



ILLUSTRATION BY RICH LILLASH

ART & SCIENCE

Multidisciplinary researchers lead to
design breakthroughs,
shaping the quality of life.

BY EILEEN WATKINS

“Making a cubicle smaller isn’t necessarily good just because it saves space and money. It’s a matter of first cost versus long-term cost, of cheaper-and-faster versus the greater benefits over time.”

—Neil Frankel, FIIDA, FAIA,
Frankel + Coleman, Chicago

OVER THE PAST DECADE, INTERIOR design has become democratic. Designers have taken greater pains to satisfy the everyday users of a building rather than just the ego of the owner.

Research on both employees and visitors has resulted in huge changes in offices, public buildings, health-care facilities and corporate headquarters, with more to come in the near future. “We used to design an office to please the property owner or the CEO,” says IIDA Past President (1998–99) Neil Frankel, FIIDA, FAIA. “Now design is much more aligned with user satisfaction.”

Some of the most important work in recent years has come out of a joint effort by the American Institute of Architects and the Salk Institute in La Jolla, Calif., according to Frankel, who is a faculty member at the Graduate School of Architecture and Urban Planning, University of Wisconsin, Milwaukee, and founder

of Chicago’s Frankel + Coleman studio. The joint effort resulted in the establishment in May 2005 of the Academy of Neuroscience for Architecture (ANFA) in San Diego. The academy will “support research in areas such as the ways in which architectural environments can be designed to enrich learning in classrooms, increase office productivity and facilitate healing of patients in healthcare facilities,” according to the Fall 2005 *Neuroscience Quarterly*. Researchers are monitoring the brains of people as they experience certain environmental stimuli to try to determine why and how various elements affect them.

One of the academy’s leading neuroscientists, Fred H. Gage, told the journal, “The design of the environments in which we live, work and play affect the underlying structure of our brains as we navigate through those environments, but we do not know how this design affects

our brain and behaviors. ANFA has been established to develop and test hypotheses so that a knowledge base at the interface between architecture and neuroscience can be developed.”

“In lab work, they’ve identified the effects on rats of crowding, light and spatial relationships,” Frankel says. “We have to get people into the mindset that these issues are of value. Making a cubicle smaller isn’t necessarily good just because it saves space and money. It’s a matter of first cost versus long-term cost, of cheaper-and-faster versus the greater benefits over time.”

Frankel also theorizes that the environmental community went down the wrong road by keeping “green” design limited to a moral question. “We need to emphasize benefits such as lower absenteeism, health costs and other things that affect the bottom line,” he says.

Increasingly, designers and architects cooperate in such studies with

researchers from other disciplines. At Salk, they brainstorm with neuroscientists. Often, they exchange ideas with ecologists, sociologists or clinical psychologists. The greatest challenge, Frankel says, is “translating the social sciences into design terms – learning each other’s language.”

Input from specialists in indoor air quality, innovative materials, acoustics and energy efficiency have resulted in new, high-performance buildings such as The Federal Reserve Bank of Minneapolis, Minn., by Hellmuth, Obata + Kassabaum Inc. (HOK) and the Seattle Justice Center by NBBJ. Scientific research has provided architects, interior designers and engineers with tools such as low-emission, double-insulated glass, paints and adhesives free of volatile organic compounds, more efficient systems for heating and cooling buildings, and decorative surfaces made from salvaged and recycled materials.

In addition, the development of computational fluid-dynamics modeling allows professionals to study how a building’s heating, cooling and ventilation systems will perform while it’s still in the design stages. Programs such as the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, created by the U.S. Green Building Council, established national standards for quantifying sustainability differences between projects, measuring progress in these areas and keeping track of goals.

SOCIAL BENEFITS

The trend toward interdisciplinary design research also draws praise from Joy H. Dohr, Ph.D., Professor at the University of Wisconsin, Madison. “Research should incorporate all aspects of design – technical, behavioral, cultural, historical and creative,” she says.

Under the Microscope

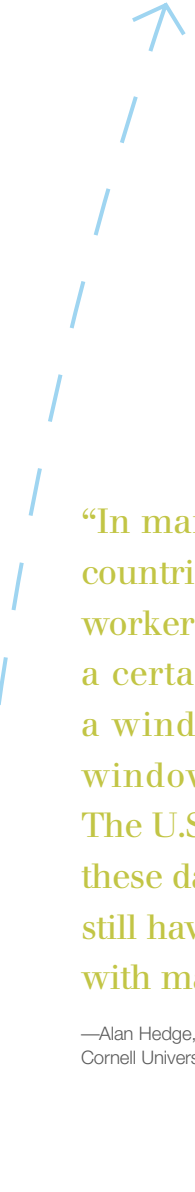
We’re getting older and fatter, notes Alan Hedge, and office designers must learn to cope. By 2025, the worldwide population of people aged 65 and over will more than double, while the number of those under age 15 will grow by only 6 percent and those under 5 by less than 5 percent, according to estimates by the U.S. Census Bureau. And in May 2004, the International Obesity Task Force determined that about one person in four is obese, or 30 or more pounds heavier than the ideal. This equals 312 million people worldwide.

“The pressure is on to make cubicles smaller, when it should be the opposite,” he says. “We must accommodate heavier people and those with disabilities. Since the 1970s and ‘80s, what’s changed? How we work. We’re much more sedentary, sitting all day in front of a computer. Designers need to encourage people to move.” He recommends the European approach of making the stairs in a building more obvious than the elevators — the opposite of the American approach. Hedge points out that workplace ventilation also needs improvement in the United States, “for protection not only against normal diseases, but also bioterrorism.”

Hedge also feels there must be more research done on optimum lighting. “As we get older, it’s harder for the eye to receive certain wavelengths. In your late 50s, you need about three times more light than in your early 20s. Workplaces should have task lighting for dealing with paper documents and lower levels at the computer.”

Both Joy Dohr and Dan Gundrum would like to see more post-occupancy evaluation of design. Dohr believes designers should talk to the person who normally “doesn’t get heard,” such as the building’s maintenance worker or new visitors to the space. Gundrum agrees: “We’d have a stronger understanding of what works.”

Neil Frankel would like to see an institutionalized system to measure the results of interior design research and share it with the professional community. “The design community needs to increase publishing its research,” he says. “Each firm thinks having more information gives it a competitive advantage over the firm across the street. But the bar of the profession doesn’t get raised — the information isn’t documented, tested and revised. Somebody has to take this on, whether it’s government or private enterprise. The culture has to change.”



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—Alan Hedge, Professor of Ergonomics, Cornell University, New York

Dohr has been involved through the Foundation for Interior Design Education Research (FIDER) in design research and has studied environment and behavior issues. Aided by graduate students, she referenced studies on assisted-living facilities and aging-in-place issues.

The work done since the 1970s on aging and the environment has made a significant change – architects and interior designers studied the systems needed to support aging, and the housing industry responded.

For example, a study done in the late 1990s by John P. Marsden of I.D.E.A.S. Inc., an Ohio-based research, education and consulting firm, showed photographs of various assisted-living facilities in Michigan, Massachusetts and Florida to 100 elderly retirement-housing residents and 100 of their family members, and asked them to rate the most “homelike” environments. Marsden noted the elements that people found most homelike, such as porches and portico entries, signs of occupancy and good maintenance, human scale, natural materials and attractive landscaping. Research along these lines is meant to help designers to create environments with greater appeal for the elderly.

Dohr also has seen positive results when designers and architects collaborated with graphic artists on such aspects as wayfinding – the combination of signage and layout (or architecture) that helps people find their way around a building or complex – particularly for complex projects such as medical facilities

and public buildings. Through computer-aided design, such a team can create more effective “environmental graphics.”

ERGONOMIC ADVANCES

The marriage of science and aesthetics also has given rise to welcome advances in office equipment, observes Alan Hedge, Professor of Ergonomics at Cornell University, New York.

“We now have chairs that allow people to move and that move with them,” he says. “Europe, especially, has introduced high-adjusting work stations, which let you raise or lower the work surface with the touch of a button. Newer keyboard mechanisms allow for a more neutral posture, and voice-recognition software is getting better.”

Hedge added that in desktop computers, the old cathode ray is being supplanted by the flat LCD screen. Again, he sees Europe leading the way in adopting this technology. “It saves space in the work station, and because the screen doesn’t flicker, it causes less eyestrain. You can read off it more quickly, and it saves on energy costs.”

The next wave, he notes, will be organic light-emitting diode technology. Pioneered by Kodak, this produces a very bright display on a paper-thin screen. Hedge predicts that this innovation, combined with the wider use of tablet computers, could bring back the old-fashioned “writing desk” in an office like the type seen 100 years ago.

Western Europe and Scandinavia have left North America behind, he

says, in the area of livable office design. “In many European countries, by law, each worker must be within a certain distance of a window and the windows must open. The U.S. is an anomaly these days in terms of still having huge spaces with many cubicles.”

Research done by the Finnish Institute of Occupational Health has found that workers in shared spaces suffered more respiratory illnesses in winter than those in private offices. This suggests better office design can result in healthier employees and reduced absenteeism.

THE WIRELESS REVOLUTION

Dan Gundrum, director of the New York office for the London-based firm DEGW, agrees the microchip has had a dramatic impact on interior design. “Over the past 10 years, the computer escaped from the computer room,” he says. “Pervasive computing and networking have made it possible for people not to go to work, so vast portions of office space are sitting empty.”

He notes that DEGW conducts continual research in the context of its practice. The firm has produced several studies on the ways in which buildings needed to change to support the new technology, including “Office Research into Building Information and Technology” (ORBIT), published in 1985, and “New Environments for Working,” which became the 1997 book *The New Office* by DEGW founder Frank Duffy.

For the 2003 study *Sustainable Accommodation for a New Economy*

(SANE), funded by the European Commission, DEGW collaborated with other firms from the United Kingdom, Germany, Spain and Norway. Their report criticized the design “supply chain” for continuing to produce office buildings that no longer meet the needs of modern workers.

Gundrum says that in its research, DEGW uses focus groups, time-utilization studies and observation through repeated visits to the workplace. “We’ve seen that people spend less and less time at their desks,” he says. “They work at meetings, at home, in an airport lounge, in a coffee shop or in their cars.” Now some DEGW clients, such as the BBC, have styled their offices as collaborative, club-like spaces.

The fact that fewer people are coming to work at “the office” has its pluses and minuses, Gundrum says. “It could make for a better work/life balance, but it could make it harder to draw a boundary between the two. Also, that wonderful sense of being among colleagues is lost, and the company can lose its corporate mind-set when its people don’t coalesce at work. The new work style suggests it’s OK to be alone, but human beings are social creatures. We like to come to work to be with each other.”

He notes that some big, suburban companies have created up to a dozen sublocations, letting people choose where they want to work. “It’s too soon to gauge the true impact of the movement,” Gundrum says, “but it’s going to be interesting.” 