ing and thought about how important our martyrs were to the history of China,” King says. “Or, ‘What a beautiful day it is today.’ Lots and lots of these—and not just randomly. They’ll post them in big bursts when they need them.” King’s team found large batches of fake posts turning up around the same time as crises, holidays, and other events that might stir up public action: the Shanshan riots in June 2013, the Urumqi Railway explosion in April 2014, Martyr’s Day, Tomb Sweeping Day, Communist Party meetings to discuss national policies. “It’s almost like when you’re having an all-out fight about something with your spouse or your kids,” King points out, “and you want to end the argument, and so you say, ‘Hey, why don’t we go get ice cream?’”

This finding—that 50-cent party members are less interested in controversy than in cheerleading—fits with King’s previous research on China’s social-media control (see harvardmag.com/china-censors-13), in which he found that the government would ignore comments disparaging the regime or local leaders, while posts about organizing protests, or even pro-government rallies, were invariably censored. “They don’t care what you say or what you think,” King says. “They only care what you can do. They don’t want people in the streets.”

Last spring came an unexpected twist, when a Western reporter got hold of an unfinished draft of the 50-cent party research paper and called King with some questions for an article. King answered them and then, realizing that his research would be going public ahead of schedule, posted the paper on his website. The reporter published his article, and about an hour and a half later, another publication picked up the story; 72 hours after that, some 5,000 articles had appeared worldwide.

That’s when the Chinese government responded. In an editorial in the pro-government Global Times, the regime “for the first time admitted the existence of the 50-cent party,” King says, and attempted to explain to its citizens the reason for this “public opinion guidance,” which is their term of art for information control. “Basically, the government argued that without such control, the country would fall into strife and chaos. ‘And,’ King adds, “they said that the Chinese people are in agreement about the necessity of this public opinion guidance.”

As it happens, that was an assertion King could check. After the international blizzard of attention, there was enormous discussion on Chinese social media about the paper and the government’s answer to it. “So we downloaded all the posts commenting on it,” King says. The finding? He smiles. “Well, it turns out that the Chinese government’s claim in their editorial is incorrect. Eighty percent of the people, at least on social media, think it’s not a good idea to be censoring and fabricating posts.”

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**Is Epigenetics Inherited?**

**Epigenetics**, which governs whether specific genes in the body are turned on or off, has broad effects on health and development, ranging from the propensity to develop cancer to a disposition to become fat or thin. That has made epigenetic inheritance—the idea that these patterns of gene expression can be passed from parents to children, grandchildren, and beyond, the subject of profuse research. Some investigators have begun to treat it as settled science. But Karin Michels, Sc.D. ’95, brought bracing skepticism to the question of whether epigenetic information in mammals can be transferred across generations during a talk earlier this year at the Radcliffe Institute, where she has been a fellow.

Every cell in a human body has the same DNA, or underlying genetic code, explained Michels, who chairs the department of epidemiology at UCLA’s Fielding School of Public Health. Epigenetics governs how those genes are expressed at every stage of life. During development, for example, epigenetic markers govern the differentiation that makes a muscle cell different from a kidney cell purely through the genes that are activated—and then maintains that program from one generation of cell to the next, so muscle remains muscle, and kidney remains kidney.

But that may be incorrect. A grandmother who smokes, thus altering her own epigenome, couldn’t in theory pass the harmful epigenetic configuration caused by her habit. Research has shown that smoking can cause abnormal increases in hormones that signal hunger, and if this is heritable, that could lead
to obesity in her granddaughter.

But has science proven that these are transgenerational effects? Far from it, said Michels. First, she pointed out, evolution militates against epigenetic inheritance. Epigenetic changes take place through three different mechanisms, the best studied of which is DNA methylation. Methyl groups, a methane-derived group of atoms that are layered on top of DNA molecules, provide instructions for which genes should be turned on or off—but during reproduction, mammalian cells go through two full cycles of demethylation. That process strips all methyl groups, and thus epigenetic information, from germ and embryonic cells. To date, there is no evidence that epigenetic information can survive two rounds of this biochemical cleansing.

Second, proving that an epigenetic configuration can be passed transgenerationally would require ruling out the possibility that any observed effect might have resulted from exposure in the womb. Michels, an epigenetic epidemiologist, studies such exposures and cited one famous experimental example in mice. A pregnant yellow-furred Agouti fed a diet rich in methyl donor groups (a stand-in for a healthy diet), has predominantly healthy offspring with brown coats. But if fed regular mouse food, the mother gives birth mainly to obese, yellow-furred offspring in poorer health. This is clearly an epigenetic effect, Michels said, but it is not transgenerational. It results instead from exposure to a transient environmental stimulus—the food the mother mouse eats—during a critical period of fetal development. Such exposure can induce permanent changes in metabolism and susceptibility to chronic disease, but doesn’t mean that the epigenome of the mother passed to the offspring. Instead, the effect is more like the changes seen in honeybee larvae. Those fed royal jelly become queens: large, long-lived, fecund, showing low brain activity. Those fed worker jelly are short-lived, small, but much more neurologically active.

Claims that epigenetics has influenced multiple generations in families whose founders survived famines or other traumatic events are especially difficult to substantiate in humans, Michels explained: the effects would need to carry across four generations in the maternal line to prove that the effect was inherited. That is because female reproductive cells are fixed even before birth. Smoking by a pregnant mother would therefore affect the mother, her unborn child, and also (if that unborn child is female) the third generation through the reproductive cells of that unborn child (see illustration). In males, because sperm is generated continuously throughout life, only three generations are required to prove epigenetic inheritance. But even that timespan is too long for any researcher studying humans. Even in laboratory animals, Michels said, no researcher has proven transgenerational epigenetic inheritance. Despite claims to the contrary in the most distinguished scientific journals, she asserted, every experiment to date could be explained by in-utero exposures or other mechanisms.

She allowed just one exception, which occurs through a distinct and poorly understood mechanism called genomic imprinting. This transgenerational inheritance seems to be limited to genes that control growth during fetal development. In general, the male allele of genes for growth is turned on, while the female allele is turned off; this memory of which
Cognitive Benefits of Healthy Buildings

IMAGINE A BUSINESS that creates a perfectly energy-efficient environment by adjusting ventilation rates in its workplace. On paper, the outcome would seem overwhelmingly positive: fewer greenhouse-gas emissions to the environment and lowered costs to the business. It’s an idyllic scenario, except for what Joseph Allen and his team at the Harvard T.H. Chan School of Public Health (HSPH) describe as the potentially serious human cost: workers with chronic migraines, nausea, fatigue, and difficulty focusing. Fortunately, these side effects are avoidable.

“The truth is, we absolutely can have buildings that are both energy-efficient and healthy,” says Allen, assistant professor of exposure assessment science. In 2015, his team published a two-part study that quantified the cognitive benefits of improved environmental conditions for workers. The first phase took place in the Syracuse University...