

THE EDITORS' BLOG

For more posts from SciAm Observations, see [www.SciAm.com/blog](http://www.SciAm.com/blog)

more enormous cost of changing our ways in order to avert these harms: Lombard Street Research, a for-profit macroeconomic research think tank that advises businesses, has put the figure as high as \$18 trillion.

No matter what we do, it's clear that climate change could be a significant drag on the world economy for centuries to come—not to mention the indirect effects such as wars caused by climate change: current, projected and historical.

Run to Starbucks, Get Less Cancer?

Posted by JR Minkel, July 30, 2007

At first glance, this new droplet of research linking caffeine mixed with exercise to protection against skin cancer in mice seems like grounds for excitement. Mice who were fed the equivalent of one to four cups' worth of caffeine per day and also ran on their wheels showed nearly four times as much destruction of ultraviolet-damaged skin cells as sedentary, decaffeinated mice after two weeks. (The paper was published online July 30 in the *Proceedings of the National Academy of Sciences USA*.) Interestingly, the (premium) blend of coffee and exercise conferred more protection than the added effects of caffeine or exercise alone. The two things seem to be feeding on each other in some unknown way.

I can already imagine the marketing campaign: "SPF 15, now with caffeine!" Then people will start making their own by squirting sunscreen into the coffee grinder. It could all get really gross.

Of course, the normal caveats apply here: these are rodents, and we don't know how well this finding will translate to us nor how much cancer protection a given amount of cell self-destruction might confer.

And after a moment's percolation, I conclude that even if the effect holds for people, it is likely to be more of a comfort to coffee drinkers than a cancer cure.

True, coffee drinking has yet to max out: 37 percent of 18- to 24-year-olds drink it, averaging 3.1 cups per day, according to National Coffee Association numbers. But at

➔ *Continued on page 46*

countries, because the cost of each net is only \$5, and each treatment dose of medicine about \$1. Gratis distribution of nets is already being applied successfully in several impoverished countries.

Malaria control is the bargain of the planet. A study that my colleagues and I undertook recently showed that comprehensive coverage of nets and medicines, as well as indoor insecticide where advisable, can be accomplished for \$3 billion a year in the next few years, which equals just \$3 from each person in the high-income world. And these costs will come down in later years as infection rates decline. In addition to the lives saved, the economic

gains in Africa would soon amount to tens of billions of dollars a year, manifested in direct reductions of the cost of illness and increased economic growth.

Funding sources are coming into line. The Global Fund to Fight AIDS, Tuberculosis and Malaria is a natural funder and leader. The World Bank can play a pivotal role, especially because the bank's new president, Robert B. Zoellick, has shown leadership on this issue in the past. The Bush administration has recently increased malaria funding. The private sector is ready to step up with support in various ways, and the public is already donating tens of millions of dollars to buy bed nets for the poor through organizations such as Malaria No More ([www.malariamore.org](http://www.malariamore.org)). We are at the threshold of a great advance. It is now time to cross it. ■

*Jeffrey D. Sachs is director of the Earth Institute at Columbia University ([www.earth.columbia.edu](http://www.earth.columbia.edu)).*



An expanded version of this essay is available at [www.SciAm.com/ontheweb](http://www.SciAm.com/ontheweb)

MATT COLLINS

Skeptic

The Really Hard Science

To be of true service to humanity, science must be an exquisite blend of data, theory and narrative

BY MICHAEL SHERMER



Over the past three decades I have noted two disturbing tendencies in both science and society: first, to rank the sciences from "hard" (physical sciences) to "medium" (biological sciences) to "soft" (social sciences); second, to divide science writing into two forms, technical and popular. And, as such rankings and divisions are wont to do, they include an assessment of worth, with the hard sciences and technical writing respected the most, and the soft sciences and popular writing esteemed the least. Both these prejudices are so far off the mark that they are not even wrong.

I have always thought that if there must be a rank order (which there mustn't), the current one is precisely reversed. The physical sciences are hard, in the sense that calculating differential equations is difficult, for example. The variables within the

BRAD SWONETZ

THE EDITORS' BLOG

For more posts from SciAm Observations, see [www.SciAm.com/blog](http://www.SciAm.com/blog)

this stage, few of us need to be reminded that exercise is good for you, and coffee already has a mixed bag of potential health benefits (possible reduced risk of diabetes) and detriments (hypertension) that seems unlikely to sway anybody one way or the other, assuming they weigh the evidence.

Even one of the researchers who identified the link between coffee and diabetes didn't advocate drinking more java, according to the kicker in a *New York Times* piece from last year.

Maybe pharma could identify some caffeine-ish compound that conferred extra protection against skin cancer for those with a family history of it. But until then, keep using your (caffeine-free) sunscreen, kiddies.

Want to Get from Point A to Point B in One Piece? Don't Take the Shuttle

Posted by Christopher Mims, July 20, 2007

As a follow-up to my previous post about the likelihood of being killed by various forms of transport, I looked up statistics on the space shuttle. Here's how it breaks down:

Fatalities per 100 million passenger-kilometers:

Car: 1.1

Rail: less than 0.1

Air: 0.1

Space shuttle: about 1.9

That assumes that all shuttles have cumulatively logged approximately 718 million kilometers in their many orbits around Earth and that there have been two lost missions, for a total of 14 fatalities.

Fatalities per 100 million passenger-hours:

Car: 32

Rail: 2

Air: about 35

Space shuttle: 52,599

That assumes that the shuttle has logged 11,000 days in flight.

Anyway, there you have it, folks: you're 1,600 times more likely to die on a two-day space shuttle trip than on a week's hard driving cross-country (assuming you're clocking eight to 10 hours a day on the road).

causal net of the subject matter, however, are comparatively simple to constrain and test when contrasted with, say, computing the actions of organisms in an ecosystem or predicting the consequences of global climate change. Even the difficulty of constructing comprehensive models in the biological sciences pales in comparison to that of modeling the workings of human brains and societies. By these measures, the social sciences are the hard disciplines, because the subject matter is orders of magnitude more complex and multifaceted.

Between technical and popular science writing is what I call "integrative science," a process that blends data, theory and narrative. Without all three of these metaphorical legs, the seat on which the enterprise of science rests would collapse. Attempts to determine which of the three legs has the greatest value is on par with debating whether  $\pi$  or  $r^2$  is the most important factor in computing the area of a circle.

Consider data and theory first. I began this column in April 2001 with what I called "Darwin's dictum," which came from a quote from the sage of Down in response to a critique that *On the Origin of Species* was too theoretical and that he should have just "put his facts before us and let them rest." Darwin responded by explaining the proper relation between data and theory: "About thirty years ago there was much talk that geologists ought only to observe and not theorize, and I well remember someone saying that at this rate a man might as well go into a gravel-pit and count the pebbles and describe the colours. How odd it is that anyone should not see that all observation must be for or against some view if it is to be of any service!"

Charles Darwin's dictum holds that if observations are to be of any use they must be tested against some view—a thesis, model, hypothesis, theory or para-

digm. The facts that we measure or perceive never just speak for themselves but must be interpreted through the colored lenses of ideas. Percepts need concepts, and vice versa. We can no more separate our theories and concepts from our data and percepts than we can find a true Archimedean point—a god's-eye view—of ourselves and our world.

Data and theory are not enough. As primates, humans seek patterns and establish concepts to understand the world around us, and then we describe it. We are storytellers. If you cannot tell a good story about your data and theory—that is, if you cannot explain your observations, what view they are for or against and what service your efforts provide—then your science is incomplete. The view of science as primary



research published in the peer-reviewed sections of journals only, with everything else relegated to "mere popularization," is breathtakingly narrow and naive. Were this restricted view of science true, it would obviate many of the greatest works in the history of science, from Darwin's *On the*

*Origin of Species* to Jared Diamond's *Guns, Germs, and Steel*, the evolutionary biologist's environmental theory about the differential rates of development of civilizations around the world for the past 13,000 years.

Well-crafted narratives by such researchers as Richard Dawkins, Steven Pinker, the late Stephen Jay Gould and many others are higher-order works of science that synthesize and coalesce primary sources into a unifying whole toward the purpose of testing a general theory or answering a grand question. Integrative science is hard science. ■

Michael Shermer is publisher of *Skeptic* ([www.skeptic.com](http://www.skeptic.com)). His latest book is *Why Darwin Matters*.

MATT COLLINS