

The background of the entire page is a complex, overlapping architectural sketch. It features various lines, rectangles, and irregular shapes that suggest a city plan or a series of interconnected structures. The lines are thin and grey, creating a dense, textured effect. The overall style is technical and artistic, typical of architectural drawings.

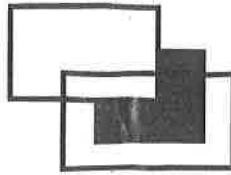
Design in mind

Psychologists can
help to design smart,
sustainable spaces for
the 21st century.

BY KIRSTEN WEIR



To learn more about Dr. Aaron Hipp's research on how bike lane design can affect citizen's community choices, go to our digital edition at www.apa.org/monitor/digital/bike-lanes.aspx.



Picture your favorite room. What do you love about it? The art on the walls? The way the light filters in through the windows? The view beyond the curtains?

It's no surprise to psychologists that our surroundings influence our moods, thoughts and behaviors. Wherever we go, sensory elements such as light, color, texture and scent mingle with our cultural associations and personal beliefs, allowing us to make sense of our surroundings. "It all adds together in a messy equation to create our total experience of a place," says Sally Augustin, PhD, an applied environmental psychologist and past president of APA's Div. 34 (Society for Environmental, Population and Conservation Psychology).

For decades, environmental psychologists have explored the interactions between people and their surroundings, and architects and designers have tapped that knowledge to create more pleasing places and spaces. But the field has changed since its early days. In the 1970s, global overcrowding and urban strife were top concerns, says Daniel Stokols, PhD, a psychologist at the School of Social Ecology at the University of California, Irvine. As a result, many environmental psychologists of the era concentrated on issues of human spatial behavior, crowding and urban stressors that might prompt violence.

While such topics are still of interest, Stokols says, the field has shifted to reflect modern concerns, such as ecological sustainability and public health. As we adapt our urban environments for the challenges of the 21st century, psychologists have a particularly important role to play in making sure human nature is part of the plan.

Smart societies

Top among today's environmental psychologists' concerns is how technology has shaped our lives. "When the field [of environmental psychology] started, there was no Internet," Stokols says. Since then, technology has fundamentally changed the way we live, work and play.

In the late 1990s, urban sociologist Ray Oldenburg, at the University of West Florida, posited that there were three types of human environments. "First places" are the homes where we sleep, eat and escape from the world around us. "Second places" are the office buildings, factories and other locations where we go to make a living. "Third places" are the informal settings of public life, such as coffee shops, theaters and parks (*American Psychologist*, 2009).

But in today's wireless world, those distinctions are blurred. The home, for instance, is no longer a refuge from the

outside world. "The home is now a hub," Stokols says — a place where residents do online banking, respond to work emails and socialize on online forums. Similarly, workplaces have adopted features of first and third places: Many now offer domestic and recreational amenities such as daycare centers or gyms. Our public spaces, too, have changed. Coffee shops were once places to relax and talk with friends or strangers. Today they're just as often remote offices filled with people staring at laptops or tablets, doing solitary work.

The technology that brought about these changes has made our lives easier in many ways. We can stay in touch with friends on the other side of the world, work from our living rooms and watch the latest blockbuster movie without leaving the couch. But technology has also thrown new cognitive and behavioral challenges at us — challenges that scientists are only beginning to understand.

Take "smart" buildings. Modern offices and other public buildings are increasingly equipped with sensors that automatically adjust the temperature, dim the lights and flush toilets without any help from humans. These designs can help conserve electricity, water and money — an obvious benefit.

However, the inability to crack a window could have unintended side effects. When people lack control over their environments, their stress levels climb, says Suzanne Holt Ballard, PhD, a psychologist in the department of social medicine at Ohio University. "There's a disconnect between a technologized environment and what it can do, versus what we as human beings need to flourish," she says.

Jennifer Veitch, PhD, a psychologist at the National Research Council of Canada who studies the effects of indoor lighting, has found that job satisfaction and commitment to the organization increased when people could control the lighting in their offices because it enabled them to meet their individual needs. In related research, she found that when people judge the lighting as better, they experience better moods and better health outcomes, including fewer sick days (NRC Institute for Research in Construction, 2010).

Though our Information Age tools may be new, learning to live with technology is something we humans have been doing since our ancient ancestors chipped their first stone tools, says Patricia H. Hasbach, PhD, a psychotherapist who also consults with architects, land-use planning firms and other businesses. As much as we're a technological species, we're also deeply connected to our natural environment, Hasbach says.

The biophilia hypothesis posits that humans have an

innate desire to seek out nature and other forms of life. Indeed, research supports the idea that exposure to nature is psychologically restorative. Access to nature has been shown to lower stress and anger, improve cognitive functioning and

Healthy planet

Hasbach thinks of natural design along a continuum. For example, on one end of the spectrum, a person may have access to a wild mountain trail. A more domesticated version of that experience may be a city park or bike path. At the opposite end

of the spectrum is a treadmill in a windowless room. We can't always have the mountain trail, but we can manage the design process. "How can we design something that moves a bit to the wilder side of the continuum?" she asks.

Of course, green is no longer just a color. In this era of climate change and dwindling natural resources, sustainability has become both a buzzword and a guiding principle of design. In the wake of Superstorm Sandy, which devastated many East Coast communities in October 2012, mayors and planners are thinking more seriously about how to make cities more resilient in the face of climate change, says Ballard. There, too, psychology can and should inform the process. City planners can design public transportation systems with the goal of reducing carbon-dioxide emissions, for example — but without an understanding of how people use those options, their efforts may fall flat.

As we implement smart energy technologies, Veitch says, we must be cognizant of how they affect human behavior and well-being. She points to the development of commercial lighting systems. Before the 1990s, fluorescent lighting systems cycled on and off at a frequency that, while not consciously detectable to humans, led to disrupted eye movements and headaches, Veitch and others found. Fortunately, newer

systems are both more energy efficient and friendlier to human health. However, says Veitch, the new light-emitting diode (LED) systems gaining in popularity can flicker similarly to the old fluorescents. She's now working on recommendations to guide manufacturers to create LED systems that don't cause problems for employee health (IEEE Standards Working Group, 2010).

"In the industrialized world, people spend over 90 percent of their time in buildings," Veitch says. "Conditions in these buildings will have many effects on us, and the cost to society (and individuals) of adverse effects is far greater than the cost of the building or its energy use."

Psychologists are also working with designers to create public buildings that promote sustainable choices, says J. Aaron Hipp, PhD, a social ecologist at Washington University in St. Louis. If a person is accustomed to composting and recycling at work, he's more likely to keep up the habit in his own house. If a person's workplace provides showers and bike racks, she's more

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mood, and even speed recovery from surgery.

For instance, Marc G. Berman, PhD, at the University of Michigan, and colleagues found that people who took a walk in a park did better on tests of memory and attention than did people who took a city stroll. The study also found that people who viewed photos of nature scored higher on attention tests than those who looked at pictures of urban scenes (*Psychological Science*, 2008). And a study by researchers at the Norwegian University of Life Sciences and Cornell University found that people were less likely to become fatigued during work that demanded attention if there were plants in the room (*Journal of Environmental Psychology*, 2011).

Despite such evidence, the natural element has tended to get lost in the design process. The good news, Hasbach says, is that recent concerns about climate change and ecological sustainability are helping to focus our attention on the importance of human-nature interactions.

likely to choose biking over driving. The key is to design spaces where such behaviors are easy and automatic, says Hipp. "It's about making these things the default choice."

The same principle applies to creating communities that promote public health. With obesity rates at crisis levels in countries around the world, many psychologists are studying ways to make neighborhoods healthier. Promoting physical activity is a good first step.

"Urban sprawl is significantly correlated with inactivity and obesity," Stokols says. But neighborhoods can be designed to be more walkable by adding sidewalks and bike lanes, shops and amenities near residential areas, and natural features like parks and trees.

Other seemingly small design elements can lead to lasting changes in behavior, as Hipp and colleagues learned in a study of Washington, D.C., commuters (*American Journal of Preventive Medicine*, 2013). With data from city webcams, his team compared how many people biked in particular intersections before and after the city added protected bike lanes. Unsurprisingly, people were more likely to bike after the additions. The surprise was that weather no longer seemed to deter riders. Before the lanes were added, bike ridership dropped off dramatically in bad weather. But after the additions, people were as likely to ride on rainy days as when the sun was shining.

By making it easier and safer for people to commute by bicycle, it became part of their daily routine, Hipp says. "That's the goal. You design environments in such a way that the default option is the healthy, easy option."

Tomorrow's cities

Designing for human nature can encompass everything from the shape of a table to the layout of entire cities, says Augustin. And those designs may influence behavior in surprising ways. Consider Cairo's Tahrir Square, the nucleus of the 2011 Egyptian revolution, as well as protests in 2012 and 2013. "It works out to be a good place for people to gather to express their views because of the shape of the square and the way streets run into it," Augustin says.

Knowing that, future designers might "design for democracy" by creating similar gathering spaces, while governments that wish to suppress such activity could choose to avoid them.

According to the United Nations, about 85 percent of Americans will live in urban areas by 2020, rising to approximately 90 percent by 2050. This pattern is repeating itself around the globe. "The city is important because that's where most of humanity lives," Ballard says.

In rapidly developing countries such as China, entire cities are being built from scratch. Designers and architects now have the ability to create places that build sustainability into the system and promote residents' health and well-being from the ground up. The danger in that, says Ballard, is that cultural

differences can get lost in the process. "Because the future city is a global marketplace, there isn't a lot of cultural distinctiveness. There isn't a lot of attention being paid now to the cultural context or the history or practices of the inhabitants as the design takes shape," she says.

Another concern is that the virtual bricks are being laid before anyone fully considers how best people interact with the technology. "The issue is that technology is driving design," Ballard says. "I think we need to determine first what kind of societies we want to create. We need to have a very clear vision about what's important, and what our goals are."

Psychologists can help flesh out those goals, she says — but first they need a seat at the drawing board. "I think we're almost absent in the [design] process. We need to step up and make clear what we have to offer across the range of psychological knowledge. Engineers and policymakers and architects obviously assume knowledge about people, but psychological knowledge is not lay knowledge," she says.

Stokols, too, sees a need for more input from experts on the human mind. "I think many design decisions go on without any psychological input or any behavioral perspective at all," he says.

Yet he's hopeful that's changing. "There's a lot of activity, not just doing research but also translating it into effective community interventions," Stokols says, such as installing plants and artwork in health-care settings to enhance their restorative ability and designing neighborhoods to reduce community crime or to encourage greater physical activity among residents. "Having watched this field evolve over 40-plus years, I'm pretty excited about where it's been, but also about where it's going." ■

Kirsten Weir is a writer in Minneapolis.



How office lighting influences job satisfaction

Dr. Jennifer Veitch found that giving employees control over their work lighting enhanced their commitment to their organizations and their overall job satisfaction. To see a video about her research, go to www.apa.org/monitor/digital/lighting.aspx.