

TREES

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HOW TREES CALM US DOWN

In 1984, a researcher named Roger Ulrich noticed a curious pattern among patients who were recovering from gallbladder surgery at a suburban hospital in Pennsylvania. Those who had been given rooms overlooking a small stand of deciduous trees were being discharged almost a day sooner, on average, than those in otherwise identical rooms whose windows faced a wall. The results seemed at once obvious—of course a leafy tableau is more therapeutic than a drab brick wall—and puzzling. Whatever curative property the trees possessed, how were they casting it through a pane of glass?

That is the riddle that underlies a new study in the journal *Scientific Reports* by a team of researchers in the United States, Canada, and Australia, led by the University of Chicago psychology professor Marc Berman. The study compares two large data sets from the city of Toronto, both gathered on a block-by-block level; the first measures the distribution of green space, as determined from satellite imagery and a comprehensive list of all five hundred and thirty thousand trees planted on public land, and the second measures health, as assessed by a detailed survey of ninety-four thousand respondents. After controlling for income, education, and age, Berman and his colleagues showed that an additional ten trees on a given block corresponded to a one-per-cent increase in how healthy nearby residents felt. “To get an equivalent increase with money, you’d have to give each household in that neighborhood ten thousand dollars—or make people seven years younger,” Berman told me.

Are such numbers fanciful? The emerald ash borer, which has killed a hundred million trees across North America in recent years, offers a grim natural experiment. A county-by-county analysis of health records by the U.S. Forest Service, between 1990 and 2007, found that deaths related to cardiovascular and respiratory illnesses rose in places where trees succumbed to the pest, contributing to more than twenty thousand additional deaths during the study period. The Toronto data shows a similar link between tree cover and cardio-metabolic conditions such as heart disease, stroke, and diabetes. For the people suffering from these conditions, an extra eleven trees per block corresponds to an income boost of twenty thousand dollars, or being almost one and a half years younger.

What is most interesting about this data, though, is one of its subtler details. The health benefits stem almost entirely from trees planted along streets and in front yards, where many people walk past them; trees in back yards and parks



don't seem to matter as much in the analysis. It could be that roadside trees have a bigger impact on air quality along sidewalks, or that leafy avenues encourage people to walk more. But Berman is also interested in a possibility that harks back to Ulrich's hospital-window finding: perhaps it is enough simply to look at a tree.

In the late nineteenth century, the pioneering psychologist and philosopher William James proposed a distinction between "voluntary" and "involuntary" attention. When you cross a busy intersection or pore over a spreadsheet, you are depleting finite reserves of voluntary, directed attention. The antidote is not, as one might first guess, to sit quietly in a darkened room. "The environment has to have some kind of stimulation to activate your involuntary attention—your fascination," Berman said. Urban environments can certainly elicit involuntary attention (honking horns in Times Square), but they do so in a harsh, peremptory way that requires voluntary attention to override. Natural environments, on the other hand, provide what Berman calls "softly fascinating stimulation." Your eye is captured by the shape of a branch, a ripple in the water; your mind follows.

As a doctoral student at the University of Michigan, a decade ago, Berman conducted a study in which he sent volunteers on a fifty-minute walk through either an arboretum or city streets, then gave his subjects a cognitive assessment. Those who had taken the nature walk performed about twenty per cent better than their counterparts on tests of memory and attention. They also tended to be in a better mood, although that didn't affect their scores. "What we're finding is that you don't have to like the interaction with nature to get the benefits," Berman said. Some of the walks took place in June, whereas others took place in January; most people didn't particularly enjoy trudging through the harsh Michigan winter, but their scores jumped just as much as in the summer trials. Not surprisingly, those whose directed attention is most depleted seem to get the biggest benefits: an end-of-workday nature romp probably packs a greater restorative punch than one first thing in the morning, and the boost is five times bigger in people who have been diagnosed with clinical depression.

You can produce an attenuated version of the same effect simply by looking out a window, or (for experimental convenience) at a picture of a nature scene. Over the past few years, Berman and his colleagues have zeroed in on the "low-level" visual characteristics that distinguish natural from built environments. To do this, they broke down images into their visual components: the proportion of straight to curved edges, the hue and saturation of the colors, the entropy (a statistical measure of randomness in pixel intensity), and so on. The view of an arboretum, for instance, tends to have higher color saturation than that of a street corner, indicating that "the colors in nature are more of the 'purer' version of those colors," Berman said. Even when images are scrambled so that there are no recognizable features, like trees or skyscrapers, to betray what they represent, their low-level visual characteristics still predict how much people will like them.

It's nice to think that research like this can affect public policy. Ulrich's work has already "directly impacted the design of many billions of dollars of hospital construction," according to one health-care trade publication. Perhaps we will reconceive our cities and move toward richly hued streetscapes and buildings with fractal patterning that whispers to our nature-starved souls. Berman's aim, though, is more prosaic: he hopes that we will plant more trees. His results reveal a clear and consistent hierarchy. A walk in the woods trumps a picture of a tree, which trumps an abstract image, no matter how soothing. Something deep within us responds to the three-dimensional geometry of nature, and that is where arguments of economic equivalence, however well intentioned, fall short. If someone offers you ten thousand dollars or ten trees, take the trees. ■

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