SEX AND THE SO

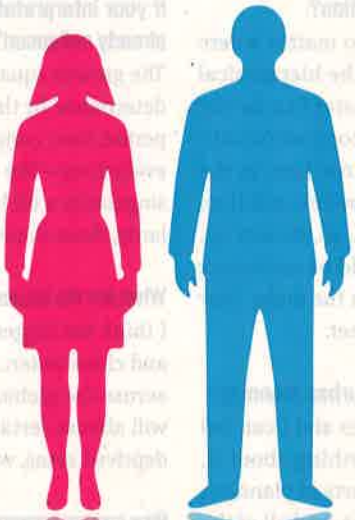
IT MAY BE HARD TO BELIEVE IN THE midst of another contentious election cycle, but the next quarter century in the United States promises to be a period of increasing moderation and stability—at least according to a little-known but compelling theory about how the ratio of available men to available women alters our lives.

Harvard social psychologist Marcia Guttentag began formulating her theory in 1975, after watching Mozart's *The Magic Flute* with her second husband, psychologist Paul Secord, and her two children, Lisa, 16, and Michael, 14. "Nothing is more noble than wife and man, man and wife, and wife and man ... [reaching] to the height of Godliness," sang Papageno and Pamina onstage. Hearing them extoll the virtues of marriage so extravagantly put Guttentag into a kind of "cultural shock," she later wrote. These were the 1970s, after all, when millions of marriages—including both Guttentag's and Secord's first marriages—had collapsed in the chaos of the free love movement spawned during the previous decade.

When Guttentag returned home, she and her daughter listened to songs that were popular at the time, all of which had a "love 'em and leave 'em" theme. Why were views on marriage in these two eras—Mozart's 1790s and America's 1970s—so very different? Maybe, she conjectured, women were in short supply in Mozart's day, and perhaps now, in the 1970s, there were just *too many women.*

That became the title of a book Guttentag began writing soon after she had her insight, which she knew was the most important of her career. For the first time in U.S. history, she soon learned, the "availability sex ratio"—the ratio of adult men to adult women who are available to marry—had dropped well below 1.0, to perhaps 0.7 by 1970. This meant that there were now 10 available women for every 7 available men, an excess of *millions* of women of marrying age. What had caused the sex ratio to drop so dramatically, Guttentag wondered, and what impact did this change have on society?

While busy directing two research centers at Harvard University, Guttentag began *Too Many Women* as a true labor of love. She examined imbalances in the ratio of men to women in various cultures and at various times throughout history and the effects they had on social systems. Among other things, she found that where the sex ratio was high, marriage was stable and women tended to stay home, but where the sex ratio was low (too many women, that is), marriage was unstable and women moved into the workplace.



The dramatic differences between Sparta and Athens during the fourth century B.C. drove the point home for Guttentag. Ancient Athens most likely had a sex ratio between 1.43 and 1.74 (based on a historical analysis) because of rampant female infanticide and neglect. With three men for every two women, women were kept uneducated and at home. Sparta, in contrast, was a military state in which males were removed from their families early on to be trained as soldiers. With an extreme shortage of men in Spartan society, girls received educations and even physical training similar to that of boys, and women controlled and inherited property. Fourth century B.C. Spartan women controlled 40 percent of the land and property in Sparta; Athenian women controlled no property at all.

But Guttentag's book was not to be, at least not the way she planned it. On November 4, 1977, just five days short of her 45th birthday, she died from a heart attack while alone in a hotel room in New York City. Her husband, Paul, completed her manuscript, but the book that finally came out in 1983 was academic in nature, not the mainstream "big think" book she intended. With her death, the book deal she had made with a major publisher disappeared, and sex ratio theory stayed mainly in the obscure recesses of various academic specialties.

BIOLOGISTS HAVE LOOKED AT THE SEX RATIO in animal populations for generations, typically just by counting the males and females in a pack or herd. The natural sex ratio for the American alligator, for example, is about 0.2, or one male for every five females. That kind of ratio makes sense when males fight a lot and female fertility is low.

To study the sex ratio in humans is more challenging, especially if your goal is to determine how the sex ratio affects social systems. Nigel Barber, an evolutionary psychologist based in Birmingham, Alabama, has tested its power more than any other scholar. Among his recent findings: When the sex ratio is low (too many women), women are more slender; when women are in short supply, as was the case in the United States in the 1950s, women are more curvaceous, perhaps because they are trying to look the part of traditional wife and mother. Barber's studies, which often look at patterns in 40 countries or more, have shown the power of the sex ratio in predicting such things as the rate of nonmarital births, the practice of polygyny, and even the likelihood that men will grow facial hair. The more men there are, he found, the more hair they grow to attract mates.

In a study of divorces in the U.S. from 1896 to 1992, Barber reports that the divorce rate

SOURCES: U.S. CENSUS BUREAU, STATISTICAL ABSTRACT OF THE UNITED STATES; CENTERS FOR DISEASE CONTROL AND PREVENTION

ners, politicians, and architects. Yet when my collaborators and I looked at tremendous amounts of data about cities, we found universal scaling laws again. Each city is not so unique after all. If you look at any infrastructural quantity—the number of gas stations, the surface area of the roads, the length of electric cables—it always scales as the population of the city raised to approximately the 0.85 power.

So even without planning it, every city's infrastructure follows the same mathematical pattern? How can that be?

The bigger the city is, the less infrastructure you need per capita. That law seems to be the same in all of the data we can get at. It is a really interesting relationship, and it's very reminiscent of scaling laws in biology. However, when we looked at socioeconomic quantities—quantities that have no analogue in biology, like wages, patents produced, crime, number of police, et cetera—we found that unlike everything we'd seen in biology, cities scale in a superlinear fashion: The exponent was bigger than 1, about 1.15. That means that when you double the size of the city, you get more than double the amount of both good and bad socioeconomic quantities—patents, AIDS cases, wages, crime, and so on.

And those laws apply to all cities, regardless of location?

This scaling seems to be true across the globe, no matter where you are. I think that what's responsible for it is the hierarchical nature of human relationships. First of all, you cluster in a family. On average, an individual doesn't have a powerful connection with more than four to six people, and that's just as true here in the U.S. as it is in China. Then there are clusters of families, and then larger clusters that form neighborhoods, and so on, all the way up. The structure of this network of relationships could be analogous to the behavior of the networks of blood vessels in the body. They could be the universal thing holding the city together.

Does your discovery have practical implications for urban planning?

You tell me the size of any city in the United States and I can tell you with 80 to 90 percent accuracy almost everything about it. The scaling laws tell you that despite all of the efforts of planners, geographers, economists, architects, and politicians, and all of the local history, geography, and culture, somehow cities end up having to obey these scaling laws. We need to be aware of those forces when we design and redesign cities.

> "Despite all the efforts of planners, architects, and politicians, cities somehow obey scaling laws."

Can your insights about the scaling laws of cities help us understand the impact of population growth and urban migration?

I believe that part of what has made life on Earth so unbelievably resilient—able to evolve and survive across billions of years—is the fact that its growth is generally sublinear, with the exponents smaller than 1. Because of that, organisms evolve over generations rather than within their own lifetimes, and such gradual change is incredibly stable. But human population growth and our use of resources are both growing superlinearly, and that is potentially unstable.

Meaning that our consumption of resources can't keep growing forever?

Right. Our theory suggests we will face something mathematicians call a "finite time singularity." Equations with superlinear behavior, rather than leveling out like the sublinear ones in biology, go to infinity in a finite time. But that's impossible, because you're going to run out of finite resources. The equations tell us that when you reach this point, the system stagnates and collapses.

If your interpretation of population growth is true, why haven't cities already collapsed?

The growth equation was derived with certain conditions that are determined by the cultural innovation that dominates each historic period: iron, computers, whatever it is. An innovation that changes everything—like a new fuel—resets the clock, so you can avoid the singularity a bit longer. But the theory says that to avoid the singularity, these innovations have to keep coming faster and faster.

What are the issues most likely to push us toward collapse?

I think the biggest stresses are clearly going to be on energy, food, and clean water. A lot of people are going to be denied these basics across the globe. If there is a collapse—and I hope I'm wrong—it will almost certainly come from social unrest starting in the most deprived areas, which will spread to the developed world.

How can we prevent that kind of collapse from happening?

We need to seriously rethink our socioeconomic framework. It will be a huge social and political challenge, but we have to move to an economy based on no growth or limited growth. And we need to bring together economists, scientists, and politicians to devise a strategy for doing what has to be done. I think there is a way out of this, but I'm afraid we might not have time to find it.

That sounds similar to the dire warnings of economist Thomas Malthus in the 19th century and biologist Paul Ehrlich in the 1960s. Those predictions proved spectacularly wrong. How is yours different?

I've been called a neo-Malthusian as if it's a horrible word, but I'm proud to be one. Ehrlich and Malthus were wrong because they didn't take into account innovation and technological change. But the spirit was correct, and it is unfortunate that people dismiss their arguments outright. Even though innovations reset the clock, from the work that I've done, I think all they do is delay collapse.

CIETY

In the 1970s, a Harvard psychologist proposed that the ratio of men to women shapes culture and politics. Her theory predicts U.S. social trends for the next 25 years.

BY ROBERT EPSTEIN

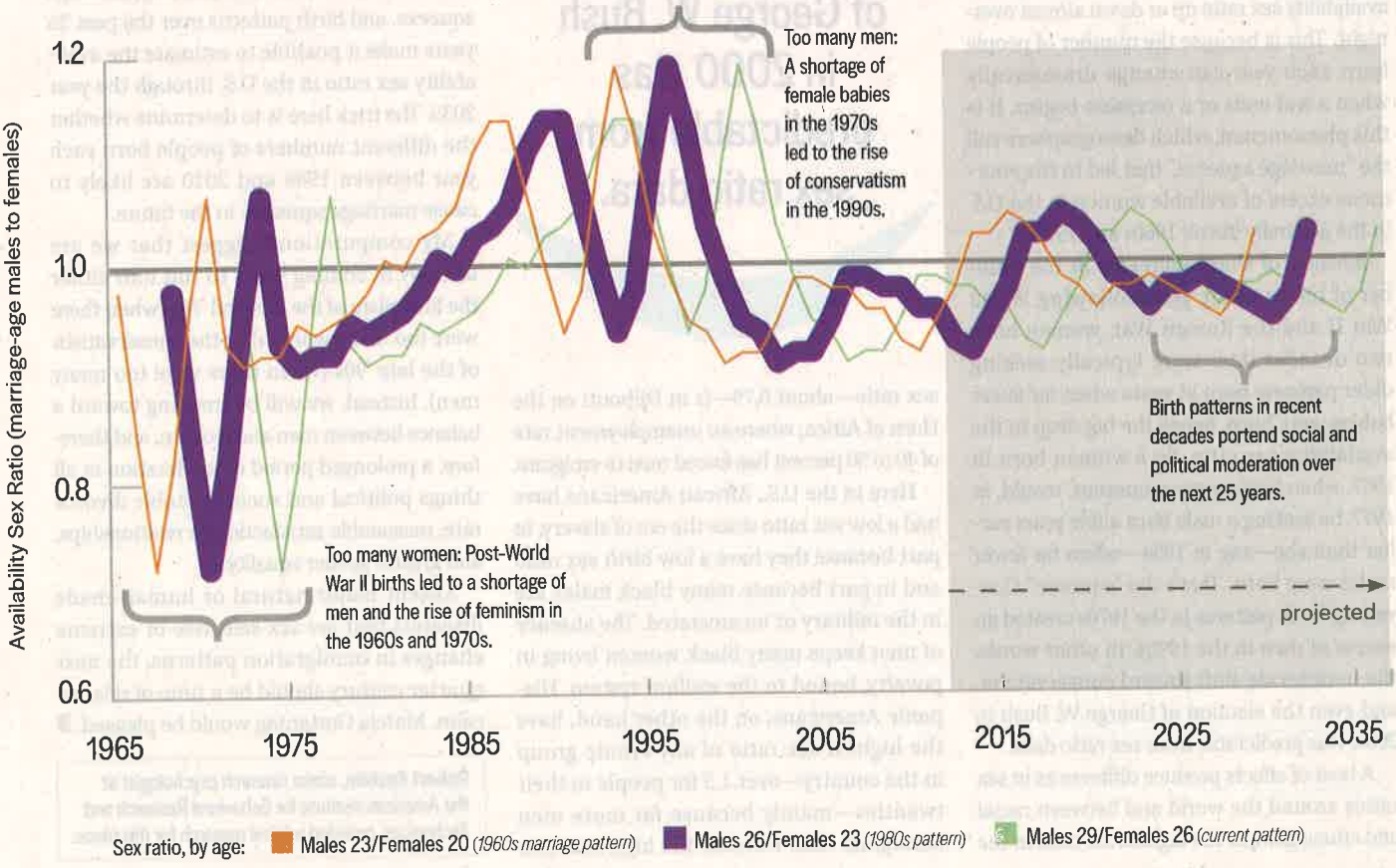
could be predicted remarkably well from the sex ratio. The success or failure of marriage, in turn, ripples though social systems, affecting prevailing values. When there is an excess of available men—as was true during most of U.S. history because most immigrants are male—marriage is generally revered and values are conservative. When available women outnumber available men, women are set free of the home, and values shift toward liberalism. But a low sex ratio also lowers the living standards of women and causes turmoil in relationships, mainly because men typically have more power in society, which they tend to exercise crudely when there are extra women around.

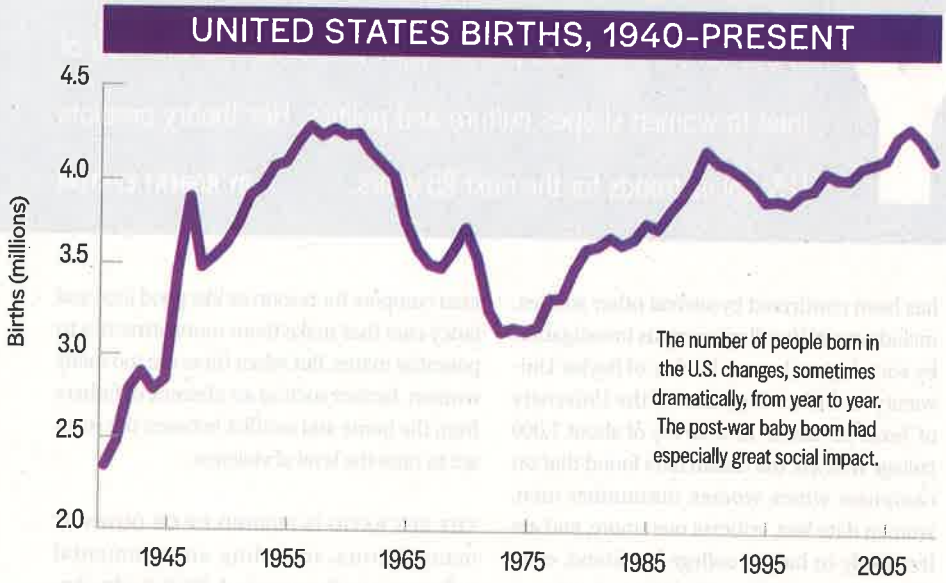
The chaos associated with low sex ratios has been confirmed by several other studies, including a 2010 college-campus investigation by sociologists Jeremy Uecker of Baylor University and Mark Regnerus of the University of Texas at Austin. In a survey of about 1,000 college women, the researchers found that on campuses where women outnumber men, women date less, criticize men more, and are less likely to have a college boyfriend, even though they are also more active sexually.

One kind of chaos that seems to flow from a low sex ratio is counterintuitive. In multiple studies that examine this issue both across countries and over time, Barber has shown that a shortage of men is associated with higher rates of rape, violent crime, and assault. When women are in short supply, men compete for resources like good jobs and fancy cars that make them more attractive to potential mates. But when there are too many women, factors such as an absence of fathers from the home and conflict between the sexes act to raise the level of violence.

THE SEX RATIO IS PUSHED UP OR DOWN BY many factors, including environmental influences in the womb. A 2010 study conducted in the U.K. found that babies born to two nonsmokers were more likely to be male (birth sex ratio of 1.14), whereas babies born to two smokers were much more likely to be female (birth sex ratio of 0.77). Worldwide, the birth sex ratio is generally above one, about 1.07—nature's way,

UPS AND DOWNS OF AMERICA'S SEX RATIO





perhaps, of compensating for the higher mortality rate of males throughout life. By the time people are in their eighties, however, the sex ratio drops to 0.7 or less. Men are in short supply among the elderly.

The sex ratio that is most important in influencing social systems is the one that applies to men and women of mating and child-rearing ages—the availability sex ratio. The fact that women usually prefer marrying men who are slightly older can shift the availability sex ratio up or down almost overnight. This is because the number of people born each year can change dramatically when a war ends or a recession begins. It is this phenomenon, which demographers call the "marriage squeeze," that led to the enormous excess of available women in the U.S. in the generally liberal 1960s and 1970s.

Because of sharp increases in the number of births in the years following World War II and the Korean War, women born two decades later were typically seeking older partners born in years when far fewer babies were born, hence the big drop in the availability sex ratio. So a woman born in 1957, when births were numerous, would, in 1977, be seeking a male born a few years earlier than she—say, in 1954—when far fewer males were born. That's the "squeeze." Conversely, birth patterns in the 1970s created an excess of men in the 1990s. In other words, the nationwide shift toward conservatism, and even the election of George W. Bush in 2000, was predictable from sex ratio data.

A host of effects produce differences in sex ratios around the world and between racial and ethnic groups. The highest sex ratio in the world right now—4.15—is in Qatar, where thousands of men have immigrated to work on construction and oil projects. The lowest sex ratio—about 0.79—is in Djibouti on the Horn of Africa, where an unemployment rate of 40 to 50 percent has forced men to emigrate.

Even the election of George W. Bush in 2000 was predictable from sex ratio data.

Here in the U.S., African Americans have had a low sex ratio since the era of slavery, in part because they have a low birth sex ratio and in part because many black males are in the military or incarcerated. The absence of men keeps many black women living in poverty, bound to the welfare system. Hispanic Americans, on the other hand, have the highest sex ratio of any ethnic group in the country—over 1.5 for people in their twenties—mainly because far more men immigrate than women. The high sex ratio should make that community politically conservative, yet Hispanics generally support liberal politicians, perhaps because liberal politicians are perceived as more pro-minority and pro-immigrant, overriding the sex ratio influence in this case.

In Asian countries, particularly China and India, the ratio of males to females has remained stubbornly and artificially high, causing concern among government officials. Because male offspring are preferred in many Asian cultures, sonograms are now being used to identify female fetuses, which are then aborted in large numbers. The birth sex ratio in China is now an alarming 1.13. The fear in some circles that an excess of men will lead to cultural chaos is actually inconsistent, though, with the views of Secord, Guttentag, and others. Barber's research suggests, for example, that a high sex ratio generally leads to less violence toward women. But the excess of men in China and India has led to new kinds of abuse—women being abducted from Bangladesh, for example, to serve as brides for single males in India, as well as the trafficking of young women within India.

In relatively stable societies like the U.S., the most powerful factor determining the balance of men and women is that marriage squeeze, and birth patterns over the past 25 years make it possible to estimate the availability sex ratio in the U.S. through the year 2035. The trick here is to determine whether the different numbers of people born each year between 1986 and 2010 are likely to cause marriage squeezes in the future.

My computations suggest that we are unlikely in coming years to run into either the liberalism of the '60s and '70s (when there were too many women) or the conservatism of the late '90s (when there were too many men). Instead, we will be trending toward a balance between men and women, and therefore, a prolonged period of moderation in all things political and social: a stable divorce rate, reasonable satisfaction in relationships, and greater gender equality.

Absent major natural or human-made disasters that are sex-selective or extreme changes in immigration patterns, the next quarter century should be a time of relative calm. Marcia Guttentag would be pleased.

Robert Epstein, senior research psychologist at the American Institute for Behavioral Research and Technology, provided original research for this piece.