The "light-touch, low-cost intervention" attendance updates they sent to parents reduced absences in grades K-5 by 8% and chronic absences by 15%. That success was the catalyst for EveryDay Labs.

Bailard became CEO in 2018 after spending three years as a leader of the Social Entrepreneurship Program at Stanford GSB's Center for Social Innovation. Before that, she held management roles at Opower, which prompts utility customers to cut their energy usage by comparing their energy consumption with their neighbors. Bailard says that experience proved more helpful than an education degree or school administration experience. "If I had an education background, I might have thought that certain things were impossible," she says. "It's been kind of liberating and freeing that I don't know the 'typical' way of doing it. In some ways, it's been a benefit, but the flip side, too, is I've leaned heavily on learning from a sales perspective on CEOs of other ed-tech companies" as well as GSB classmates with startup expertise.

About 20% of U.S. students live in a state where school funding is based on attendance, so school districts have a financial incentive to improve that metric. But turning school districts into customers can be challenging because of a long sales cycle, high turnover in district purchasing and decision-making roles, and the steep cost of making those sales, Bailard says. The potential market, however, is huge. EveryDay Labs counts 15% of the top 100 U.S. school districts as customers. It estimates that adding 7,400 more districts — all but the smallest — would boost annual recurring revenue to about \$1.6 billion.

Since raising an \$8 million Series A round in 2021, EveryDay Labs is positioned to transform from a services company to a full-fledged tech company. Bailard will steer the operation as it looks to apply behavioral science and family engagement practices to areas beyond attendance. One promising application may be improving schools' notoriously obtuse communications to parents, a potential market of \$2.1 billion, she says.

EveryDay Labs already has the trust of school administrators seeking remedies for high absenteeism, an unwelcome legacy of the pandemic. The percentage of chronically absent students has nearly doubled from the prepandemic rate of about 15%, according to the nonprofit group Attendance Works. In 30 California school districts, the rate of chronic absenteeism surged to 22% over the past two school years from 9% in 2020-21. Bailard estimates it will take a decade to return absentee rates to pre-pandemic levels. Pandemic-era safety nets that bolstered attendance, such as free healthcare, have vanished, and attendance norms have changed. Parents are more likely to keep kids home when they have minor cold symptoms and are more comfortable ditching school for family trips.

Changing behavior doesn't happen overnight, but if moms and dads can make sure their kids are at their desks daily, those learners will have a better chance of keeping pace with classmates and ultimately receiving high school diplomas. "It's really hard to know how to support your child's success in school," Bailard says. "We're giving parents a straightforward way to do that: by helping your child attend every day."

— June D. Bell

CHLOE CUSHMAN

CLASS TAKEAWAYS

Negotiation Without Threats or Losers

From the conference room to the kitchen and everywhere in between, negotiations are everywhere. “Even though negotiations are pervasive, research shows that we often leave value at the table,” says professor of organizational behavior Michele Gelfand. In *Negotiations*, Gelfand teaches students how to get beyond the view of negotiation as a competition and move toward strategies for collaborative dealmaking where everybody wins. Here are five takeaways from her course — “one of my favorite classes to teach at the GSB”:

1. Know thyself and the other: “Preparation is a vital part of the negotiation process, yet many people fail to properly analyze their own and others’ perspectives prior to discussions,” Gelfand says. Before you begin, she recommends thinking about your own and your partner’s interests, goals, and alternatives, as well as strengths and weaknesses.

2. Mind your metaphors: Are you approaching the negotiation as a game, a battle, a dance, or a puzzle? “We’re often completely unaware of the metaphors guiding us at the negotiation table,” Gelfand says. Coming up with a “shared metaphor” to guide the process can lead to a better outcome.

3. Beware of fixed perceptions: “Negotiators often assume that their interests are diametrically opposed to their counterparts’,” Gelfand says. Yet many negotiations aren’t win-lose. Instead, look for “integrative” solutions where everyone gets something they want. “The best negotiators are very creative.”

4. Limit the use of power and threats: Falling back on threats and appeals to

rights shifts the focus away from your underlying interests. “Disputes or rejected claims are inevitable, but there is a way to manage them effectively,” Gelfand says. “Always aim at getting back to your interests, even in the face of threats and power strategies.”

5. Cultivate cultural intelligence:

“People often assume that what works in their own culture works everywhere,”

Gelfand says. However, cultural intelligence is critical to negotiating across boundaries and managing global teams. “If you cultivate cultural intelligence, the desire and ability to interact across cultures, you’ll be in a much better position to develop high-quality agreements anywhere around the world.”

Go to stanford.io/negotiations to watch a video of this Class Takeaways.



MARIA HERGUETA

SEEN AND HEARD

“I think that the classic version of ‘homo economicus’ has got to evolve into somebody who... cares about other people.”

— David M. Kreps, the Adams Distinguished Professor of Management, Emeritus, at an eponymous symposium last November.

AFTER HOURS

A Slice of Cutting-Edge Research – Hold the Formality

Students eat up faculty findings (and pizza) at Insights and Bites.

Launched last fall, Insights and Bites offers one-hour evening sessions where GSB faculty discuss recent research, take questions, and join students for a few bites of pizza in an informal setting. The impetus for the pilot program, says Senior Associate Dean for Academic Affairs Amit Seru, was the recognition that many MBA students are eager to learn more about professors' cutting-edge research, but are exposed to a small fraction of it in their courses. "Faculty often don't get the opportunity to talk about their current research in the classroom," he says. "These evenings offer live interaction around a particular topic."

Nearly 300 students attended the first six sessions, where two or three faculty presented. The menu included Nobel Prize-winning economist Guido Imbens discussing experiment design; accounting professor Rebecca Lester talking about corporate taxes; and marketing professor Jonathan Levav presenting findings on remote work and innovation (read more about his work on page 46).

Political economy professor Neil Malhotra spoke about a study that found Facebook and Instagram did not increase political polarization, contrary to popular belief. Economics professor Susan Athey, currently the chief economist for the United States Department of Justice, used her session to address the social effects of technology and the impact of policy interventions (read more about her and Imbens' work on page 32). Seru and fellow finance professors Peter DeMarzo and Arvind Krishnamurthy discussed the collapse of Silicon Valley Bank and their research into worrisome long-term issues in the U.S. banking system.

Seru thinks the sessions' informality led to a comfortable rapport and promoted robust discussion. "Faculty wanted students to chime in during their presentations, and we saw that happening in every session with several insightful comments from students," he says.

Following more sessions in February and May, Seru hopes the program will expand, with the evening discussions possibly opening up to alums. — *Kevin Cool*

SEEN AND HEARD

"To have a safety culture takes a mindset that every moment is a moment to reinforce safety."

— Patti K. Poppe, MS'05, CEO of Pacific Gas & Electric, at the Business, Government & Society Forum. Watch her session at stanford.io/poppe.



CAREER ADVICE

Think Like a "Friction Fixer"

Emails that drone on and on. Meetings that could have been Slack messages. Memos loaded with empty jar-

gon. We're all familiar with friction, or what Robert I. Sutton and Huggy Rao describe as "forces that make it harder, slower, more complicated, or downright impossible to get things done." In their new book, *The Friction Project: How Smart Leaders Make the Right Things Easier and the Wrong Things Harder*, Sutton (a professor of organizational behavior, by courtesy, at the GSB and professor emeritus of management science and engineering at Stanford) and Rao (a professor of organizational behavior at the GSB) offer a wealth of advice on identifying and removing troublesome friction — while implementing the helpful kind. Here are some tips for aspiring "friction fixers":

Less Is More: We often believe that adding stuff is an improvement. Calling extra meetings might feel productive but may do more harm than good. To combat "addition bias," Sutton and Rao recommend locating subtraction targets. Try "the rule of halves": reduce something (like the length of a meeting) by 50% and only add back what's truly missing.

Value People's Time: The hallmark of great friction fixers is their consideration of other people's time. Sutton shares an example from an unexpected place — the California DMV, where he saw a friendly employee make their way

down a line of 50 people, handing out forms (and pens) so some could finish their business on the spot and others could wrap up their appointments more quickly. Thanks to this helpful friction fixer, Sutton was out of the DMV in half an hour.

Get Rid of Gobbledygook: Overly complex lingo can be confusing. Take the management framework Holacracy, which is full of lines like this: "A Role may link into another Circle if a Policy of that other Circle or any Super-Circle thereof invites it." To avoid "the hazards of convoluted crap," Sutton and Rao suggest speaking or writing in concrete terms, incorporating sensory metaphors, and using the present tense.

Slow Down: Some friction is good. In particular, generating great ideas can't be rushed. "To do creative work right, teams need to slow down, struggle, and develop a lot of bad ideas to find a rare good one," Sutton and Rao write. After launching a new project, take a moment for some "imaginary time travel." Generate "preictorems" in which your team sketches out the story of its future success and "premortems" in which you speculate about massive failure.

Everyone Can Fix Friction: Friction elimination is both top-down and bottom-up. Hawaii Pacific Health's Getting Rid of Stupid Stuff (GROSS) campaign was driven by doctors and nurses who flagged tasks that cut into their time with patients — like a mouse click that was sucking up 1,700 hours of nurses' time every month. While senior executives may initiate systemic change, every member of an organization can contribute to friction fixing.

— *Audrey Kim*

ON THE RECORD

The basic principles of pressing a record have stayed the same for well over 100 years. There's a little more automation than you would've seen 50 years ago. We have almost 60 machines. Two-thirds are old presses that were manufactured in the '60s and the '70s. If you can maintain the "technology" that powers them, you can get a lot of life out of them. It's somewhat art, somewhat science; everything's not plug-and-play.

IN THE GROOVE

Once the record press is set up, you heat up the vinyl compound that you use to make the record. It becomes like a hockey puck or a biscuit. The press grabs the labels and the hot biscuit, and moves them to the center of the press, where it'll smush it all together so that all the grooves get filled out. Then you blast it with cold water to allow the record to set and firm up.

HIT FACTORY

Back in the '60s, United was pressing a lot of records for Motown. They built a plant with an apartment specifically for the Motown artists who wanted to come down and see their records being manufactured. We stayed there until 2017. We were just bursting at the seams, so we bought a building six times the size. This one's 150,000 square feet.

COLOR ME IMPRESSED

We probably do two-thirds black records and one-third color records. It's not as hard to make a color record as it used to be. The colors today are terrific. A lot of artists want to do a custom color. They like swirls and they like splatters. We make a split-color record where we combine two extruders to make a puck that's half red and half green — or whatever they want.



20

SPIN CYCLE

Expanding required not only bringing in more record presses but also building out a lot of infrastructure: huge boilers that produce steam that melts the vinyl compound, a massive water system pumping tons of water to the presses, cooling towers that bring the water temperature down and recycle it, and a compressed air system that enables the pneumatics to grab record labels.

22

TAYLOR-MADE

On any given day, there are maybe 30 different releases on the presses. If one of them happens to be a new Adele or Taylor Swift release, that's going to run for a long time — days or weeks. If it's a band that's just starting out in a garage, that record will probably run for the morning.

MAKER**United Record Pressing**

Mark Michaels, MBA '87

UNITED RECORD PRESSING is the oldest vinyl record-pressing plant in the world and the largest in North America. We celebrated our 75th anniversary in February.

URP has always been in Nashville. Its history is so unique and it's something we really celebrate. Over the years, it has pressed thousands of really important records. It pressed the first Beatles single in America and most of the Motown records during the '60s and '70s.

I bought the company in 2007. I've got an enormous passion for music, so that was a happy coincidence. But that wasn't why I bought it. I thought it was a good deal and I wanted to build a small, niche business. I didn't think vinyl was going to go away, but I didn't think it was going to have the explosive growth that it has had over the past decade.

The low-water mark for vinyl was probably 2007 or 2008. The market was just the hardcore audiophile collectors. There was a whole generation of people that had grown up on only digital music, so they never had the experience of opening a record and looking at it, smelling it, reading the liner notes, and dropping a needle in the groove. When artists got behind vinyl again and started doing really interesting, creative things with the format, that resonated with this segment of the market. If you really love music and you love the art, you want to engage with it.

The market picked up momentum in 2009 and 2010, and that carried on for the next seven or eight years. You had lots of demand, but the industry had limited ability to supply it. As vinyl really started to go crazy in 2020 and 2021, our customers asked us, "Can you expand more?" Now we're making around 40,000 records a day. We made a little over 10 million records last year and we should exceed that this year.

This business just sucked me in and I fell in love with it. Even in the darkest days of trying to figure out how you're going to make all this work, you look around and say, "You know, I'm pressing Miles Davis' *Kind of Blue* right now. This may not be an easy day, but it's not that bad."

— Told to Dave Gilson

MARIA HERGUETA (ILLUSTRATION)



Mark Michaels, MBA '87, is the CEO and chairman of United Record Pressing.

Photo by Abigail Bobo

Insights

BULL MARKETS

Pensions Are Mixing Risky Bets with Sunny Predictions

An analysis of U.S. public pensions questions their managers' financial optimism.

BY LEE SIMMONS

More than 20 million Americans are covered by state and local government pensions. Unlike 401(k) plans in the private sector, these “defined benefit” plans promise to pay retirees a set amount of money every month for the rest of their lives.

For most public workers, these generous programs are a cornerstone of their financial security; for many, they're one of the main attractions of government jobs. Yet the plans, by their own reckoning, are underfunded to the tune of \$1.6 trillion.

That shortfall would leave them 75% funded, which may not sound too dire. But that figure vastly understates the issue, says Joshua Rauh, a GSB finance professor who leads the Hoover Institution's State and Local Governance Initiative. Rauh estimates that unfunded pension liabilities — the gap between promised benefits and the assets set aside to pay for them — are actually closer to

\$5.1 trillion, which translates to an overall funding ratio of less than 50%.

The problem, he says, is that future pension obligations are being grossly undervalued — and the discrepancies are adding up. With Oliver Giesecke, a research fellow at the Hoover Institution, Rauh gathered data on the pensions in every state, as well as the biggest cities and counties in the U.S. Over the nine-year span of their study, unfunded liabilities grew by 50%, even as stocks surged and state and local budgets contributed more to pension plans. Meanwhile, fund managers chased higher returns by investing in riskier assets like real estate, private equity, and hedge funds.

That combination of a huge funding gap and growing risk exposure should raise alarms about the long-term viability of these plans, Rauh says. “The current system is not sustainable, and state and local governments are not being candid with their employees or taxpayers about it.”



JOSHUA D. RAUH

is the Ormond Family Professor of Finance at Stanford GSB.



Checking the Math

“When a state government promises to pay its workers a pension after they retire, it’s essentially incurring a debt on which future payments must be made,” Rauh explains. Those payments will be drawn from investments made today. Assuming those assets will appreciate over time, that means current contributions can be less than the dollar amount of the future promise. But how much less?

To determine that, administrators discount the future sum by a percentage reflecting the rate of return they expect to earn on that money in the meantime. The higher the discount rate, the smaller the present value of the liability on the books, and the less they need to sock away.

As you might expect, cash-strapped states and municipalities are inclined to optimism. In 2022, the average discount rate used by funds was 6.7%. That choice was based on recent investment results, but it reflected yields on risky assets during a market boom — which are anything but certain over the long term. (The actual return on fund assets that year was negative 3.2%.)

Pension obligations, on the other hand, are effectively ironclad commitments — often guaranteed by law and almost certainly by political considerations. “It’s a total mismatch,” Rauh says. “You have risky assets backing up risk-free liabilities.”

The current system ignores that disconnect. “Those high-targeted returns may or may not be achieved in any year, but public sector accounting and budgeting proceed under the assumption that they will be achieved with certainty,” Rauh says.

To be sure of having enough money to pay retirees, funds would have to stick to risk-free securities like U.S. Treasury bonds, which averaged just 2.1% over the past decade. That doesn’t mean they should, Rauh says. (They’d be worse off if they’d missed the recent stock market boom.) But that low, default-free 2.1% rate

is what markets would use to measure the true value of future pension obligations, say Rauh and Giesecke.

Applying market-value funding ratios shows that Wisconsin’s pension plan was 74% funded in 2022. At the other end of the list, New Jersey’s plan was just 29% funded. The nation’s biggest public pension fund, California’s CalPERS, had a market-value funding ratio of around 48% — significantly below the 77% it reported.

“The method used by public pension systems makes no sense,” Rauh says. “It’s just basic finance: The present value of a stream of payments is determined by the risk properties of those payments. It has nothing to do with the assets used to back them.”

Rose-Colored Assets

Pension sponsors say none of this will matter if their asset portfolios hit their targets — as they often have. “And if not?” Rauh asks. “I don’t think people realize their governments are gambling on endless bull markets, and those bets are being underwritten by taxpayers.”

The data shows that public pensions have increased their risk exposure over the past 30 years, investing not just in stocks but also more speculative assets like private equity. And those with lower funding ratios, in particular, were more aggressive in their investments. More risk means higher expected returns. And since funds use target returns to discount their liabilities, that higher discount rate makes their balance sheet look healthier, even if the assets underperform.

This accounting creates a false picture of the cost of public employment, Rauh says. “You’re paying employees a salary, but you’re also accruing new pension

obligations each year, which is essentially deferred compensation. Aggressive discounting makes that deferred amount look smaller.” It also gives the impression that governments are contributing enough to pension funds. That’s pretty remarkable, considering that annual pension contributions as a percentage of government payroll have increased from 22% to 28% in the past decade.

With proper discounting, even those contributions fall short of the true cost in every single state, the researchers found. “Really, they should be putting in much more, closer to around 40% of payroll, to keep these plans solvent,” Rauh says.

By using an inappropriate discount rate, public employers have obscured their real long-term costs. “That’s enabled politicians to kick the can down the road for a long time, and that tab will ultimately have to be paid by future generations,” Rauh says. “Without reform, state and local governments will increasingly have to draw on tax revenue to meet their obligations, crowding out spending on things like education and public safety.”

Yet that future isn’t inevitable. States and cities could move to defined contribution plans similar to those offered by private employers. Rauh and Giesecke recently surveyed more than 7,500 public employees and found them surprisingly receptive to this model. Nearly 90% said they’d be willing to switch to a 401(k)-type plan under some circumstances. More than half said an employer contribution of 10% of their salary would be sufficient.

“Public-sector workers care about good government like anyone else. And they know a fiscal collapse is not in their interest as citizens or employees,” Rauh says. “Moving to a system that preserves benefits *and* stabilizes public finances would make their own futures more secure.” **GSB**

“I don’t think people realize their governments are gambling on endless bull markets, and those bets are being underwritten by taxpayers.”

PERSONAL VALUES

How Much Is Your Favorite App Worth to You?

A new way of calculating GDP includes the trillions in uncounted value generated by free platforms.

BY KATIA SAVCHUK

How much would someone have to pay you to stop using Facebook for a month: \$5? \$10? \$100? That's the question Erik Brynjolfsson and his fellow researchers posed to nearly 40,000 Facebook users from 13 countries. It turned out that less than one-fifth would stay away in exchange for five bucks, while more than three-fourths would abstain for \$100.

These findings were part of an experiment designed to shed light on the value of digital goods — the plethora of virtual products that have become a fixture of



NEILSON BARNARD



ERIK BRYNJOLFSSON is a professor (by courtesy) of economics and of operations, information, and technology at Stanford GSB.

daily life, from video streaming platforms to messaging apps and e-commerce sites. Despite the benefits they bring consumers, most digital goods are free. That means they're largely overlooked in calculations of gross domestic product, which, with few exceptions, is based on the price people pay for goods and services.

The limitations of GDP are well documented — the metric ignores the value of everything from antibiotics to clean air to doing your own laundry. Brynjolfsson is among those who say a new, broader set of metrics is needed now that the average American spends almost 24 hours a week online.

“You can't manage what you can't measure,” says Brynjolfsson, a professor (by courtesy) at Stanford GSB and director of the Stanford Digital Economy Lab. “If you don't know where value is being created in the economy, you're going to make bad decisions as policymakers, as executives, and as citizens.”

The experiment, described in a National Bureau of Economic Research working paper, estimated the value of Facebook and nine other digital goods: Twitter (now X), Instagram, WhatsApp, Snapchat, TikTok, Google Search, Google Maps, YouTube, and Amazon Shopping. Brynjolfsson and his coauthors ranked the relative benefit people derived from these sites based on how willing they would be to stop using them for a month.

People preferred Google Search the most — even more than meeting friends in person — followed by YouTube and Google Maps. Twitter and Snapchat were the least preferred services, while Facebook was somewhere in the middle. The researchers used their findings on how much money people would accept to stop using Facebook to extrapolate the dollar value of other products. The study was conducted in partnership with

Meta, the parent company of Facebook, Instagram, and WhatsApp; the company had no veto over published results.

The study concluded that just these 10 digital goods produced more than \$2.5 trillion in value annually, the equivalent of around 6% of total GDP across the 13 countries included in the study. “The magnitude of the effect was striking,” Brynjolfsson says. “It tells me that measuring the value of digital goods is not just a theoretical exercise: This is making a first-order difference in billions of people's lives.”

Beyond the Material World

The research also found that countries with lower GDPs, such as Mexico and Romania — and lower-income people within each country — derived proportionately more value from digital goods than their wealthier counterparts. “At first, I thought that was sort of surprising, but then I realized, if you don't have much money, it makes sense to consume and get a greater benefit from free goods,” Brynjolfsson says. “That means an important implication is that digital goods tend to reduce inequality within countries and between countries.”

In earlier research, Brynjolfsson and his colleagues estimated the value of several digital goods, including Facebook and smartphone cameras. The latest study covered a larger basket of products and included a much bigger sample of people from a broader geography. Next, his team at the Stanford Digital Economy Lab will

undertake a massive study to measure the value of over 800 goods: not only digital products but also more traditional goods and services such as toothpaste, cars, and healthcare. “Even with something like toothpaste, the consumer value may be very different from the price you pay,” Brynjolfsson says.

Brynjolfsson is using this research to help establish a complementary metric to GDP called GDP-B, which measures how much goods contribute to people's welfare, not how much they cost. This spring, the Digital Economy Lab is organizing a workshop with representatives from the U.S. Bureau of Economic Analysis, which tracks GDP, and comparable agencies from other countries to discuss the new framework. “I'm hopeful they'll start adopting GDP-B alongside traditional GDP,” Brynjolfsson says. “Instead of just measuring how much you spend on things, this measures the benefit you're getting from them, which is going to be a more interesting and relevant concept for a lot of purposes.”

A more expansive measure of value could provide a more robust foundation for decisions about everything from R&D funding to economic legislation, Brynjolfsson says. It could also inform measures to curb inequality. “If you want to further reduce income inequality, one tool is improving the nation's digital infrastructure so more people have access to free digital goods,” he says.

As more of our lives shift online, Brynjolfsson believes it will become even more important to account for what we get out of “digital things made of bits” and not just “physical things made of atoms”: “If we don't, eventually we'll be missing almost the whole ballgame.” **GSB**

“Instead of just measuring how much you spend on things, this measures the benefit you're getting from them.”

CRITICAL MATH

Back to the Basics of Personal Finance

Annamaria Lusardi has spent her career uncovering high rates of financial illiteracy — and working to turn them around.

BY KRYSTEN CRAWFORD

Americans aren't good at managing their money — and there are signs that the problem is getting worse.

For two decades, Annamaria Lusardi, a globally recognized expert on personal finance, has been tracking financial literacy rates using three basic questions (see next page). In her latest analysis, just 29% of survey participants in the United States answered all three correctly, while the rest got them wrong or indicated they didn't know the answers.

A little more than half of respondents demonstrated an understanding of how inflation works. About two-thirds could do a simple interest-rate calculation. Only 4 in 10 understood that, when it comes to investment risks, mutual funds are generally safer than a single company's stock.

These results are especially troubling considering how much control Americans have over their finances: Employees shoulder more of their retirement planning and consumers can quickly move money and make investments using their phones. "The world is changing really fast and we just expect people to have the skills to make financial decisions



COURTESY ANNAMARIA LUSARDI



ANNAMARIA LUSARDI
is a professor of finance (by courtesy) at Stanford GSB.

EXTRA CREDIT

The “Big Three” questions have become a standard gauge of financial literacy.

1. Suppose you had \$100 in a savings account and the interest rate was 2% per year. After five years, how much do you think you would have in the account if you left the money to grow?

- a. More than \$102
- b. Exactly \$102
- c. Less than \$102

2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, with the money in this account, would you be able to buy...

- a. More than today?
- b. Exactly the same as today?
- c. Less than today?

3. Do you think the following statement is true or false?

Buying a single company stock usually provides a safer return than a stock mutual fund.

Answers: 1: a. 2: c. 3: False.

that have critical lifelong impacts,” says Lusardi, who joined Stanford last September as a professor of finance (by courtesy) at the GSB and a senior fellow at the Stanford Institute for Economic Policy Research. She is also the director of the Initiative for Financial Decision-Making — a new collaboration between the GSB, SIEPR, and the Department of Economics in the School of Humanities and Sciences.

High rates of financial illiteracy are also problematic, she says, given heightened economic uncertainty and growing wealth inequality. Respondents who were young, less educated, female, or not employed scored the lowest on the survey, and Black and Hispanic respondents’ scores were lower than Asian and white respondents’.

A Global Problem

“Financial illiteracy has been and continues to be a global phenomenon,” Lusardi says. Her latest analysis, coauthored with SIEPR executive director Jialu Streeter, is part of a special edition of the *Journal of Financial Literacy and Wellbeing* that examined financial knowledge in 16 countries, from Finland to Uruguay.

Each study is based on the results of the “Big Three” questions that Lusardi crafted 20 years ago with her longtime collaborator, economist Olivia Mitchell of the Wharton School at the University of Pennsylvania. Since the mid-2000s, researchers and organizations worldwide have integrated these questions into their assessments of household finances. Across the findings, there’s been a common theme. “The continuous surprise is just how low financial literacy is in the United States and around the world,” Lusardi says.

Her research has found that people who understand basic financial concepts are better at managing money. They save more for retirement, make smarter investment decisions, and manage their debts

more effectively. Her latest study shows that people who are financially literate are more likely to have money on hand to weather the early stages of an economic shock such as a pandemic.

Lusardi has also shown that people think they know more about personal finance than they actually do, which makes them more vulnerable to poor decision-making.

The answer to financial illiteracy lies in providing people with a basic education in the ABCs of personal finance, says Lusardi, who has taught financial literacy to undergraduate and graduate students for more than a decade. “Developing personal finance skills is as important as learning how to read and write,” she says.

“I’m not talking about expecting people to become Warren Buffet. I’m talking about teaching people, especially the young, how to make savvy financial decisions. For first-generation or low-income students, it often means talking about topics they seldom discuss with their parents.”

Lusardi sees reasons for optimism. More than half of U.S. states have added personal finance instruction as a high school graduation requirement. Universities, including Stanford, offer personal finance courses. Employers are recognizing that financial anxiety hurts employee productivity and are sponsoring personal finance lessons in the workplace.

“Financial literacy education is really accelerating,” Lusardi says. “We’re finally seeing things turn around and, to me, that’s a very positive result.” **GSB**

A version of this story was originally published by the Stanford Institute for Economic Policy Research.

“I’m not talking about expecting people to become Warren Buffet. I’m talking about teaching people, especially the young, how to make savvy financial decisions.”



PRACTICE SPACE

Getting Into “the Zone” Isn’t About Perfection, It’s About Uncertainty

Research uncovers the “magic combination” that makes it easier to achieve a flow state.

BY SACHIN WAIKAR

Most of us have experienced it — whether working on something creative like a music composition, perfecting a medium-range golf putt, or striving for the next level on a video game.

It’s the state of “flow,” or the “feeling of being completely immersed and engaged in what you’re doing, getting lost in the process,” as described by David Melnikoff. In other words, flow is being in “the zone,” when distractions fade and productivity spikes.

While getting into the zone may evoke images of someone executing something flawlessly — like basketball star Steph Curry hitting repeated three-pointers — it’s less about perfection than getting into

NANCY ROTHSTEIN



DAVID MELNIKOFF

is an assistant professor of organizational behavior at Stanford GSB.

a state of maximum focus and concentration, where even highly challenging work seems to unfold largely on its own.

In his research, Melnikoff, an assistant professor of organizational behavior at the GSB, seeks to understand how we can get into flow more easily while pursuing everyday or aspirational goals. “Goal-pursuit doesn’t always need to be a grind,” he says. “It can happen effortlessly or even automatically. That’s an underappreciated side of human motivation.”

Indeed, “when you’re in flow,” Melnikoff explains, “goal-pursuit reverses. Normally, if you pursue something like healthier eating, it requires a lot of self-control not to stop. In flow, *stopping* is the hard part due to the natural momentum you build.”

That flip is exactly why people are eager to enter a state of flow; it helps them achieve a meaningful goal with less effort and greater engagement. There’s even evidence that flow improves our overall sense of well-being. Yet so far, the factors that make it easier to get into flow have remained elusive. “The thinking has been that flow emerges when there’s compatibility between the difficulty of a task and your skill level,” Melnikoff says. “But that still leaves a lot of questions unanswered.”

His recent research fills in some of the blanks. “The magic combination to flow is starting out highly uncertain, then reducing that uncertainty predictably through your actions,” he says, “so that you’re constantly satisfying your curiosity about what the future holds.”

Eliminating Possible Futures

In a study written with Ryan Carlson at Chicago Booth and Paul Stillman at San Diego State University, Melnikoff aims to move our understanding of flow from the abstract to a computational theory that identifies its necessary components. At the core of their take on flow is the idea of reducing uncertainty, or “eliminating possible futures,” as Melnikoff puts it.

Consider what it’s like to play an instrument like the piano. If your goal is to play a piece without any errors, then each time you play the right note, it becomes clearer that you may reach your objective. “Every time you press the next key, you eliminate uncertainty about that specific outcome,” he says.

However, the uncertainty varies dramatically depending on your skill level. A virtuoso playing a familiar piece will have zero uncertainty about doing it well, while a novice might feel daunted about playing anything so complex. The lack of uncertainty in both scenarios means a lack of flow. “In either case, the outcome is a foregone conclusion,” Melnikoff says. “For flow, we believe someone should feel like, ‘I might nail this, or I might flounder. Let’s find out.’”

In short, the researchers propose that the likelihood of entering flow is highest when a given task of interest falls between routine and unreachable. “It needs to be something that’s going to spark your curiosity about what the outcome is going to be,” Melnikoff says.

Future Imperfect

To test their hypotheses, Melnikoff and colleagues developed a series of experiments where participants completed tasks with varying levels of uncertainty. They found that the combination of high initial uncertainty with reliable

ways of reducing it was most likely to induce flow.

Across multiple experiments, the team consistently found that entering a flow state depends on two factors: starting with an optimal level of uncertainty (meaning no foregone conclusions) and the ability to reduce that uncertainty predictably based on one’s performance. “The task has to start as an open question that your actions answer,” Melnikoff says. Moreover, after exposure to multiple types of games, participants were more likely to pick ones with features that made flow more likely, suggesting a connection between flow and enjoyment.

These findings could help improve real-world processes and increase engagement in workplaces. He suggests devising processes that “inject uncertainty” into the future to make people more curious about the outcome of their work. For example, he says, “Don’t just frame a sales competition as winner-take-all. Most people will assume they won’t win. But if there are lots of prizes and the size of the prize depends on where you rank, now there’s a lot of uncertainty.”

Ultimately, flow comes down to facing a situation with reducible uncertainty. The circumstance may already feature that, or we can hack it into the system ourselves. “Injecting uncertainty is a way to improve engagement and productivity by getting into flow,” Melnikoff says. **GSB**



TARGET PRACTICE

Play a simple yet challenging slingshot game
David Melnikoff designed to study flow at
stanford.io/slingshot.

“In flow, *stopping* is the hard part due to the natural momentum you build.”



DEBT TRAP

The Hidden Costs of Clicking “Buy Now, Pay Later”

Instant online credit comes with big downsides for some borrowers.

BY THEODORE KINNI

In the past couple of years, a new payment option has become almost ubiquitous on online retailers’ check-out screens: Buy Now, Pay Later.

This fintech innovation offers consumers instant financing for large and small purchases on a transactional basis. In a typical purchase, a shopper might pay 25% down for that new sofa or this week’s groceries and pay off the remaining 75% in three equal installments — one every two weeks. If they make the payments on time via a bank account or credit card, the loan is interest-free.

Over the past decade, fintech companies such as Klarna, Affirm, and Afterpay have taken Buy Now, Pay Later from a niche alternative to a mainstream choice by signing up tens of thousands of retailers. The retailers offer BNPL as a payment option at the point of sale and pay a small merchant fee, as with credit cards.

Unlike plastic, however, BNPL does not require a rigorous credit check. That’s made it a hit with consumers, especially younger adults without well-established credit. Total loan volume among the



ED DEHAAN

is a professor of accounting at Stanford GSB.

largest BNPL providers grew from \$8.3 billion in 2020 to \$24.2 billion in 2021, according to the Consumer Financial Protection Bureau. During the 2023 holiday season alone, shoppers availed themselves of \$16.6 billion in BNPL loans.

“BNPL is a pretty slick innovation. It is convenient and it’s basically free credit if you pay it off on time,” says Ed deHaan, a professor of accounting at the GSB.

However, it also has the potential for misuse and abuse. If BNPL borrowers do not make the payments on time, they can incur late charges, overdraft fees, and interest payments. If they overuse BNPL, they may postpone other payments, incurring higher interest on credit cards and other loans.

DeHaan wondered how pervasive those negative outcomes might be. “The financial savviness of the average user is not great,” he says. “And we have plenty of evidence from history that, left to their own devices, the companies that issue credit tend to do so at consumers’ expense when they can. So we should be wary of new innovation in the credit space.”

As this new financial product grew, deHaan joined Jungbae Kim of Singapore Management University and Ben Lourie and Chenqi Zhu of the University of California, Irvine, to investigate its effects. In one of the first studies of BNPL’s effects on its users’ financial health, they analyzed the bank and credit card transactions of 10.6 million U.S. consumers between 2015 and 2021. They found that 13% had used BNPL. By 2021, the average borrower was paying \$500 quarterly on a dozen BNPL installment payments.

Fast, Easy, and Unregulated

“We examined the changes in the BNPL users’ financial health before and after adoption, and compared them to similar non-BNPL users,” deHaan explains. An analysis of more than 570,000 pairs of BNPL users and non-users revealed that users incurred 4% more overdraft charges, 1.1% higher credit card interest, and 2.3% more credit card late charges than their counterparts.

The researchers then teased out those consumers who were frequent shoppers at retailers that partnered with BNPL providers. They found that being offered BNPL by a favorite retailer powerfully predicts a shopper’s willingness to use it and that these users had an 8.9% increase in overdraft charges, a 2.5% increase in credit card interest, and an 8.4% increase in late fees. This adds up to \$176 per year in extra charges for the average user and up to \$252 per year for especially vulnerable users.

“The average effect of using BNPL is negative, which is surprising,” deHaan says. “It’s a relatively small negative number, but likely meaningful for many people who live paycheck to paycheck. We’re not saying that this is all doom and gloom. We’re just saying that, like every other consumer credit product, BNPL warrants careful academic and regulatory attention and most likely also warrants regulation.”

BNPL loans are not reported to credit bureaus and are largely unregulated. Currently, BNPL providers are promoting self-regulation via a voluntary code of conduct. In October 2023, the EU revised its Consumer Credit Directive to regulate some kinds of BNPL, but the U.S. is lagging.

“The Consumer Financial Protection Bureau seemed very eager to do something about it at first, but we haven’t seen much movement,” says deHaan. “I’m surprised that regulation is taking as long as it has. But it surely must be on regulators’ agendas.”

DeHaan would like to see BNPL providers report their transactions to the credit bureaus. “That prevents debt stacking, which is when people open several accounts at the same time and end up in trouble,” he says. “Not reporting BNPL loans also doesn’t allow consumers to build up their credit scores — they aren’t getting credit for their credit.”

BNPL providers should also be responsible for providing standard consumer protections, deHaan says. “Fraud protection is a no-brainer. And there should be a regulated dispute resolution process. There are processes that credit card companies and banks need to follow that BNPL providers do not.”

“BNPL is here to stay,” deHaan adds. “I think it’s going to be a regular tool in everybody’s digital wallet, and the types of people who are adopting it now at age 22 will very likely continue using it into their thirties, and this will be a very different conversation. But right now, a little bit more of an intentional regulatory approach will meaningfully improve the welfare of BNPL users.” **GSB**

“BNPL is a pretty slick innovation. It is convenient and it’s basically free credit if you pay it off on time.”

Leadership mastery requires lifelong learning

Seasoned leaders understand the value of constant evolution, and today's ever-changing landscape demands a refresh. Stanford Executive Education offers just that—a chance to refine your approach and stay ahead of the curve. Join us to enrich your perspective, amplify your effectiveness, and shape the future with conviction.



Return to campus for
upcoming C-Level Programs

**The Strategic Chief Sustainability
Officer Program**

**Executive Program for Growing
Companies**

**The Emerging CMO:
Strategic Marketing Leadership**

**Executive Program in Strategy
and Organization**

**Innovative Product Leadership:
The Emerging Chief Product Officer**

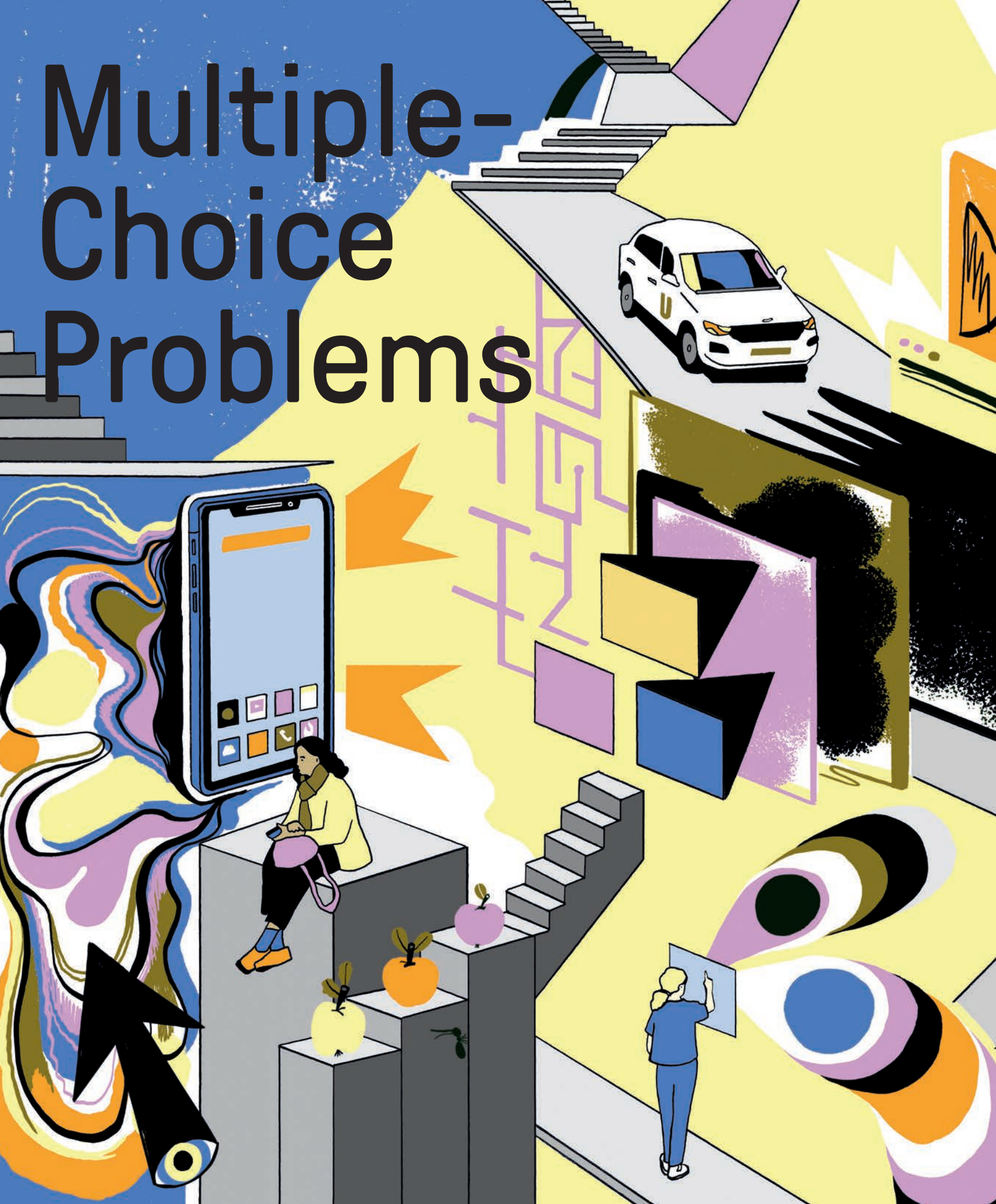


Explore our C-Level
Programs today!
grow.stanford.edu

STANFORD GRADUATE
BUSINESS SCHOOL OF

Executive Education

Multiple-Choice Problems





GSB researchers are upgrading A/B testing to keep up with new technology and help solve real-world challenges.

BY KATIE GILBERT

ILLUSTRATIONS BY FIEN JORISSEN AND FRANZ LANG

Which email subject line is more likely to persuade potential customers to open it: the one with the exclamation point or the one with the emoji? Which landing page converts to more click-throughs to a company's website: the one with more text or less?

The answers to these routine quandaries may not be immediately obvious. Yet there's a simple solution: A/B testing.

The A/B testing model has helped shape the online world as we know it — and the way marketing, website design, and all kinds of user experiences work within it. “These types of experiments are the bread and butter of most tech companies; this is how pretty much every feature is vetted to decide whether to launch it or not platform-wide,” says Gabriel Weintraub, a professor of operations, information, and technology (OIT) at the GSB. Whenever you go online, you're likely becoming an unwitting participant in an A/B test, as designers, engineers, and marketers throw different scenarios at you to see what most effectively persuades you to click, buy, or stream.

The concept behind this experimental design, also known as split testing, is straightforward: If you're trying to hone your email's subject line, for example, you randomly split your recipients into two groups. Group A receives the email with the exclamation point in the subject line, and Group B gets the one with the emoji. Compare the two groups' average open rates, and there you have it: the subject line that gets more clicks.

“There's been quite a lot of A/B testing going on,” says Guido Imbens, a professor of economics at the GSB. That's an understatement: Google, Microsoft, and other tech giants reportedly run more than 10,000 A/B tests apiece annually. Mountains of research and anecdotes

emphasize the importance and effectiveness of A/B testing for marketing, advertising, and user experience, “conveying the message that really, experimentation is very easy,” Imbens says.

However, the increasing complexity of online platforms has revealed A/B testing's limitations. A raft of research by GSB faculty members — many in collaboration with each other — is looking beyond traditional split testing and pushing the boundaries of what's possible in experimental design and analysis both online and off. “There's a very rich set of problems that call for more complex experiments where we don't actually know what the optimal thing to do is,” says Imbens, who heads the Stanford Causal Science Center and split the 2021 Nobel Prize for economics for his work on experiment design and causality. “We should all be aware that there's much more you can do beyond the standard experiments.”

From Plots to Platforms

Although A/B testing has thrived in the internet age as a tool for bringing clarity to decision-making, it predates computers by several decades. An A/B test is another term for a simple randomized controlled trial, or RCT, a concept codified by statistician and geneticist R. A. Fisher in his 1925 book *Statistical Methods for Research Workers*. Many of Fisher's experiments focused on agriculture: He randomly allocated fertilizers throughout farm plots to see which one yielded the healthiest crops. At the time, the idea that an experimental treatment should be randomized — rather than managed as transparently and tightly as possible — was revolutionary.

RCTs quickly took hold in biomedical settings, where they became the go-to design for experiments testing

Hitting the Jackpot

An experimental strategy inspired by slot machines promises less uncertainty and bigger payoffs.

Another area of GSB research that's pushing past the limitations of A/B testing has focused on “multi-armed bandits.” Mohsen Bayati, a professor of OIT who has been exploring these problems for the past 15 years, explains the basics of this approach and how it can pay off.

What are multi-armed bandits?

Mohsen Bayati: You can think of multi-armed bandits as a class of decision-making scenarios individuals or algorithms face when choosing between multiple options with uncertain outcomes. The name comes from the metaphor of a gambler facing a row of slot machines and choosing which arms to pull in order to maximize their total

payout. They don't know which arm is best in advance, so they need to experiment. Once they figure out which arm is a good one, they want to stick with it.

Now, in the context of experiment design — in marketing, healthcare, website optimization, et cetera — this offers a powerful framework for dynamically allocating resources among competing strategies.

When did this experimentation design first emerge?

Bayati: Multi-armed bandits trace back to the 1930s. But the main research started in the 1970s and '80s. The main motivation then was for clinical trial types of experiments. You can see that there is

the effectiveness of drugs. In such a trial, a group of subjects is randomly divided into two subgroups; one receives the drug (the treatment group) while the other (the control group) receives a placebo. None of the subjects know which group they're assigned to. Then the outcomes within both groups are observed, averaged, and compared.

By the early 2000s, RCTs had proved essential for drawing eyeballs and driving engagement online. Google ran its first A/B test in 2000 to figure out the optimal number of search results to show its users. By the time Susan Athey, a professor of economics at the GSB, became Microsoft's chief economist in 2008, the engineers behind the firm's Bing search engine were running thousands of A/B tests each year to guide decisions about, for example, which results should appear at the top of the page.

Yet as A/B testing became ubiquitous, it became clear that it had to evolve to keep up with the intricacies of the applications it was evaluating. For example, Bing's experiments were focused on how short-term changes affected users. Athey noticed that this user-focused experimentation was not well suited to studying advertisers, the main source of revenue for Microsoft's search business. "Understanding the advertiser side of the market — how to model their behavior, how long it took for them to respond to changes — these challenges were really acute," she says.

Admittedly, advertisers were much more difficult to experiment on. As a sample, they were diverse to the point of being unwieldy: Some were multibillion-dollar companies with teams working to optimize every pixel, while others were small businesses without the resources to obsess over their ad buys. What's more, they were competing with each other.



an opportunity cost for half of the patients in a traditional clinical drug trial, who are potentially getting an inferior version of a drug treatment. So there was this concern: What about these patients? Can we do anything for them?

Can you give an example of how a bandit experiment might work?

Bayati: Let's say that the competing strategies are two designs for a website. Think of these two designs as two arms: one of them performs better when you integrate it into the workflow of an organization — but we don't know in advance which it is. Traditionally, A/B testing solves this by randomly splitting the population into two groups; half of

the users are assigned to design A, and the other half to design B. After the experiment ends, we'd pick the better design based on the data we collected.

But this approach can be inefficient because it commits resources to the less effective option for the whole duration of the test. In contrast, a multi-armed bandit approach adjusts the allocation of resources to these two different options, A and B, over time. The idea is that we are going to potentially benefit early in the experiment by expanding utilization of the option that seems to be better — without giving up on the other option too early because we don't want to compromise the experiment's quality.

Does the bandit design come with any drawbacks?

Bayati: Yes. It might seem obvious that this design is better. So why isn't everybody using it? The number-one challenge when you use these techniques is the absence of a rigorous, statistic-backed framework for decision-making. Because classical randomized experiments have a very clean setup, you can do rigorous mathematical analysis once the experiment ends. But these bandit experiments are more complex, and the statistics and mathematics that justify their decision-making are still not fully developed. — *K.G.*

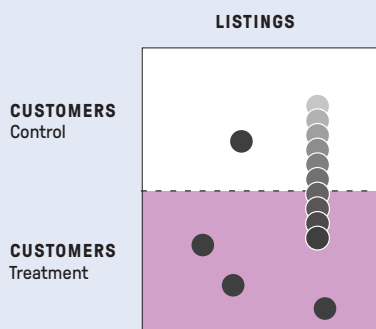
Random Rules

Running A/B tests on two-sided platforms like Airbnb presents a problem: If one group of customers gets access to better deals, it may interfere with the control group by creating more competition for bookings. An alternative approach, developed by teams under the guidance of GSB professors Guido Imbens and Gabriel Weintraub, is to randomize both the customers *and* listings into treatment and control groups.

- Treated groups
- Bookings
- Bookings taken by treated group

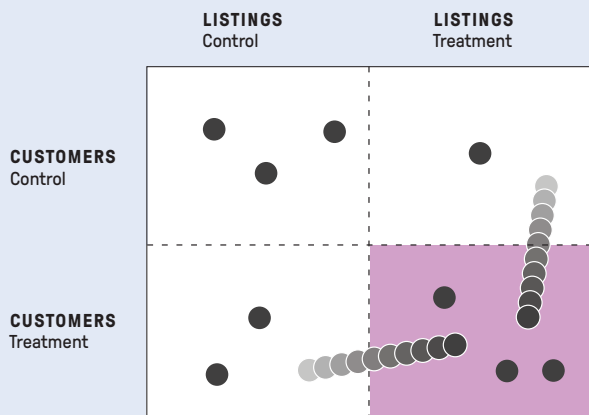
CUSTOMER RANDOMIZATION

When a basic A/B test is run on a two-sided marketplace, treated customers may “cannibalize” bookings from the control group.



TWO-SIDED RANDOMIZATION

Randomizing both customers and listings doesn't eliminate competition, but makes it easier to observe and measure.



Sources: “Experimental Design in Two-Sided Platforms: An Analysis of Bias” by Ramesh Johari, Hannah Li, Inessa Liskovich, and Gabriel Weintraub (2022); “Experimental Design in Marketplaces” by Patrick Bajari, Brian Burdick, Guido W. Imbens, Lorenzo Masoero, James McQueen, Thomas S. Richardson, and Ido M. Rosen (2023)

Over the rest of her time at Microsoft, Athey put together a set of ideas for addressing this and other obstacles to traditional randomized experiments. After leaving the company in 2013, she began collaborating with a number of coauthors, including GSB colleagues, to formalize the mathematics and theory around some of these new concepts, and to come up with novel ways to run ever more sophisticated experiments.

Not as Easy as A/B

One of the thorniest problems to emerge across all sorts of platforms is interference: When you run an experiment on, or “treat,” one group of users on an online platform, it’s likely to affect the untreated users, too.

Consider the example of a ride-sharing app: If its engineers want to test a policy that would give drivers higher tips, the A/B testing model would dictate that the change is applied to some drivers and not others. Yet if it turns out that, during the experiment, the new policy makes driving more lucrative and encourages the treated drivers to spend more time on the road, that will affect the untreated drivers, who suddenly face more competition in finding passengers. At this point, the experiment cannot accurately discern what would happen if the new tipping policy were applied to all drivers.

“It’s so important to understand how biases like interference are affecting experimental results and decision-making,” says Weintraub, who encountered this problem while advising Airbnb on solving market-design puzzles, one of his areas of expertise.

Typically, he explains, market designers are seeking a specific objective — say, maximizing bookings. In experimenting with the best ways to do so, a platform has a dizzying array of levers it can control, such as tweaking fees or sharing more or less information about properties. What’s more, companies like Airbnb are two-sided platforms, enabling sellers and customers to interact directly to make deals. And that means there are two groups of users that can be observed making decisions.

Weintraub explains that the canonical online A/B tests run by two-sided marketplaces must choose between either randomizing listings or randomizing customers. However, when platforms ran experiments by, say, randomly including better photos for some listings, the treated pages “cannibalized” demand from the control group. This type of interference effect muddled

the experimental results, Weintraub says. “That violates a key assumption in an A/B test: It’s assumed that the assignment of one unit to treatment or control doesn’t affect the outcome of any other unit.”

Experimenters also noticed interference on the customer side: For example, when they randomly assigned some customers to a group that saw cheaper prices, that exposed the control group to more competition for listings — because subjects in that group couldn’t select properties that the treated group had snatched up.

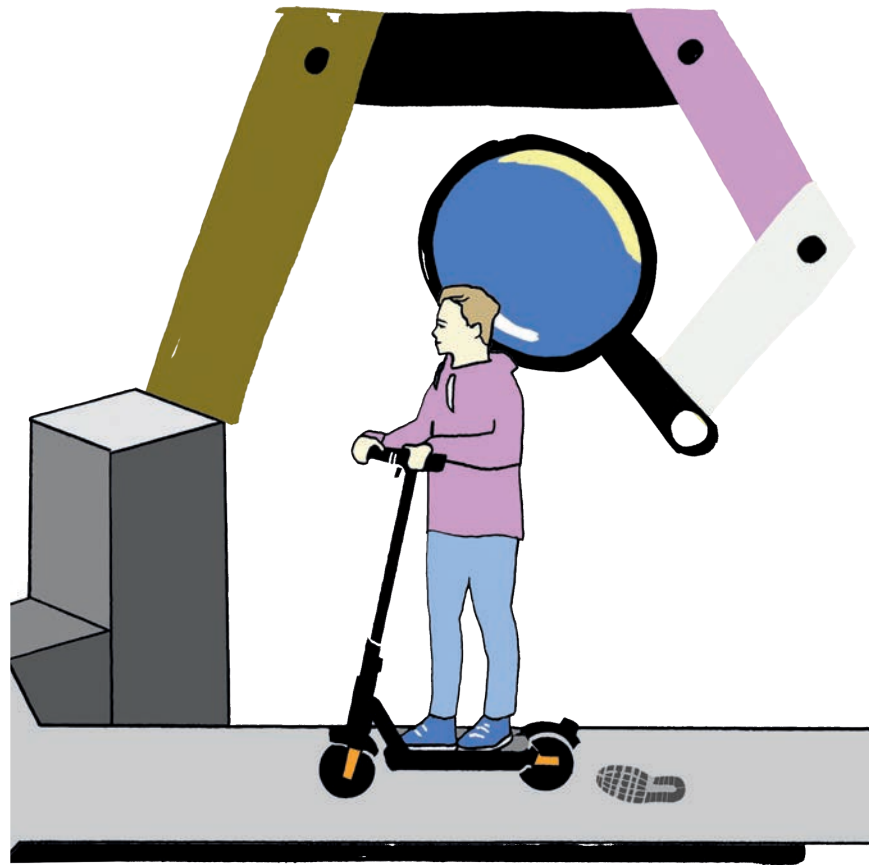
In the paper that emerged from this puzzle, Weintraub and his colleagues present a model to help experimenters determine which side of the marketplace to randomize to minimize interference and bias. And — crucially — they add that if supply and demand are mostly balanced, the answer is to randomize *both* listings and customers at the same time, using a novel experimental design they call “two-sided randomization.” The approach doesn’t eliminate competition between the treatment and control groups, but it allows its effects to be approximately observed and factored into the results.

What Weintraub didn’t know at the time was that, just down the hall, Imbens — who had been working as a consultant for Amazon — was independently percolating a similar idea for the same types of online platforms. In their paper, Imbens and his coauthors refer to these experimental structures as “multiple randomization designs.” But the idea is the same. “I remember a hallway conversation with Guido,” Weintraub says, “where we realized we totally independently and simultaneously came out with this multiple-side randomization idea.”

Imbens emphasizes that these new randomization designs could prove useful beyond the digital marketplace. He points to experiments in development economics that seek to track the spread of health education, for example. In these contexts, interference can confound results because of the difficulty of maintaining a control group. Imbens hopes this new type of experiment can be part of the solution.

The Other Side of the Equation

Much of the collaboration at the GSB around new types of experimentation has been far from accidental — in fact, OIT professors Kuang Xu and Stefan Wager say that working together has been



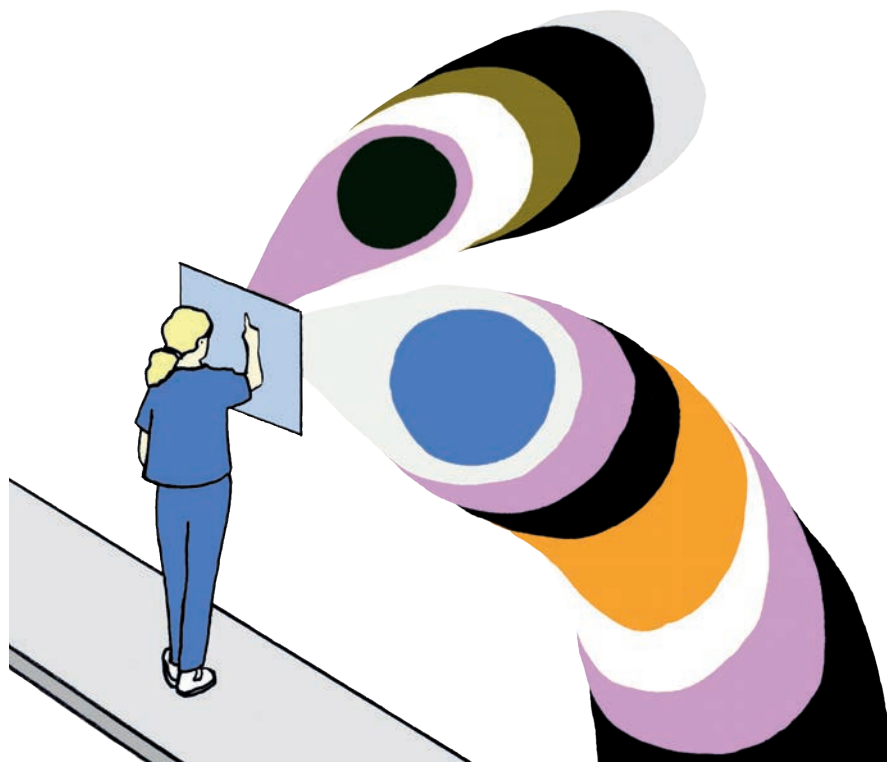
essential. Wager is a statistician who focuses on the intersection of causal inference, optimization, and statistical learning. Kuang is an operations researcher and a probabilist who uses stochastic modeling to capture the dynamics of real-world applications where information is scarce. Both say that building bridges between their disciplines has been imperative for tackling the types of problems they’re trying to solve.

Wager says this became obvious during the height of the pandemic. “During the lockdown, I felt like I was able to work on existing projects — but I didn’t have any new ideas,” he recalls. “So Kuang and I started going on semiregular ‘research hikes.’ And actually one of the recent papers with Kuang that’s bridging ideas between engineering and statistics started this way.”

When Kuang and Wager consider how to improve experimental methods, they’re looking at a different side of experimentation design. They’re focused on ways to crunch the data gathered in experiments to

“There’s a very rich set of problems that call for more complex experiments where we don’t actually know what the optimal thing to do is.”

“A company or a scientist doesn’t just want to know that, on average, a given treatment worked. It’s really important to know if it helped some people and hurt other people.”



yield clearer insights. “Drawing insight from data obviously has two elements: How do you collect data *and* how do you analyze the data that you collect?” Kuang says. “When you innovate and try to crack new problems, you can attack both — or either, potentially.” After all, he says, “changing the way you run experiments can be difficult — so, maybe you collect data the way you used to, but you analyze them very differently.” Kuang and Wager have collaborated on topics including experimental interference caused by congestion in online marketplaces.

Another fertile area of collaboration on this side of the equation is the difficulty of identifying the types of individuals who benefit (or not) from an experimental treatment. “A company or a scientist doesn’t just want to know that, on average, a given treatment worked,” Athey says. “It’s really important to know if it helped some people and hurt other people. And if you can analyze that, then you can give the treatment to the people it helped and not give it to the people it hurt.” In 2016, she and Imbens introduced a data-driven method for grouping individuals who experience different “treatment effects.” In the process, they laid some of the foundations for connecting traditional machine learning, which focused on prediction, with the challenge of estimating the outcomes of randomized experiments.

Around that time, Wager — then “a star PhD student in the Stanford statistics department,” in Athey’s words — was getting interested in this area. Working with Athey, he developed a more flexible approach to understanding variations in treatment effects, proving theoretical results about algorithms known as random forests that had proved elusive for several decades. Their papers on “causal forests,” published in 2018 and 2019, are some of the most cited statistics papers of the past

Best of Both Worlds

Combining experiments with machine learning can help policymakers reach the right people.

Running a randomized controlled study has become the standard way of seeing if something is effective — whether it’s a new medicine or a social policy. It makes sense: What better way to determine whether a policy helps people than by observing it in action?

“When we think about policies that can improve people’s lives, especially in the past decade, there’s been this paradigm that you see what works by running randomized trials,” says Jann Spiess, an assistant professor of OIT at the GSB and faculty affiliate at the Golub Capital Social Impact Lab. However, he notes, this approach is resource-intensive. Trials are difficult to organize and run. And the results’ explanatory power may be limited,

as they typically focus on average effects across a population, obscuring the impacts on individuals.

Enter artificial intelligence — specifically, using machine learning to unearth new details on how interventions work and for whom. “Machine learning gives us the opportunity to essentially personalize treatments,” Spiess says. Over the past 15 years, the Golub lab has been developing this method of synthesizing experimental data and machine learning.

In recent work with Golub lab director Susan Athey and former postdoctoral scholar Niall Keleher, Spiess confirmed the potential power

few years. Their methods have been widely adopted in academia and industry, including by technology companies such as Airbnb and Uber.

Wager presented new applications for this research in a recent paper that examines the impact of psychiatric hospitalization. With his coauthors, Wager examined five years of data from the U.S. Department of Veterans Affairs about more than 100,000 vets who had arrived at emergency departments because of suicidal ideation or suicide attempts. Focusing on those patients who were subsequently hospitalized for psychiatric treatment, the researchers sought to determine how effective a hospital stay was at preventing suicide attempts over the following year.

However, it was essential that their findings were not averaged across the group, so as not to overlook those vets who experienced increased suicidality after hospitalization. Instead, the results were broken down into granular subgroups based on factors like psychiatric diagnosis, past medical history, and family situations.

“We showed that you can reliably find groups of patients who benefit from hospitalization and others who seem to be hurt by hospitalization,” Wager says. Using machine learning tools to help synthesize the results, his team found that an individualized approach to treatment could reduce future suicide attempts in the 12 months following a hospital visit by 16% and hospitalization by 13%. “In order to do this, we really had to go beyond the kind of classical causal inference methods where you just look at whether a treatment works on average for everyone and identify a few subgroups,” Wager says.

He’s hopeful about the potential of moving beyond a one-size-fits-all approach toward more personalized outcomes. “We see this paper as an early proof-of-concept,

showing that something could be done, and we’re hoping we’ll be able to work with the VA to actually build a tool that they could use. That’s the end goal of this.”

A Community of Collaborators

All of these researchers agree that Stanford is flourishing as a hub of research on experimental design and analysis methods. The campus’s proximity to Silicon Valley is part of the reason, Imbens points out. “We get a lot of exposure to the kinds of questions the tech companies have and the kinds of problems they’re wrestling with,” he notes.

Yet as his colleagues’ research on psychiatric patients and college students has demonstrated, this research agenda has applications far beyond streamlining apps and platforms. “The sweet spot is to find research that’s relevant to the tech companies — while realizing that, actually, these problems are much more general, and what we’re doing has relevance for other contexts as well,” Imbens says.

Another result of the increased collaboration in these areas is the dissolution of walls between separate disciplines, which Athey emphasizes is a win. “These three distinct fields — statistics and econometrics and machine learning — weren’t really talking to each other that much,” she says. Within this prolific group of researchers, however, those fields are now in close conversation.

“You might think, ‘How can each of these people be the pioneer in the same thing, experimentation design and analysis?’” Athey says. “But Stanford is the pioneer. We built a group of people excited about these problems — and so it’s not an accident that we’re all here.” **GSB**

of this hybrid approach. They partnered with a nonprofit that ran field experiments to see if “nudges” via email or text might encourage students at the City University of New York to apply for federal financial aid. To develop a more nuanced portrait of who responded, they trained a machine-learning algorithm on the data. They found that reminders were most effective for students who were already inclined to file for financial aid. Students who were not likely to apply were mostly unmoved by these gentle prompts. The study also revealed that reminders don’t work for those most at risk of losing their financial aid.

“Going into this, we may have hoped the nudges work especially well for students

who are unlikely to file. And based on the experiment’s generally promising results, we would have prioritized that group,” Spiess says. “Had we done that, we would have been pursuing exactly the wrong people.”

This hybrid approach has the potential to make experimentation less expensive by supporting faster iteration. As an experiment is running, machine learning can discern what’s working and suggest ways to fine-tune interventions in real time for maximum impact. For policymakers, this adaptable, targeted process could move beyond catch-all approaches that are often costly and marginally effective.

While it’s easy to imagine how this technology could drive digital solutions — better email reminders, for instance — Athey is more excited about using it to improve interactions between people. “So much work involves humans helping other humans, but it’s really difficult for the helper, the coach, to have memorized all the details and gathered all the knowledge they need to give customized advice or treatments,” she says. The approach demonstrated here could support more personalized attention. “That’s the best of both worlds. If the computer is supporting the coach or the teacher or the helper, then they can have all the information they need to offer the best options.” — **Dylan Walsh**

Curious Conversations

If you're looking for smart answers to complex questions, then you should check out this new podcast.



The GSB's more than 150 professors publish nearly 250 research papers annually. Their findings make waves in their respective fields, but their authors often don't get a chance to share them with a larger audience of business leaders looking for timely and useful ideas. That's where *If/Then* comes in.

If/Then is a new podcast that captures the breadth and depth of the research done at the GSB and its connections to our lives, our work, and our future. Hosted by former *Stanford* magazine editor and GSB senior editor Kevin Cool, each episode features a conversation with a faculty member about the research they're most excited about — and why it matters.

The podcast's first season launched in January. Here are some soundbites from the first 13 episodes.



BILL BARNETT on the importance of foolish ideas

“People like to call Steve Jobs a visionary.... But Steve Jobs himself was famous for saying that, in fact, you cannot connect the dots looking forward; you can only connect the dots looking backwards. And that tells you the map to follow looking forwards because the surprises that come along are typically vastly more impressive than anything our limited imaginations could have conceived of as we look forward. So what does that mean in terms of innovation?”

“Focus less on whether or not your ideas are agreed to by everybody. If people are agreeing with your ideas, that’s actually a bad sign because that means your ideas are completely consistent with our outlook right now.... So what you really want to do is try to make sure that whatever ideas you’re putting forward are unique, are non-consensus. If they’re non-consensus, they might well be foolish, but if they’re right, they’re going to be genius. In that sense, foolishness is the price of genius. Organizations that create lots of foolishness also create a lot of genius.”



WILLIAM P. BARNETT is the Thomas M. Siebel Professor of Business Leadership, Strategy, and Organizations at Stanford GSB.

“**Organizations that create lots of foolishness also create a lot of genius.**”



DEBORAH GRUENFELD on our hardwired response to power dynamics

“One of the conclusions from our research on power is that what power does to people is bring out their most basic instincts and impulses. And because of how we’re socialized in the world, there are people for whom power is very attractive and it’s easy for them to see themselves in positions of power and they like the idea of having control, and there are people who don’t really want to step into the arena....”

“My sense has always been that because of some of the fears about being in positions of power, I think there is a lot of fear about the level of responsibility that comes with power and the difficult choices that you’d have to make. There are a lot of people who really avoid those positions. And I think the world would be better if there were people who were willing to take on positions of power out of responsibility for other people as opposed to being driven to power for more personal reasons.”

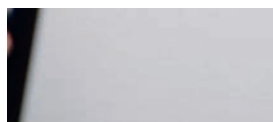
DEBORAH H. GRUENFELD is the Joseph McDonald Professor and Professor of Organizational Behavior at Stanford GSB.

BARNETT: WINNI WINTERMEYER; GRUENFELD: JULIA YU

MOHAMMAD AKBARPOUR on Taylor Swift and efficient markets

“As we are sitting here, multiple economists are thinking about the problem of ticket allocation because it’s a really difficult problem. So everything starts by this observation that if Taylor Swift concert tickets are allocated completely based on competitive equilibrium or free markets, then people who are going to be able to go to this concert are not necessarily people who love Taylor Swift the most.... If someone is willing to pay \$1,000 for a Taylor Swift concert, they do not necessarily get more value from going to a Taylor Swift concert than someone who is willing to pay \$500.”

MOHAMMAD AKBARPOUR is an associate professor of economics at Stanford GSB.



DANIELA SABAN on designing more useful dating apps

DANIELA SABAN is an associate professor of operations, information, and technology at Stanford GSB.

“The challenge is that if you just look at preferences, many people would like the same thing or would like the same person. And, of course, you cannot match everyone with the same person.... Now when it comes to retail, I may want to show you things that you’re likely to buy. And that’s great. When it comes to dating apps, I not only want to show you people that you will like. I also want to show you people that will like you back. So that changes a bit the type of people that you will see, and the type of constraints that I need to take into account when I design these algorithms.”

“
**What power does
to people is bring
out their most
basic instincts and
impulses.”**



REBECCA DIAMOND
is the Class of 1988
Professor of Economics
at Stanford GSB.

“
**Immigrant
knowledge
seems
particularly
impactful
on U.S.-born
workers and
inventors.”**

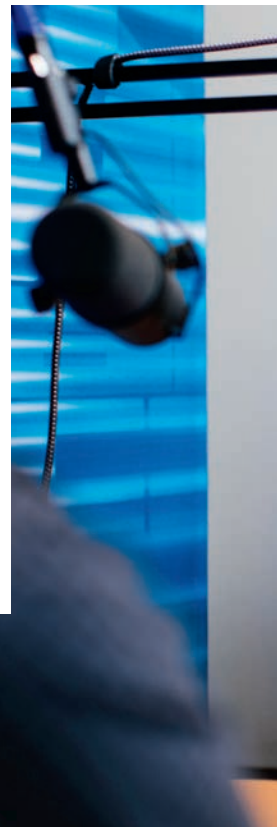
**REBECCA DIAMOND
on how immigrants
boost innovation**

“The way to have successful innovation is not to just put smart people in a room by themselves and tell them, ‘Think hard.’ It’s to collaborate and work together and create new ideas through the synergies of their knowledge. And immigrant knowledge seems particularly impactful on U.S.-born workers and inventors, and I think we potentially didn’t know how big of a deal that was.... [We found] that 36% of all innovation can be attributed to immigrants, because some of the U.S.-born production is attributable to the collaborations of immigrant coauthors. That’s a big number, suggesting that any policies that would limit or lower the number of immigrants coming to the U.S. for these super high-skill innovative jobs would have a large effect on future innovation.”

**ED DEHAAN
on why accounting matters**

“Accounting is what they call ‘the language of business.’ It’s the backbone of communication within organizations and from organizations to outsiders. And when it’s working as designed, the only people who need to worry about it are the accountants, the managers, who are using the accounting reports... and then the investors who analyze the report[s]. So when it works, it facilitates everything in business... And when it’s working well, it’s working well. And when it fails, we see catastrophic problems.”

ED DEHAAN
is a professor of accounting at Stanford GSB.



DIAMOND: ELENA ZHUKOVA; KUANG: JULIA YU



DEHAAN: ELENA ZHUKOVA; SHIV: DREW KELLY



BABA SHIV is the Sanwa Bank, Limited, Professor of Marketing at Stanford GSB.

BABA SHIV on how mindset affects our decisions

“In the real world, there are no successes or failures. Just think about it. You make a decision. There’s only an outcome. It is the brain that has to interpret that outcome as a success or a failure. And any outcome is going to be in the form of a distribution. There are going to be some positives; there are going to be some negatives.

“Now, if you are confident about the course of action you’re taking — you have visualized the whole thing, you believe with true conviction that, ‘Yes, there are going to be stumbling blocks along the way. Of course, it’s going to happen. That’s reality. But I am going to reach an endpoint I’ll be happy with’ — if you have that conviction out there, and there’s an outcome which has got both positives and negatives, which side of the distribution are you going to sample from? Naturally, the brain is going to sample from the positive end of the distribution. And therefore, it is going to become a self-fulfilling prophecy.”

“**In the real world, there are no successes or failures.**”

KUANG XU on our emotional responses to artificial intelligence

“The biggest thing is when people hear ‘AI,’ their brain kind of shuts down a little bit, right? It’s kind of like a fight or flight response.... It’s like, ‘Oh my God. I don’t know what this AI thing is.’ And the thing I want to drive home is, for businesses like that, a huge chunk of knowledge is not new, and to know where to insert a new thing is a beautiful art. And that drives a lot of efficiency and value.”

KUANG XU is an associate professor of operations, information, and technology at Stanford GSB.

JONATHAN LEVAV on influencing people’s decisions

“Suppose you want to get someone to engage in a certain behavior.... The approach of choice architecture says, ‘Wait, if I designed a decision environment taking into account people’s psychological tendencies and the way the mind works, then I can influence people’s decisions by virtue of the situation, right?’... One of the philosophers of business that I love quoting in my class is the rapper Snoop Dogg. And Snoop Dogg says that it’s too easy for kids to join gangs and do drugs. We should make it easy to do football and academics. He’s absolutely right. He has the intuition for choice architecture: Make easy the decision that you want people to make, and then they’re more likely to make it.”



JONATHAN LEVAV
is the King
Philanthropies
Professor of Marketing
at Stanford GSB.



SZU-CHI HUANG
is an associate professor of
marketing at Stanford GSB.

“
If we want
robots to
be good for
society,
then we need
to humanize
them.”

SZU-CHI HUANG on our reaction to stories about heroic robots

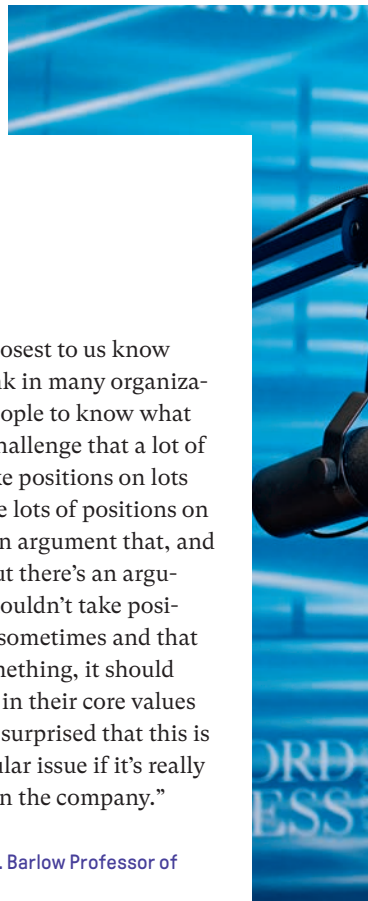
“Watching the robot stories actually makes people feel less inspired and less encouraged, and that has important consequences such as making them donate much less than people who watched the human heroes. That’s why we believe this is an important effect to document because all these YouTube videos about hero robots are everywhere. We are watching them every day, and if it lowers our prosocial motivation and our intention to help others, it could have a pretty big negative social impact.”

LEVAV: NANCY ROTHSTEIN; HUANG, HALL: ELENA ZHUKOVA

KEN SHOTTS on companies acting on their values

“I think it’s crucial that the people closest to us know what our core values are. And I think in many organizational contexts it’s important for people to know what the leadership’s values are.... It’s a challenge that a lot of companies face: are we going to take positions on lots of things or are we not going to take lots of positions on lots of things? And I think there’s an argument that, and this probably varies by company, but there’s an argument to be made that companies shouldn’t take positions on as many things as they do sometimes and that when they do take positions on something, it should actually be very carefully grounded in their core values and principles. People shouldn’t be surprised that this is the company’s position on a particular issue if it’s really coming from something deep within the company.”

KEN SHOTTS is the David S. and Ann M. Barlow Professor of
Political Economy at Stanford GSB.



ANDY HALL on what’s driving political polarization

“When you look into what’s going on with polarization and dysfunction in American politics, one of the most surprising facts that is pretty well documented in political science — but not very well understood by most people outside of political science — is that it’s pretty clear that polarization is disproportionately being driven by our politicians, by our parties... and our interest groups much more so than voters. Voters are actually not as polarized as you might think.... If you actually look at the distribution of what the American people as a whole think, [it] is remarkable how in the middle they are on most issues.”

ANDREW B. HALL is the Davies Family Professor of Political Economy at Stanford GSB.



DARRELL DUFFIE is the Adams Distinguished Professor of Management and Professor of Finance at Stanford GSB.

DARRELL DUFFIE on the future of a digital dollar

“It’s hard to imagine that a hundred years from now, people will be reaching into their pockets and pulling out grubby bits of paper. I imagine eventually we will be using digital dollars and not using paper money — to the extent that we use any government currency. Now, would we go to an all-government digital dollar? Would we go to bank digital dollars, meaning your commercial bank deposits being digitized? It’s really a hard one to call.”

“I think that’s the biggest hope in our lifetime, which is that the advent of digital currencies and better regulation for competition and innovation will trigger improvements in the way that we make payments with other forms of private money. Maybe eventually, though, we’ll get to the point at which digital dollars are used.” **GSB**



DUFFIE: NANCY ROTHSTEIN; SHOTTS: ELENA ZHUKOVA

“**It’s crucial that the people closest to us know what our core values are.**”

Growing Pains

No longer illicit, but not fully legit, the cannabis industry operates in a regulatory and financial gray area. But it can't be ignored.

BY DAVE GILSON

PHOTOGRAPHS BY DREW KELLY



The Biopharmaceutical Research Company’s “mother room” is in a warehouse-like building attached to a cinderblock office that’s as inconspicuous as the startup’s name. Entering is momentarily disorienting: A high-powered fan thrums overhead and every inch of the spotless white space is suffused in intense pinkish light. Visitors put on specialized sunglasses to filter out the mix of red and blue wavelengths calibrated to encourage maximum growth in the 177 female cannabis plants growing inside.

FUTURE’S SO BRIGHT
George Hodgin, MBA ’17, inside Biopharmaceutical Research Company’s “mother room.”



Decked out in white coveralls and hair, beard, and shoe coverings, George Hodgkin, MBA '17, surveys the crop arrayed along two 30-foot-long tables. “Kyle, do you have any favorite moms yet?” Hodgkin, BRC’s founder and CEO, asks director of production Kyle Ruddy.

“This one’s growing very nice,” Ruddy says, motioning to a plant that, to the untrained eye, looks exactly like each of its neighbors sticking out of cubes of growing medium. “But I try not to really pick my favorites at this stage.”

Over the next few months, up to 80% of these plants will be culled. Each of the survivors will be trimmed to create 30 to 40 new plants, which will be transplanted and harvested in March and again in June. “Until we see the flower,” Ruddy says, “I don’t really like to make any judgments.”

After it’s been picked, the marijuana flower will be processed here in Castroville, California, and then sent to customers around the country. Ordinarily, shipping cannabis across state lines is a federal crime — yet BRC operates entirely within the law and with the blessing of the Drug Enforcement Administration (DEA). “We grow federally approved cannabis plants,” Hodgkin says. “We manufacture drug substance here, which means we extract, isolate, and process it, and then ship it to research partners, clinical trial sites, finished product formulators, biotech companies, and pharma companies.”

When he was a student at the GSB, Hodgkin discovered a glaring disconnect in the cannabis industry: Millions of Americans were gaining access to legalized marijuana, yet research into the drug’s medical potential was stagnant. He began the laborious process of securing the DEA licenses necessary to produce the plants that might birth a new generation of cannabinoid-based pharmaceuticals. “Is there a way to crack the federal code around cannabis?” he recalls wondering. “The answer is yes. And it took us a lot of years.” The next question was, “Could you build a venture-backed business designed to help people researching cannabis? We think the answer is yes.”

BRC closed a \$20 million funding round in 2022 and now employs 19 people. It’s building a clean manufacturing room in preparation for scaling up its operations. “Our vision is to use the power of cannabinoids to treat unmet medical needs to help patients around the world,” Hodgkin says.



TOM MANNING, MBA '79
is the chairman and director of Cresco Labs.

As one of the few federally approved cannabis producers, BRC occupies an unusual spot in the United States’ cannabis industry. But then, almost everything about this industry is unusual. No longer totally illicit, but not fully legit, it operates in a regulatory and financial gray area. Yet it’s no longer a taboo or a punch line.

Hodgkin, a former Navy SEAL who had no connection to the cannabis world before he founded BRC, has seen this shift firsthand. A few years ago, he says, it wasn’t uncommon for potential funders or partners to brush off the entire industry. “Anybody that didn’t like cannabis for whatever reason — philosophically, morally — they could kind of ignore it.” Today, like it or not, that’s changed. “You can’t really ignore it anymore.”

In November 2023, Ohio became the 24th state to legalize cannabis for recreational use following the passage of a ballot measure approved by 57% of voters. More than half of all Americans now live in a state where pot is legal, and nearly 9 in 10 adults say it should be legal for medical or recreational use.

The U.S. market for legal recreational and medical cannabis was nearly \$30 billion in 2023, according to BDSA, an industry analyst. It could be more than \$44 billion by 2027, which comes out to about 10% annual growth.

“That developed out of a near-standing start 10 years ago,” says Tom Manning, MBA '79, the chairman and director of Cresco Labs, a publicly traded company that operates 70 dispensaries and manufacturing facilities across eight states. It is one of a handful of large “seed to sale” companies that have been riding and guiding the industry’s expansion. Cresco’s revenue, Manning says, grew from zero to about \$800 million in four and a half years.

Manning joined Cresco in 2016, following a career in which he spent nearly 20 years running companies in East Asia and served as the chairman and CEO of Dun & Bradstreet. He was drawn by the chance to apply his background in strategy and finance in a fast-moving environment. “The notion of working for a hypergrowth company captivated me,” he says. “One doesn’t normally get that type of experience.” He’s led Cresco’s efforts to build a board of directors and overseen its corporate governance and compliance.

“When I joined the company as a board director, it probably raised some eyebrows in the sense that it was

COURTESY OF TOM MANNING

BY THE NUMBERS

High Tide

\$26.1B

Value of the U.S. market for legal cannabis in 2022

\$44.5B

Expected value of the U.S. cannabis market by 2027

50%+

of Americans live in a state where marijuana is legal.

an unusual move to an industry I had never worked in — and where I’m not particularly experienced with the product,” he says. Having seen the market’s rapid expansion, Manning thinks we’re past the “tipping point” where most Americans accept cannabis as a legitimate product. “I think the industry is normalizing,” he says, “and we are very excited to be a leader in assisting with that normalization.”

Yet many features of the cannabis industry are far from normal. Behind the shiny new dispensaries and slick packaging, prohibition still looms large. Like heroin and LSD, marijuana is a Schedule I controlled substance, which means that the federal government does not recognize any potential for its medicinal (never mind recreational) use.

State-legal cannabis businesses are unlikely to get busted by the feds, but they operate under unique constraints. Growers are not eligible for forms of federal aid handed out to other farmers. Federally chartered banks will not touch cannabis producers’ money, lest they run afoul of anti-money laundering laws. And the IRS prohibits any business involved in the “trafficking” of controlled substances from deducting normal overhead expenses.

Since interstate trade is illegal, each state market is isolated from the others. “There’s no one market. There are dozens of different markets because it’s regulated on a state-by-state level,” explains Kim Sanchez Rael, MBA ’91, the co-founder and CEO of Azuca, a New Mexico-based manufacturer of fast-acting delivery systems for cannabis-infused edibles and beverages. “We’ve got mature markets and emerging markets, and they have their different price dynamics on the exact same product just from one state to the other because of supply and demand.”

Azuca’s proprietary formulations are designed to boost the speed and efficacy of cannabis products. “We call it the ‘Intel Inside’ model,” says Rael, who got her start in VC and tech. “I spent seven years with Intel.”

By supplying its customers with “the magic ingredient that makes them really magical,” Azuca has managed to avoid the limits on banking and financial services faced by “plant-touching” companies. “You can’t move active product across state lines or jurisdictional lines. So our business model is that we ship the non-infused precursor anywhere in the world, and then our partners

“It’ll be a lot easier to operate without having a million different barriers in front of us.”



KIM SANCHEZ RAEL, MBA ’91
is the co-founder and CEO of Azuca.

infuse it with the active THC,” Rael says, referring to cannabis’ main psychoactive component.

Azuca has seen enviable growth. Last year, it was ranked 214 on *Inc.*’s list of the fastest-growing private companies in America, having reported 2,628% revenue growth over three years. Nonetheless, Rael strikes a note of caution when discussing the state of the industry. Growth has been uneven: Markets in states that just legalized, like New York and Missouri, have boomed, while established markets in California and Colorado have slowed as competition has driven down prices. “That really constrains the capital markets for cannabis,” she says. “And there’s a real shortage of capital in the industry right now.”

Combined with what Rael calls “regulatory whack-a-mole,” this makes for a particularly challenging business environment. “It’s the hardest thing I’ve ever done,” she says. “But it’s the most fun thing I’ve ever done because it’s so hard.”

Maggie Connors, MBA ’16, first envisioned the future of the cannabis industry when she was a student at the GSB. She’d come to California in 2014 after working in brand management at PepsiCo in New York. Though full legalization was still a couple of years away, she was struck by the sophistication of the state’s medical marijuana market. “I was really blown away by how much closer to consumer packaged goods it was,” she recalls. “There were retail shelves full of early brands and professional packaging. It was like a real consumer product — just with a Schedule I substance.”

COURTESY OF KIM SANCHEZ RAEL

88%

of Americans say cannabis should be legal for medical or recreational use.

6th

Estimated rank of cannabis among most valuable wholesale U.S. crops in 2021

24

states have legalized recreational marijuana. Medical pot is legal in 38.

1/2

of all American adults say they have tried marijuana.

Waiting to Exhale

As legalization spreads, sniffing out workplace drug use is getting trickier.

In 2022, Quest Diagnostics analyzed 6.3 million urine samples collected at workplaces across the United States. A little more than 4% tested positive for marijuana. A British tabloid trumpeted the news, claiming that “one in 25 American workers are high on marijuana at work.”

Not exactly. The most common drug screening methods do not determine if someone is under the influence when a sample is collected. Urine tests detect pot use within the past 30 days. Hair tests go as far back as three months. (More than 10% of Quest’s hair samples tested positive.) Saliva tests can pick up use within the past day — but they can’t distinguish between someone who only partakes after hours and someone who comes to work stoned.

On-the-job drug testing isn’t just logistically challenging. It’s becoming legally tricky as more states enact workplace protections for recreational and medical marijuana users. As of January, employers in California may no longer ask job applicants or employees if they use marijuana on their own time. And employers may not hire or fire workers based on urine or hair tests. Employers may still prohibit on-the-job marijuana use, however. And the new laws do not apply to construction or jobs requiring a federal background check or drug test.

Steve Lewis, MBA ’84, sees this as a step in the right direction. “Here in California, I have the right to consume cannabis tonight but show up for work and know that I’m not going to be tested unfairly,” he says. Lewis is not against workplace drug testing — far from it: He’s the CEO of Hound Labs,

the maker of the first commercial cannabis breathalyzer. “There’s a need to test,” he says, “but there’s a need to do it fairly.”

Hound Labs is marketing its portable breath test as the solution. It’s more sensitive than saliva tests and less invasive than blood tests, which are still allowed in California. It homes in on THC, marijuana’s psychoactive component, only detecting use within the past two to three hours. While it can’t tell if someone is too impaired to work safely or efficiently, it can tell if they’ve recently smoked, vaped, or taken edibles. “What we’re trying to do is deter workday use,” Lewis says. Hound plans to roll out a rapid-test version of its device later this year.

Drug use at work appears to have increased with the spread of legalization. According to Quest, more than 7% of urine samples taken after workplace accidents tested positive for marijuana in 2022 — twice what it was in the mid-2000s. The post-accident positivity rate in federally regulated industries such as airlines, trucking, and nuclear power is relatively low, but it too has doubled in the past few years.

“If we stop testing, our accident rates will increase, and we don’t want that,” Lewis says. Even if the DEA reschedules marijuana, the need for effective screening will remain, he says. “What’s invariant is the need to test, the need to be safety-sensitive in a process industry, in manufacturing, in a construction site, in a distribution center. That’s not changing.” — *D.G.*

She “nerded out” on the marketing and branding of cannabis, crafting an independent study project overseen by lecturer in strategic management Bill Meehan. (Meehan died in 2023.) “I was inspired by the leadership and management opportunity of helping shape a newly legal industry.”

California voters approved the legalization of marijuana in 2016, and the following year Connors founded Besito, which produced a stylish vaporizer and “mini joints” targeted to “lower dose” consumers. She sold the company in 2021 and is currently the vice president of marketing at Garden Society, a women-owned producer of “hand-crafted cannabis products” based in Sonoma, California. Connors thinks that region’s signature product could provide a model. “Right now the landscape is akin to wine,” she says. “Ultimately, it’s a crop. It’s about growing conditions and terroir, and people really care about where it was grown, which doesn’t happen with beer or chips.”

As more “suits” have gotten into the market, Connors has seen smaller players moved aside. That includes many people who were growing or selling cannabis before it was legal, as well as women and people of color. “You need a lot of capital to even get in the game and to keep up with expensive regulations in inefficient state-by-state markets,” she says. But, she adds, “I’d be surprised if it went the way of beer, where basically you have a handful of giant companies — we’ll see.”

Manning is also confident that cannabis is ready to join the ranks of diversified, conventional products. “Our feeling is that over time, the industry will approximate consumer products and beverage and food are probably going to be affiliated industries,” he says. “Of course, a wild card would be the pharmaceutical industry.”

Rael agrees. “From a product perspective, cannabis is ready to go mainstream,” she says. “It’s just the regulatory frame: It’s not ready for us.”

There’s plenty of buzz that change is in the works. In October 2022, President Joe Biden initiated an administrative review of cannabis’ status as a Schedule I drug. (A dozen Democratic senators went further, urging the DEA to stop classifying marijuana as a controlled substance altogether.) Just as this article was going to press in late April, it was reported that the DEA would move cannabis to Schedule III, the same

“It will take time to really unleash the potential of this industry because right now every state has its own regulatory framework.”



COURTESY OF MAGGIE CONNORS; COURTESY OF THE STANFORD DAILY

category as prescription drugs like Tylenol with codeine and anabolic steroids.

Other reforms at the federal level may be a ways off. In 2022, a measure that would have decriminalized cannabis passed in the House but got no further. Bills that would pave the way to legalization or lift limits on cannabis-related banking and tax restrictions have not come to a vote.

Rael is bearish about the pace of change at the national level. “I’ve always said, do not ever base your business strategy on the assumption that Congress is going to do something,” she says. In the past few years, she’s seen companies make risky investments on the assumption that something big was around the corner. “A lot of people have lost their shirts betting that there’s going to be full federal legalization in the near term.”

Likewise, Connors says real reform will be more complicated than just rewriting the rules. “It’s not going to be an overnight thing. Even when there is regulatory change, it’s going to be a slow process to adopt,” she says. Rescheduling would bring obvious benefits such as

MAGGIE CONNORS,
MBA '16
is the vice president
of marketing at
Garden Society.

opening up access to banking and interstate commerce. But, she adds, “It will take time to really unleash the potential of this industry because right now every state has its own regulatory framework. There’s no governing body to connect the dots.”

Cresco has been working behind the scenes to nudge lawmakers in Washington. In 2023, it reported spending more than \$900,000 on federal lobbying. On an earnings call last November, CEO Charlie Bachtell said he was “optimistic” that rescheduling would happen in the near future.

Such a change would clearly benefit the company, though Manning notes that it would also shake up the competitive landscape as beverage, food, and pharma incumbents come off the sidelines. “Many of the larger companies are still cautious about getting involved in a Schedule I drug,” he says. “Obviously, if regulatory conditions do change fairly quickly over the next year or two, that would open up the game for other participants to come in and play a more significant role.”

If and when things open up, an already competitive, capital-intensive, growth-focused market will become even more so. Like the underperformers in the mother room, many of today’s cannabis companies may not make it to the next harvest.

Back at BRC’s headquarters, Hodgin is comfortable in the niche he’s carved out. “We can do everything we want to do right now because we have all these regulatory permits,” he says. “But it’ll be a lot easier to operate without having a million different barriers in front of us every time we want to do something.”

Some of those barriers are meant to ensure that BRC remains sealed off from the parallel universe of cannabis just outside its razor-wire-topped fence. Hodgin stops outside the massive metal door of a walk-in safe protected by two keypads and a thumb scanner.

“I don’t even have the combo to this thing,” he says. “I’m not allowed to.” The DEA requires BRC to keep its harvest inside the vault — safe from anyone who might come looking for a score. “It’s weird,” he says. “You could just go buy it down the street at a dispensary.” **GSB**

Biz School Studies Use Of Marijuana

BLAST FROM THE PAST

In February 1968, MBA students in the GSB’s organizational behavior course surveyed their classmates about drug use. Of the 374 respondents, 30% reported that they had tried marijuana. No one over 30 had used it, and unmarried students were more than three times as likely to have tried it than married students. Users’ GPAs were slightly lower, though *The Reporter*, the school’s newspaper, was careful to note that “whether this is either a cause or effect is unclear.” It concluded, “The study proves nothing, but is nevertheless enlightening.”

Jennifer Aaker⁵⁴ Monifa Porter⁵⁶ Mohamed A. Hussein⁵⁸
 Lauren Cooks Levitan⁶⁰ Nand Mulchandani⁶²

Voices



Jennifer Aaker, PhD '95, the General Atlantic Professor

RECENTLY, FOUR-TIME NBA CHAMPION Stephen Curry shouted out Jennifer Aaker in a podcast. The hosts had lobbed a few big questions his way: How does he maintain excellence on the court and in his various endeavors off it? Does he believe it's possible to find balance in life while consistently shooting for greatness?

Curry spoke about the importance of continual self-assessment and mentioned a short questionnaire Aaker had created and shared with him. It is comprised of five deceptively simple questions based on decades of Aaker's behavioral research into human happiness, meaning, and potential.

One of the questions, "What was I put on this planet to do?" draws from Aaker's years of research on the importance of connecting to meaning and purpose in one's life — and the ways

HOMETOWN

Orinda, California

EDUCATION

PhD, Marketing, Psychology (minor), Stanford GSB, '95
 BA, Psychology, UC Berkeley

ACADEMIC AREA

Marketing

in which this differs from pursuing short-run happiness. Another, "What elevates me?" taps into her work on awe and how it can expand our perception of time and enhance daily well-being. A third question, "Do I have space for beauty, humor, and spontaneity?" is rooted in her book, *Humor, Seriously: Why Humor Is a Secret Weapon in Business and Life* (coauthored with Naomi Bagdonas), and in forthcoming research about the transformative power of making space for life's beautiful moments. The podcast's hosts wrapped their conversation on a note inspired by Aaker — they asked Curry to share a recent beautiful moment.

Aaker considers it imperative that her research yield practical, real-world take-aways and practices that anyone could implement. Hence the five-part questionnaire — and her ongoing brainstorming of exercises to help people benefit from her findings about the drivers of human thriving.

The Right Kind of Impact

As a teenager, Aaker wanted to become an oncologist. Her grandfather had died of cancer, and she developed an early conviction that this was how she could make a positive impact on the world.

As she worked her way through school, however, her proclivities for math and questions about the human condition steered her in a different direction. She graduated with a bachelor's degree in psychology and then a PhD in marketing. Still, she retained her driving desire to find a way to make a positive impact.

For the first decade or so of her career at Stanford, Aaker's work was largely marketing-focused. Gradually, she began to broaden out into more universally pressing questions like, How do we make

“To take my field, my research, and my connections to help save lives — that was extremely gratifying.”

the best use of our time? Under what circumstances does helping others help *us* feel better? Is it possible that even negative experiences contribute to a more meaningful life? How does one look back on past failures (and successes) to fuel forward progress and potential?

As Aaker began this transition about 15 years ago, she was researching how social media does (or does not) foster collective action. She was in the skeptical camp until one of her students, Robert, told her a story about his best friend, Sameer, a newlywed in his early 30s who had been diagnosed with leukemia. Robert had leveraged social media to organize hundreds of bone marrow drives with a goal of registering 20,000 South Asian donors in just a few weeks. He had exceeded this goal — and found a perfect match for Sameer. Unfortunately, Sameer had relapsed shortly after his transplant and passed away, perhaps in part because the match hadn't come fast enough.

Aaker remembers her reaction upon hearing Robert's story: "All I could think was, what could *I* do now?" She brought the question to her husband. Together, they collected stories like Sameer's: inspiring examples of individuals and organizations that had created infectious action with few resources. They gathered the stories — and takeaways about what had helped the viral projects take off — into a book called *The Dragonfly Effect: Quick, Effective, and Powerful Ways to Use Social Media to Drive Social Change*.

Aaker brought *Be the Match* trucks along to her book events, yielding 113,000 new names for the bone marrow donor registry and saving over 200 lives. "As someone who was always attracted to oncology, to be able to take my field, my research, and my connections to help save lives — that was extremely gratifying," she says.

Happiness and Meaning

Aaker is sometimes categorized as part of positive psychology, and while she sees

herself as aligned with that field in some ways, it's also true that much of her work has been a reaction against it. A large swath of positive psychology prioritizes feeling happy, and Aaker sensed that this prioritization can backfire.

"I saw parents that said, 'I just want my kid to be happy,'" Aaker says. "Or I saw people getting depressed when they realized they were low and thought they should be happy, and then were doubly depressed because they weren't. That got me thinking about whether there might be a difference between short-run happiness and what's truly meaningful."

In 2012, Aaker coauthored a breakthrough paper, "Some Key Differences between a Happy Life and a Meaningful Life." Aaker and her colleagues studied people who were high on happiness but low on meaningfulness and those who were high on meaning but low on happiness. They found important differences in how the two groups led their lives. Those in the happy group tended to avoid negative emotions, described themselves as relatively self-oriented, and spent more time thinking about how they felt in the moment. In contrast, those high in meaning spent more time helping others, being with friends or taking care of children, and thinking about the past, present, and future.

A Beautiful Mindset

As Aaker conducted this research, she considered the values reflected in our rapidly advancing technology — and wasn't always heartened. Most of our tech tools, she has said, are geared around creating small explosions of short-run happiness. "Like junk food, technology serves up a sugar rush but fails to nourish us," she said in a talk to the Stanford Institute for Human-Centered Artificial Intelligence (HAI) in 2020.

Aaker has spent many years teaching classes that integrate her findings regarding human potential with tech themes. She taught *The Power of Social*

Technology, followed by *Designing for VR/AR: Scaling Empathy in an Immersive World*. But the possibilities — and concerns — presented by new and forthcoming AI place an even greater need to bring Aaker's topics of research to bear on technical conversations.

She partnered with Fei-Fei Li, a professor of operations, information, and technology (by courtesy) at the GSB and co-director of HAI to teach a class called *Designing AI to Cultivate Human Well-Being*. Aaker notes that the top reason students report signing up for the class has nothing to do with the technical aspects of machine learning — it's to better understand human well-being.

"Because of the framework of human well-being that Jennifer and I try to infuse into our curriculum and our conversations," Li says. "I go back to my own research and discussions with colleagues with a focus on how to make sure our core AI technology can eventually deliver these kinds of positive values to humans and society."

Aaker's newest class, *Sustainable Human Behavior*, which she coteaches with fellow marketing professor Szu-chi Huang, is built on research she's been conducting for the past few years (also with Huang) about the power of a "beautiful mindset" and a "journey mindset."

"What we're doing with this beautiful mindset research is diving more deeply into people's subjective experience," Aaker says. "Now, think about how interesting that is relative to AI — AI is not going to be able to have subjective experiences, at least for a while. This idea of what defines the human subjective experience is going to be a blossoming topic for the next decade or so. And I'm hoping this window of research will be able to add to that conversation — in a way that anyone could feel connected to."

—Katie Gilbert

Life Support

Partly inspired by her mother's experience as a hospice volunteer, Aaker recently became a death doula. "I think there is nothing more human than supporting family in the final days of their loved one's life," she says. "I feel honored when I am able to do it — and it makes me savor each moment of this beautiful life."



WAIT, THERE'S MORE
Read a longer version of this profile at stanford.io/aaker.

Monifa Porter, MBA '03

PERHAPS MONIFA PORTER'S TECH CAREER was inevitable: As a kid, she attended computer camp, and the confetti her family threw at her brother's high school football games was the chads her dad brought home from his job using computer punch-card machines.

A self-described nerd, Porter is senior vice president and head of SHIFT[^], a startup within Mach49 of Redwood City, California, that produces AI-powered venture-building software that makes it easier and faster to build and launch startups. Linda Yates, Mach49's CEO and the lead investor in SHIFT[^], gave Porter a mandate to "democratize" the company's professional services offerings, making them more accessible to a broader user base.

AI is the latest domain for Porter, a veteran entrepreneurial strategist and product development leader. In the past two decades, she's worked as a senior product manager at PayPal, creating products to combat fraudulent transactions; led a team at Opower that designed and built a web-connected thermostat; and held management positions at fintech company Taulia and A3Ventures, the innovation lab and capital investment engine of AAA Northern California, Nevada, and Utah.

LOCATION

Oakland, California

EDUCATION

MBA, Stanford GSB, '03
MA, Ohio State University
BA, Miami University

PROFESSIONAL EXPERIENCE

SVP and head of SHIFT[^], Mach49
Advisor to Energicity, Mindful You, NOCAP Sports, and Headnote
Head of product, A3Ventures

Yet Porter says she initially had little interest in technology. Curious about consciousness and our perceptions of reality, she studied psychology and neuroscience on a full scholarship at Miami University in Oxford, Ohio. Then she dug into critical race theory and women's studies at Ohio State, exploring the intersections of race, gender, and society. Porter planned to earn a law degree and enter academia, but a detour to San Francisco altered her course yet again.

How would you describe your mission?

I lead SHIFT[^], a startup within Mach49 that provides venture builders with the tools and methods to validate new business concepts with customers and bring new ventures to market. SHIFT[^] enables entrepreneurs to find those customer insights that are really the keys to the realm. I want to put tools into people's hands to build their own businesses and solve their own problems.

I found that with corporate venture building, the problems corporations are willing to solve are big problems for big markets. But the problems the world faces are both big and small. So who's solving the hyperlocal problems of a kid in a neighborhood where there's no grocery store? When you put entrepreneurship into the hands of everyone, real-world problems at any scale can get solved. If you can empower people everywhere to solve the immediate problems that are right in front of them with new businesses and new ventures, then the smaller but important things that big corporations don't care about can also be fixed.

What's a project you're excited about?

We just wrapped a project working with a client team who wanted to create a new venture focused on DEI in hiring. We agreed that we would work together to help them figure out the "what" and "how" if they were willing to pilot some of my new tools.



ELENA ZHUKOVA

“When you put entrepreneurship into the hands of everyone, real-world problems at any scale can get solved.”

Typically, in a 12-week engagement, we go from an idea on the whiteboard to a customer-validated business plan and pitch with an understanding of what the product is going to be. But we don't actually ship the product in that time frame. With this client, by the end of the engagement we were able to put a real functional product in front of people.

Our client's product showed the real-world experience of a job candidate rather than just the bullets on their resume, because, you know, bullets on a resume highlight the brand of the places that you worked, or the brand of the university that you attended, but they don't necessarily fill in all the blanks of all your skills. With SHIFT[^], we were able to build the product and get it in front of hiring organizations — and have those hiring organizations agree to be pilots, in less than 12 weeks.

It was wildly successful. Our software wasn't just doing things faster; it also uncovered new customers for us.

What are some of the limitations and risks of relying on AI in this context?

Critically important is the interaction between AI and humans. Because if you just push a button on AI, you'll get an answer — but it may or may not be the right answer. But when you use AI as a copilot, and you're going back and forth, you can validate, you can explore, and you can discover new things. You have to be able to prompt the AI appropriately. We're trying to make sure that the interaction model is crisp and clear and that we're bringing in human intelligence in exactly the right moments in the workflow.

How often have you been the only woman — or the only Black woman — in a room of founders, executives, or VCs?

That's like 98% of my career. It's kind of part of who I am. I'm multilingual. I can talk to a lot of different people. I've always been able to relate to whoever I'm

in a room with. That's probably a coping skill I learned as a child when I was the only Black kid in my classroom.

What is wonderful now is that I'm an executive. I hired my team, and when I look at my team, it's one of the most diverse groups I've ever worked with. We are a wide-ranging group, across race, gender, sexual orientation, ethnicity, and geography — a Rainbow Coalition on my little team. And that's not because I'm trying to fill a quota. It's because when I hire, I hire the very best, and I do not exclude anyone from that pipeline.

Why did you pivot from law and academia to technology, startups, and product management?

I have the attention span of a gnat. I do the things I'm interested in, and I'm willing to follow my nose. As I look back, I don't have any regrets. I see the through line. It makes sense to me why I did one thing and then the next. [After college] I was young and gay and living in Ohio, so I moved to San Francisco with a bicycle and \$60 in my pocket. I had it in my head that I was going to stay for nine months while I finished my law school application. That was the plan in 1997. It's now 2023, and I'm still right here in the Bay Area.

Early in my career, I was working in customer care at CNET, and I was invited by some friends who were starting a company to come and run their customer care team. That's when I realized I can move fast and break things with a small team and have a bigger impact. I decided to let my law school admission go because I wanted to stay with business and build new ventures and startups and work with small teams and build cool stuff.

I didn't know what a product manager was. It was 2000. I was working with engineers, business leaders, and designers, and I was imagining the next thing we would build and writing it down in the context of, *Here's how we achieve our business objective with a really*

great design. Here's what the engineers should build next. I didn't know what that job was, but I loved it. I looked on Yahoo HotJobs and read through the job descriptions until I found one that looked like that: product manager.

You were drawn to Stanford GSB for what you call its “entrepreneurship spirit.” What has stuck with you?

How do you rise above the fray and find the solution that's going to optimize and maximize for all parties? I got that fundamental way of thinking from business school. The modeling class I took turned out to be really awesome. I still think about that class.

In my first job out of business school as a product manager, I worked with a data scientist on algorithmic approaches to solving fraud problems at PayPal. We were looking at all the variables that could potentially indicate that a transaction was fraudulent. We would switch out the payment method given the degree of risk. That was the very first product I shipped at PayPal, and it was a giant regression model. And I was like, oh, I learned this in school. I know how to do this.

I also spent as much time as I could outside the business school. I took bass lessons. I took Spanish literature and creative nonfiction and all kinds of stuff. I go back any time I can. I teach a couple of product management classes a year [at the GSB]. Answering students' questions is probably some of the most interesting thinking that I do.

How does your work intersect with DEI?

What we're doing right now with SHIFT[^] is democratizing entrepreneurship globally. We're getting venture-building tools into everyone's hands. That's really important to me. I see it as a way to drive diversity and inclusion and to enable all kinds of people from all over the world to solve really important problems that a large corporation may find too small to solve. — June D. Bell

Tech Trek

When thinking about her next travel destination, Porter has her eye on Nigeria. “I'd love to explore Lagos because of its thriving tech and AI sectors, and its vibrant entrepreneurial scene,” she says. “It would be incredible to connect with local founders and creatives and experience the energy of one of the world's largest megacities firsthand!”

Mohamed A. Hussein, PhD '24



MOHAMED A. HUSSEIN'S FIELD IS MARKETING, but he's not just aiming to persuade consumers to buy a certain brand of sneakers or breakfast cereal. Instead, he wants to figure out how to sell democracy — how to get more Americans to engage politically and to listen to one another, rather than repeat stock slogans or wallow in cynicism and apathy.

"I feel it's a moral obligation," Hussein says. "We need to protect this democratic system. We need to understand it; we need to make sure that people are engaged and that we can persuade voters to turn out at the polls."

That passion was first sparked when Hussein was a teenager growing up in Cairo and watching the Arab Spring, a pro-democracy movement that swept across Egypt and other Middle Eastern and North African countries in the early 2010s. While he was too young to participate directly, "it got me interested in how you move people, and how do they go almost overnight from accepting the status quo to suddenly feeling inspired to take action?"

HOMETOWN

Cairo, Egypt

EDUCATION

BA, Middlebury College

FIELD OF STUDY

Marketing

When Hussein came to the United States to attend college a few years later, he was shocked to discover that friends and colleagues seemed detached and disinterested in the political process. "Back home, there were people who had lost their lives or been injured just because they wanted the right to vote," he says. "Here in the U.S., that right is protected, but even so, many can't be bothered to go and actually vote. That juxtaposition was so stark. But I was, like, hold on a sec. This is really interesting and important."

As a teenager, your mother, a single parent, lost her job and could no longer afford to pay for your education. How did that shape your thinking and your career path?

In Egypt, there are strong norms and social expectations. It wouldn't have been acceptable for me to go to work as a waiter or a cashier because then people would have seen that our family was suffering financially. What would look socially acceptable but still generate income?

I had to be creative. I was always really good at Arabic and competed in poetry and grammar competitions. So I thought, who can I teach Arabic to? As it turned out, there were a lot of people from abroad who were interested in learning. But I had another problem — I didn't speak any English. I had to teach myself. I started listening to BBC Radio every day and read every book I could get my hands on and used a dictionary to figure out words. I did that for six months, putting all my energy into it. Once I knew English, I had a way forward. I started connecting with people on language exchange websites. I ended up teaching dozens of students, mostly ones coming from Oxford and Cambridge to spend a year abroad studying in Egypt.

I learned from my students, too. I was 14 at the time, and they were juniors in college. They took a tremendous interest in me. One of them changed my life by telling me about United World College, an orga-

"The most persuasive people I've come across weren't the ones who were the loudest or the most boisterous."

nization that gives people from all over the world scholarships to finish high school abroad. I ended up applying and getting in. Otherwise, I would have never left Egypt.

You're interested in finding ways to improve political discourse and get people on opposite sides to listen to one another.

What led you to focus on that problem?

When I left Egypt, I attended UWC Pearson, a boarding school in Canada that aimed to bring together young people from different countries and backgrounds. Everyone was on scholarship, and we had more than 70 different nationalities represented. It was life-changing. There was such a strong culture of openness, of trying to hear and learn from one another. There, I noticed that the most persuasive people I've come across weren't the ones who were the loudest or the most boisterous, the ones who steamrolled other people. Instead, they were the people who were willing to take a step back and show that they were open-minded and interested in hearing your perspective.

This got me interested in studying receptiveness — people's willingness to seek out and engage with ideas and others they disagree with. In my research, I have found that signaling receptiveness to others — by, for example, asking questions, admitting uncertainty, or using more inclusive language — is very impactful. It can make you more persuasive, it can encourage others to share your message and help it spread, and it even decreases the likelihood that your content gets censored online. It's a superpower that all of us can tap into.

After studying economics, what led you to go for a PhD in marketing?

I wanted to be in a department that was interdisciplinary. At Stanford, we have faculty who are trained as consumer psychologists, social psychologists, and economists. This fits with how I think we should approach consumer behavior research, looking at it from multiple

perspectives. In my own research, for example, I run carefully controlled experiments to understand the precise psychology involved, but I also use natural language processing tools to examine how the phenomena I study manifest in the wild.

The other huge thing was the opportunity to be in the pioneer cohort of the Knight-Hennessy Scholars program. It's a community of people who are really excited about making the world a better place. I have friends who are working on curing blindness or improving female labor participation in India. Constantly interacting with people who are so different from you and are in different fields is an extremely enriching experience academically.

I also was fortunate to get a Diversifying Academia Recruiting Excellence (DARE) fellowship. This group, particularly director Anika Green, was how I finally believed that someone with my background has a shot at becoming a professor.

What classes and professors at GSB have been beneficial to you?

Professor of behavioral science and marketing Zak Tormala is my primary advisor, and he's been a big influence. In my first year, I took a class with him on attitudes and persuasion that really changed my trajectory. Up until that point, I hadn't really known about attitudes and persuasion or political psychology as subdisciplines, and something just clicked.

Marketing professor Jonathan Levav is so good at distilling ideas down to their very essence. Often, the most impactful research ideas are the ones that are simple and elegant. Marketing and management professor Christian Wheeler is really good at making sure you understand the boundaries of your ideas. It's not enough to say that X causes Y. It's important to ask, why does X cause Y? Additionally, I'm a member of sociology professor Robb Willer's

lab. He's been a great informal mentor to me, and his lab environment has been very enriching intellectually.

What's the focus of your doctoral research?

My dissertation examines the intersection of consumer behavior and politics. For instance, for decades, we consumed political information privately, but now our information consumption habits are pretty public. On Facebook, you can see what kind of events your friends go to, and on Twitter, you can see who people follow and engage with online.

Given this visibility, how do we evaluate people who are willing to consume political information from members of the opposing political party? In experiments and in online Reddit data, we find that being receptive to opposing political views carries reputational costs. This matters because in a democracy, you would ideally have voters make up their mind after considering multiple perspectives, but we are finding that peers intervene and punish such open-mindedness, which makes it less likely to happen.

In another part of my dissertation, I look at how consumers react to a novel and increasingly prominent political advertising strategy: what we term "meddle ads." Last year, Democrats tried out a new strategy in which they boosted and helped far-right candidates win Republican primaries because they're seen as easier to beat. We find that when people learn about the use of this advertising strategy, they dislike candidates who use it, they are less likely to vote for them.

What's interesting is that one of the reasons people have this aversive reaction is that they think meddle ads can undermine and erode trust in democracy. I think that helps us appreciate how nuanced and complicated political polarization really is and gives us hope that there are still people out there who value and care about protecting democracy. — *Patrick J. Kiger*

Born Identity

Hussein's official date of birth is not day he was born. "The government employee told my dad that they had 'run out of space' for my actual birthday, so he could make me two days older or two days younger. My dad went for two days older. So my official birthday is November 7, but I was actually born two days later."

Lauren Cooks Levitan, MBA '92

LAUREN COOKS LEVITAN HAD JUST GRADUATED from Stanford GSB with her MBA and was ready to begin a career in consumer retail. Eventually, she would rise to executive positions at multiple companies, but her first move was highly unorthodox for a newly minted MBA: she took a minimum-wage job working on the sales floor at Crate & Barrel.

“While still at the GSB, I was introduced to someone named Phil Schlein, the former CEO of Macy’s West, who at the time was a venture capitalist on Sand Hill Road,” Levitan recalls. “He became a very generous mentor and resource for me because he knew my aspirations to build a career in retail. He said you need to prove to people in retail that you’re really prepared to learn from the ground floor. He said, ‘I think you should go work in a store.’ And so I did.”

It was a decision emblematic of Levitan’s combination of practical thinking and strategic intuition. During a career that has included stints on Wall Street and Main Street, her direction has always been informed by a passion for meeting consumer needs. Today, she is chief financial officer at Faire, an online wholesale marketplace that supplies products to small businesses and provides virtual storefronts for brands. For example, a mom-and-pop store on the hunt for unique Halloween decorations will be pleased to find a life-size hanging skeleton for sale on Faire, and the little shop on the corner that wants to offer

LOCATION

Mill Valley, California

EDUCATION

MBA, Stanford GSB, '93

BA, Duke University

PROFESSIONAL EXPERIENCE

CF0, Faire

CF0, Fanatics

Founding partner, Moxie Capital

holiday puzzles its customers won’t find at Walmart has a go-to. Meanwhile, the brands selling those products prosper by finding a community of retailers looking for just the right thing.

“Knowing that you can empower these hundreds of thousands of entrepreneurs is very gratifying,” Levitan says.

What were your earliest influences, careerwise?

When I was in middle school, a big shopping center opened in my hometown called Northbrook Court, and people were very excited about it. I remember I would walk through, and I would see a store and think to myself, “Well, that’s not going to work. No one’s going to shop there.” The prices are too high, or the product is wrong. And normally, I was right. A year later, that thing would be gone. I had this inner voice that was always critiquing and commenting, and it was only years later that I realized everybody didn’t have that voice.

You studied political science at Duke but ended up on the trading floor at Goldman Sachs right out of college. And you were there at a rather tumultuous time.

I got there right before the 1987 crash. I loved the action and the activity, but what I also loved was that we were coming out of a recession, and the first set of deals were consumer deals. The consumer usually has to pull the economy out of a recession. These were projects that were very much in my wheelhouse and matched up with that kind of consumer instinct that I had. Just serendipity.

You arrived at the GSB with a very specific aim in mind, right?

At Goldman Sachs, I had the good fortune to work on a bunch of equity transactions for retailers — Williams-Sonoma and Tiffany and Safeway and Staples. But I decided I was much more interested in working inside those companies, so I spent my whole time at Stanford looking at consumer retail and



“The immediacy of the feedback from the consumer is something that you should never lose sight of.”

restaurant businesses. Whenever there was any opportunity to do a project or work with a company, that's what I gravitated to.

It takes a certain amount of chutzpah to deploy your business school training in a retail store. What did that experience at Crate & Barrel teach you?

What I learned from it was that the immediacy of the feedback from the consumer is something that you should never lose sight of. I really tried to reflect on that and infuse that customer input in everything I did and everything my teams did. As you get more and more senior, you're farther removed from the consumer, and ultimately, that's the only vote that counts.

I spent time in the stores with Crate & Barrel, and then I joined a company called Gymboree. I was the merchandise manager for the little boys' business, and my manager left a week after I got there. So all of a sudden, here I was, this brand new person in this role I was supposed to be learning. And so while they were looking for her replacement, I was figuring it out and basically doing the job. Eventually, they just gave me the job — a battlefield promotion.

But then it was back to Wall Street.

As much as I'd said I was never going back to Wall Street, I wanted to be in a company. I was eager to put together the operational skills that I built in the stores with the more strategic skillset I had built at the GSB and with the access to capital markets that I'd built earlier in my career on Wall Street.

You were there at the cusp of the technology revolution. How did that fit with your interest in consumer-facing businesses?

I went to my boss, and I said, "There's this thing that I think is happening at the intersection of consumer and technology, and I think there's going to be some public companies that emerge over the

next couple of years. And because we're such a technology-driven firm, we should really go after this."

The entrepreneurs we worked with didn't want to be thought of as retail or consumer businesses because they'd have lower valuations. They wanted that technology valuation, but they also wanted people who understood their business and could help guide a conversation related to it. I ended up spending 13 years back on Wall Street and saw the transformation of e-commerce.

You've had many successes, but what's an example of a failure you experienced, and what did you learn from it?

I like to build things. I like to be part of a team that is pushing towards something together. That's the part of this work I enjoy most, so after 13 years on the sell side, I thought, 'I should just devote 100% of my time to helping build companies.' I partnered with somebody who had a deep background in private equity, and she and I set off to raise a fund and build a portfolio of companies in consumer and in retail.

We did this in the middle of the market crash in 2008, so that was not the best timing, and we weren't successful. I mean, we did a couple of deals; some were successful, some were not. But we weren't successful in really getting a firm off the ground. But any time we did make an investment, I tended to go inside the company and do a lot of the work that a CFO does, even if we had somebody in place. I was getting back involved in the operation of companies. That's always where my heart has been.

Speaking of CFO, you were in that role at Fanatics, which must've been fun for a self-described "sports nut."

It was like a duck taking to water, I just loved being around sports all the time. But I was managing a team in Jacksonville, Florida, and I was in Northern California. I spent about a week every month there, and I always felt like it wasn't as successful for them or for me for me to be

3,000 miles away. I learned a ton in that job, but when Faire came knocking, it was a really great opportunity for me to marry a lot of things.

What is it about Faire's mission that inspires you?

We say our mission is to empower entrepreneurs to chase their dreams. We are a two-sided marketplace. On the demand side are hundreds of thousands of independent retailers, and on the supply side are about 100,000 independent brands. These are all people who wanted to have their own business, and they've typically been disadvantaged relative to much larger retailers and brands. So we're building technology tools that level the playing field.

How does the work you're doing now align with your interest in supporting women in business?

I had a hypothesis that Faire would over-index to female and underrepresented minority ownership, and that turned out to be true. The day I learned that was the day that I knew I was going to accept the job because not only was I impressed by the overall mission of the business, but I got to marry my personal and my professional passion for the first time in my career. Our business model is helping to level the playing field, and it is disproportionately helping to level the playing field for women. That's very special to me.

What values are important to you in choosing a place to work?

It's changed over time, but what's important now is two things. The impact that I believe I can have on the organization — that's one big plank. The other plank is what the community, the culture, and the mission of the business is. Faire is the first company I have worked for that is a mission-driven organization. I regret that it's taken me this long in my career to get to a mission-driven organization, but I can't imagine ever taking on a role now if that wasn't the case.

— Kevin Cool

Icebreaker

Levitan is passionate about sports, both as a fan and sometimes as a player. In high school, she was part of an all-girls hockey team called the Mother Puckers.

Nand Mulchandani, MS '18



NAND MULCHANDANI'S UNUSUAL CAREER unfurled as a series of pivots that make total sense — at least in retrospect.

With a degree in math and computer science from Cornell University, Mulchandani nabbed a job at Sun Microsystems. He then co-founded three technology startups and managed another, all involving enterprise infrastructure and cybersecurity. All were acquired by larger companies, and he twice moved into positions at those firms: security product management and marketing for VMware, and vice president of strategy and market development at Citrix.

Then, a surprising turn: For all his entrepreneurial success and management experience, Mulchandani decided he needed a more well-rounded business education. In 2018, he earned an MS at the GSB. He followed up with a degree in public administration at the Harvard Kennedy School.

Mulchandani had hoped to run for an open congressional seat. But the campaign for higher office fizzled. That meant Mulchandani needed to pivot again. A Harvard classmate introduced him to a three-star general, and that led to a post as chief technology officer and later acting director of the U.S. Department of Defense's new Joint Artificial Intelligence Center.

From there, it was another leap to the CIA, where he could draw on his governmental experience, deep tech background, and

LOCATION

Fairfax County, Virginia

EDUCATION

MPA, MC, Harvard Kennedy School
MS, Stanford GSB, '18
BA, Computer Science and Mathematics, Cornell University

PROFESSIONAL EXPERIENCE

Chief technology officer, Central Intelligence Agency
CTO and acting director, Joint Artificial Intelligence Agency, U.S. Department of Defense
Vice president, strategy and market development, Citrix

extensive Silicon Valley connections. "I'm an unabashed technology and American maximalist," Mulchandani says. "When it comes to the technology industry, we're number one."

You did much of your early schooling in Delhi, India. What kind of adjustments did that entail?

I was actually born in California, in Mountain View. When I was eight years old, my parents decided to move to Delhi. My dad's side of my family is all in India. My mom's a Dutch citizen. Our family is very international. My dad wanted us to connect with our family and the culture there.

It turned out to be a really tough transition. We were accustomed to all the comforts of the United States. The Indian educational system is very different, very competitive, very focused on science and math and engineering. I did a lot of debate and drama, which I think ended up helping me later in life.

Was your focus always on technology?

For as long as I can remember, I had always thought that I was going to go back to Silicon Valley and do a startup. I graduated [from Cornell] in 1991, right into the middle of a recession. At that time, Sun Microsystems was the hot company. It was the Open AI or the Netscape of that day, and I was very lucky to get a job there. I worked on chip design and compiler optimization, which is now considered really old-school stuff. I love the tech industry; it's my lifeblood, although I don't like the over-glorification of it.

How did you get involved in startups?

Compared to today, doing startups in the '90s was hard. I tried a few different projects, which did not work out, and it was all very discouraging. I thought, "I need to get a professional degree to learn how." I applied to a bunch of business schools — didn't get into Stanford, got into Harvard Business School. Then what happened — and this is the beauty of

"We have adversaries trying to hack us every day and trying to hunt our technology and people down every day."

Silicon Valley — I was having lunch with a couple of buddies who had a startup, and ran into another group of folks. [Sandeep Johri, MBA '90, now CEO of Checkmarx, an application security firm, said], "I'm thinking of doing a startup in the intranet space, can we have lunch?" I ended up deferring HBS.

What were the common threads in your four startups?

My focus has always been enterprise infrastructure software and cybersecurity companies. I just love the creation of new products, as well as the go-to-market side of it. One question I often get asked was, "How did you design your career?", and the answer is "I didn't." I have a very large network of people that I know and am lucky to get a lot of ideas thrown at me. Usually, I get pulled into stuff that becomes really exciting and interesting.

So how did you end up in the MSx program?

I don't want to call it my mid-life crisis. I had a really fun and successful career, but I think I'd had my fill of startups and have seen the tech industry from almost every angle. I still had this itch to go to grad school. I liked the idea of going back to give myself time to understand why things worked the way they did. I wanted to learn more about the underlying structural aspects of business.

And then you went to Harvard?

This is where things get even more complicated. The other thing that I'd started thinking about was a potential run for public office. I took some classes at the GSB around politics and Congress and policy-making. The faculty said, If you really want to go do this, you don't have any connections in Washington, [and] Harvard has this mid-career program at the Kennedy School. I was this very odd duck, being from the tech industry trying to pivot into government work. Unfortunately, the run for office didn't work out because the seat that was going to come open didn't.

That meant another big pivot.

Yes, coming out of graduate school I was now unemployed! But like in my previous life, I got lucky that chance meetings with people led to something new. I got connected through a Harvard Navy classmate to an Air Force general at the Pentagon, John "Jack" Shanahan. He said, "I'm creating this artificial intelligence center for the military and need to partner up with a technologist." I said, "I'm not really doing anything else, so sign me up." The funny part is, this was literally my first trip to the Pentagon, and I didn't have any clearances or idea what I was getting into.

This was kind of another startup, albeit within a large organization.

It is, absolutely. General Shanahan and I teamed up and brought our own respective skills and relationships to the mission. My startup learnings and experience — applying that to this two-million-person organization — that was the trick. It was a huge case study in how you deal with organizational change.

How did you end up as the CIA's first chief technology officer?

The CIA, recognizing the growing interaction between Silicon Valley and the USG, wanted to hire someone who knew both worlds. They boldly looked for someone we are starting to call a "dual-citizen" of Silicon Valley and the government, who has experience in both of these worlds. The idea with the creation of the CTO role was that the Agency was going to elevate this position to be part of the senior leadership team. It's a very CIA thing to do, to think forward, be ahead of the curve.

What do you do as CTO?

First and foremost, we're a 75-year-plus human intelligence agency. We have been doing technology here for a long, long time, and we do it at scale — the scope of our technology work is extremely broad and wide. My joke is that we do every-

thing from shoe phones to internet-scale software and everything in-between. These things have to work fail-safe, they have to be hacking-proof. One big aspect is managing a very broad portfolio of tech. Another dimension is to get the best of industry and bring it back into the Agency. There are all kinds of issues in terms of hardening those products. We have adversaries that are trying to hack us every day and trying to hunt our technology and people down every day — that's the nature of our business. The other thing is the relationship with the Valley — learning and mastering six to ten emerging tech markets: the semiconductor industry, 5G, biotech, fintech, artificial intelligence, high-performance computing, space, fusion, next-generation batteries.

You need to understand the most cutting-edge developments in each field.

We employ some of the world's leading experts in each one of these areas. Our analyst community is world-class. This is an adult candy store of incredibly smart people. Technology is rapidly changing, incredibly deep, and very complex. It is incredibly important for us to be on the cutting edge.

What lessons from Stanford have stayed with you?

Everybody who goes there is looking for two things. One is you're trying to get better and smarter in one dimension you may already have been good at. The other dimension that Stanford really focuses on is the pivot: It's the idea that you as an individual have such potential to go do anything it is you want to do. I was a technologist for my entire career, had never stepped foot in the Pentagon or the agency here. But the ability to have the confidence or the training to make such a hard pivot... I'm a little bit of a poster child [for] the perfect pivot. We need a lot more people doing this pivot, going from technology into government.

— Julia A. Klein

Economic Models

"It was an amazing year," Mulchandani says of his time at the GSB. Memorable moments included *Project You*, guest lecturer Tyra Banks' course on personal brand management. "On the other end, I took a class with professor Myron Scholes, who has the Nobel Prize [in economic sciences] for options pricing."

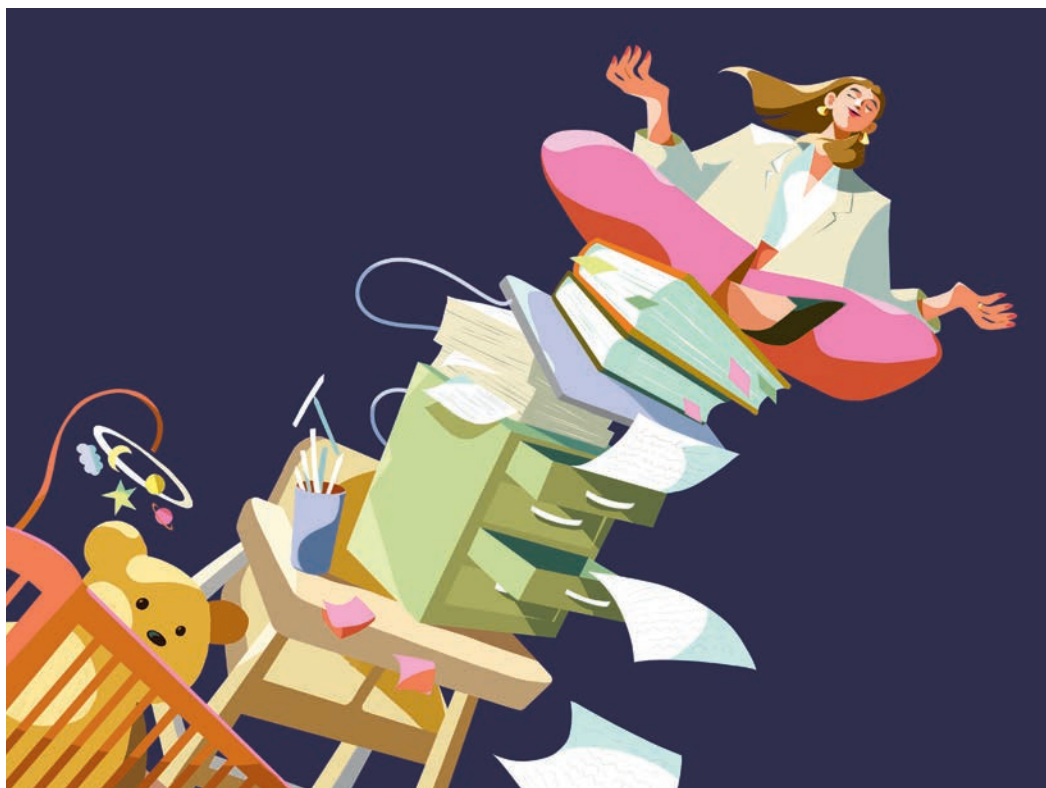


GRADUATE SCHOOL OF BUSINESS
KNIGHT MANAGEMENT
STANFORD UNIVERSITY

Illustration by Manshen Lo

WHAT MATTERS TO ME NOW AND WHY

Alyssa Rapp, MBA '05



Like many newcomers to Silicon Valley, when I entered the GSB I did not wonder why I should start a company but only questioned why I shouldn't. The pixie dust in the air surrounding Sand Hill Road fueled those dreams, as did the insights I gained from entrepreneurial greats like Joel Peterson. As an entrepreneur, I hoped to create unique solutions to commercial problems, thus jobs, and give back through a life of service.

My inspiration for this path, as I wrote in my What Matters Most essay, were my Jewish elders: my Dutch grandfather, a Holocaust survivor and entrepreneur; and my stepfather, whose walk-around management style had taught me most of what I knew about leadership up to that point. Like them, I sought a life fueled by passion and purpose that resulted in impact.

I still do.

What has changed is my appreciation of how much grit, tenacity, luck, and support one needs to pursue their entrepreneurial dreams, even in the greatest country on Earth. I now have a deeper understanding of the complex role government plays in capital markets. I have been caught in the crosswinds of regulatory changes, first as a dot-com founder navigating the landscape for third-party marketing firms in the wine industry.

RECONNECTING

Alyssa Rapp, MBA '05, is a CEO, lecturer in management, author, and director by day, and an athlete, wine enthusiast, and entrepreneurial tinkerer by night.

More recently, as the CEO of a SPAC, an unexpected SEC rule change nearly wiped out the entire asset class just weeks after we launched. In both cases, I pivoted to survive. I had been raised to believe that government only does good in people's lives. That foundational value has been tempered by witnessing how the wrong kind of intervention can hamper well-intentioned entrepreneurs and decimate shareholder value.

I've evolved to be even more committed to gender equality in corporate America, having encountered blatant sexism over the years — from potential investors on Sand Hill Road in my 20s to a potential target company's CEO in my 40s. These kinds of experiences fueled me to create *Women as Investors, Directors, CEOs, and Executives*, a course I have taught for four years at the University of Chicago Booth School of Business. I am unapologetic about only serving on boards and leading teams that walk the walk of gender equity.

I underestimated how the balancing act of being a mom/wife/CEO/executive/investor/director would force me to continually assess my priorities. (I've been lucky that my GSB classmate, Hal Morris, has been the greatest husband, partner, and teammate I could have ever chosen.) To paraphrase my friend Marissa Mayer, the dichotomy of being a mother and CEO is no dichotomy at all — but the system needs slack in order for women to excel in their kaleidoscope of roles.

Today, I am even more of a believer in the GSB's call to change lives, organizations, and the world. Living a life whose end product is impact and service is what matters most. And the people with whom you partner personally and professionally punctuate every step of the journey — and likely matter most of all. **GSB**

“The dichotomy of being a mother and CEO is no dichotomy at all.”

Stanford | Women on Boards

Lead change. Build boards.
Empower women.

Start your board journey

Access resources to help you prepare for your board journey.

Find a board seat

Apply for board openings with support from our dedicated board match team.

Become a modern steward

Engage with thought leaders to understand issues and best practices in corporate governance.

Network with amazing leaders

Meet and mentor other Stanford leaders with similar interests and experiences.

Learn more at <https://stanfordwomenonboards.stanford.edu>



Career support that's personal

Did you know you have lifetime access to free one-on-one career coaching?

Alumni Career Services has a coaching team with extensive experience working with Stanford GSB alumni at all career stages.

So whether you want to get clearer on your next career step, create a job search strategy, or forge a new path in retirement, you can still lean on your Stanford GSB support system.

Visit stanford.io/careercoaching

Email gsb_alumnicareers@stanford.edu

Call +1 650 723 2151



Career Coaching



Programs



Online Content and Tools



Networking Opportunities

Causal Forests, CIA, Battlefield Pro
Choice Architecture, Insights and B
⁵¹Regulatory Whack-a-Mole, Foolish
Pathfinder, ADHD, Buy Now, Pay La
Friction Fixer, Two-Sided Randomi
¹¹Autonomous Vehicles, Ticket Alloc
Immigrant Knowledge, Public Pensi
Best Dishwasher, ¹³Red Flags, Chef
Snoop Dogg, Shoe Phones, Metapho
Grubby Bits of Paper, Path Depend
Kaleidoscope of Roles, Seed to Sale,
¹¹⁹Pixie Dust, Core Values, Secret Sa
Gobbledygook, Research Hikes, A/I
Digital Goods, Steve Jobs, Mother R
¹⁰Triple Bottom Line, Financial Illite
Cultural Intelligence, Infectious Act
Meddle Ads, Miles Davis, Scaling Er
⁵⁹Receptiveness, Multi-Armed Band
Injecting Uncertainty, Snail-Mail Re
Flow State, ¹⁸Hot Biscuit, Hypergrow
Fast Rejection Mindset, Beautiful M