JOHN P. EBERHARD, FAIA,
Consultant, The American Institute of Architects

Remember the time you first visited the Lincoln Memorial in Washington? You passed from a busy world to the quiet of Henry Bacon’s architectural setting. Even as your eyes adapted to the dim light, you became conscious of an inner feeling of awe as you stood before the statue of the “Great Emancipator” by Daniel French. Even without looking at his memorable words, inscribed on the walls, you heard them boom in your mind: “...that a government of the people, by the people, for the people, shall not perish from the earth.” You turned to look down the length of mall, past the Washington Monument to the Capitol, and were filled with the majesty of it all.

Whether you were 7, 17, or 70 at the time, your sensory system was exercised to its maximum to produce this sublime experience. Your eyes were providing images to the visual cortex in your brain that linked with memories stored in the subconscious depths. As they swept around the inner spaces of the memorial recording impressions at the rate of 700 times per second, you simultaneously were able to recall images of the majestic exterior and to “hear” Lincoln’s stirring words in the recesses of your auditory cortex.

In 1992, Sylvester Damianos, FAIA, and Norman Koonce, FAIA, were inspired by Dr. Jonas Salk to explore this power of architecture to elevate and enrich the human experience. As leaders of The American Architectural Foundation, they launched, and the AIA now continues, an exploration of this very real but uncharted realm.

In 1992, Sylvester Damianos, FAIA, and Norman Koonce, FAIA, were inspired by Dr. Jonas Salk to explore this power of architecture to elevate and enrich the human experience. As leaders of The American Architectural Foundation, they launched, and the AIA now continues, an exploration of this very real but uncharted realm.

They looked to the research community studying the brain and mind, known by the collective term “neuroscience.” As the appointed leader exploring the links between neuroscience and architecture, I found this community generating a huge body of knowledge growing at a very fast pace and predicted to be one of the most important bodies of work in this century. Such studies promise to so substantially change the understanding of our profession that how we advise and serve our clients in the future will be changed greatly. The resulting “predictive knowledge” will allow architects to assess the consequences of design decisions early and accurately and present them to clients with hard, verifiable data to back proposals and plans.

continued on page 4
Welcome to the AIA Journal of Architecture

BY NORMAN L. KOONCE, FAIA,
AIA Executive Vice President and CEO

I am pleased to introduce AIA J, the first AIA Journal of Architecture. As I do so, two thoughts are uppermost in my mind.

First, this publication is a direct response to your requests. Many AIA members have told us they want a communication resource that addresses substantive issues, a resource that shares relevant, timely, and concise knowledge that contributes significantly to their professional understanding and success. They also said they wanted a printed document they can hold, one they can read wherever they want.

After you have read the Journal from cover to cover, I hope you agree we have listened to these needs.

The second thought relates to a concept and a reality, both of which stand out in this issue. The “concept” is that each AIA Journal of Architecture will be built around a core topic. What could be more important or timely for our profession than the focus of this first issue, Research and Design?

The “reality” is the rapidly emerging interest of neuroscientists in helping architects become more fully informed about those for whom we design — our clients.

What would it mean for architects to move beyond an intuitive and anecdotal rationale in their design? How much better could we serve our clients and the public if we understood how their brains enable perception of their physical environment and generate physiological responses to it?

In the late 19th century, medical doctors were educated, trained, and equipped to provide what they believed to be the best services possible for their patients. But they were practicing with little knowledge of germs and without antibiotics or vaccines. Knowledge developed in the 20th century enhanced their worth to the community and enabled them to better serve their patients.

If our profession commits to a similar research-oriented pursuit of knowledge in the 21st century, architects will not only enjoy an enhanced reputation as professionals vital to the health of their communities, but they will also have the knowledge to do better work.

Why am I so confident? After more than a decade of working with such research pioneers as the late Dr. Jonas Salk, consulting with Nobel Laureate Dr. Gerald Edelman, and seeking opportunities for involvement by the Salk Institute’s Fred Gage — all in the interest of gaining greater understanding of the power of architecture to elevate and enrich the human experience — doors have begun to creak open. Other prominent scientists are eager to join with the AIA, and they will. But they all acknowledge that as a precondition of success, architects must become an integral part of the research process. Only then will the door open wide to reveal a universe of data that will raise the value of our profession.

Leading that effort on this end is John Eberhard, FAIA, who became the director of discovery for the American Architectural Foundation in 1995. I invited John in 2000 to return as consultant to the AIA to develop a research agenda for the Institute. As you will discover in this issue, under his passionate leadership, research opportunities have accelerated greatly.

Succeeding issues of the Journal will explore other timely topics. Each issue will offer the diverse perspectives of members who are leaders in their fields. Each will provide a forum for clients, the academy and related professionals. And, of course, the Journal will tap into the rich resources of the AIA’s knowledge communities and components.

Twelve years ago, frustrated over the meager press coverage of architecture, I was informed by a CBS News executive that architecture seldom becomes newsworthy except when it fails. I asked, What if we told you that an individual’s longevity, health, and productivity were directly proportional to the quality of the architecture they consistently experienced? You can’t say that, he shot back. I know, but what if we could, I responded. Without hesitation he replied, when you can, let me be the first to know. Twelve years later, we may be getting closer to making that call.

In response to an electronic survey, 43 principals from firms large and small around the country shared their views on research and its place in their practices. All reported maintaining some form of a library at their firms, and nearly one third integrate research on human perceptions into the design process. But few report a more proactive approach to making such research part of their practice.

1. Has your firm undertaken or commissioned any research projects that relate to design’s influence on how people think, act, work, play and otherwise interact with their built environment?
   Yes: 5. No: 38.

2. Does your firm currently employ any research findings in the design process regarding human perceptions and behavior?

3. Does your firm maintain a research relationship with a college, university, or other institution?
   Yes: 2. No: 41.

4. Does your firm have an employee with research as an established part of his or her job duties?
   Yes: 7. No: 36.

5. Does your firm maintain a library?
   Yes: 43. No: 0.

6. Have you personally been involved in any research undertaken by professional organizations such as the AIA at the city, state, regional, or national level?

Below are some opinions expressed on the value of research that examines the relationship between human behavior and the built environment.

“Human behavior is complex, and the relationship with the built environment is challenging for two primary reasons:
1. We all experience the environment individually, each with different experiences, ‘meanings,’ and values.
2. Very little literal, fact-based documentation defines reliable cause-and-effect relationships with the environment or elements of the environment.”
   — WILLIAM T. EBERHARD, AIA, IIDA, Oliver Design Group, Cleveland

“Research is vital, as we need to understand what we are doing as designers. Otherwise, we are creating problems rather than solutions.”

“We may respond to built-environment-induced stresses in inappropriate ways, not realizing [the responses] may be caused by bad design.”
   — ROGER M. YANAGITA, Roger M. Yanagita Associates, Architects, Los Angeles

“Human behavior is an extremely important factor in stressful situations, such as hospitals, medical offices and exam areas, but not as important in large retail boxes…An architect with training and innate ability brings to each project a certain understanding about human behavior and the built environment, an understanding that can be heightened to some degree by research for a particular project.”
   — MICHAEL WM. TOTO, Valus and Carpenter Associates, Westport, Conn.

“There is little emphasis on this relationship, other than common sense, in the work we do. Who will pay architects for this research, even if it is determined highly desirable?”
   — WILLIAM A. HALL, FAIA, Hall Partnership Architects LLP, New York City

“This may interest those who have a polemical ax to grind, but I daresay that most practitioners are like me. We know enough about the relationship between human behavior and the built environment; the difficulty is in getting our clients to place sufficient value on quality in the built environment.”

“Our research in this area is included in our post-occupancy evaluation, which includes questions about human behavior. This information is invaluable to better enable us to design the next similar project and to be able to call ourselves experts on a given building type.”
   — WAYNE S. LLOYD, AIA, Lloyd & Associates – Architects, Santa Fe

“My personal concerns revolve around…the lack of a human perception that architectural influence over the built environment is worthwhile or to be pursued. We are getting more help from the building codes and their enforcement than from any public aesthetic demanding a more pleasing visual environment in the expansion of architectural influence. I find these facts both remarkable and sad, but then, I am an architect.”
   — WAYNE M. REED AIA, WPM Architects, Columbia, S.C.
How the Brain Experiences Architecture

continued from front page

Alison Whitelaw, president of the San Diego Architectural Foundation, says, “If we truly can design environments for people that are more relevant to their basic needs — whether it’s a school environment that maximizes the learning potential of students or the healing environment that restores patients to good health — our buildings will endure and they will better serve our users in the community well into the future.”

The basics of perception

How the body relates to a space can be studied independently of what is going on in the mind (e.g., ergonomics), but how the mind engages space has to include the body and the brain of the individual.

At the level of core, or basic, consciousness, we are “unconsciously” registering the environmental variables’ effects on our nervous system — heat, light, noise, smells, tactile sensations, and our perception of movement and spatial orientation arising from stimuli within the body itself. All of these sensations are silently registering in our viscera as well as our somatosensory cortex via signals of which we are not aware.

At the level of extended consciousness, we are simultaneously experiencing space as assembled by our sensory system and combining this experience with memories of places similar to the one we are in. Our minds are sorting through all of this to let us know if we are dealing with “reality.”

Part of the brain’s internal environment is generated by a ceaseless pressure to seek out new stimuli. This greed for information is one of the fundamental properties of the brain, and it is reflected in our most basic reactions.

A workshop conducted in Woods Hole, Mass., in August 2002 by the AIA found architects and academics involved in the design of health-care facilities having productive discussions with neuroscientists from government and private laboratories.

Dr. Einar Gall, the director of research for the Neuroscience Institute, observes, “A fundamental part of the biology of the brain’s development is that we learn about our world by trying all sorts of moves, the way that babies do. Your brain is constantly modified by these experiences. These modifications become our memories.”

The promise of applications

Architecture matters most when the ideas incorporated in building design are serious reflections of concepts like those underlying perception that have been examined by knowledgeable professionals. And knowledgeable professionals will increasingly be required to explore the rich research base of neuroscience to help them in understanding scientifically what have historically been intuitive observations. Marrying this knowledge could lead to numerous real-world applications:

• The nervous system and brain form the communications network for undertaking work. By understanding the biological basis for workplace stress, we understand the potential for induced illness within the cognitive environment as well as how to induce wellness.

• By understanding how lighting, acoustics, thermal conditions, and windows affect the cognitive activity of children in a learning environment, we will have evidence for enriching the school environment.

• By understanding how human brains lead some people to find their way more easily than others, we may be able to provide more easily used navigation in complex buildings.

• Neuropathologic changes associated with neurodegenerative disorders are known to cause Alzheimer’s. By understanding how such damage to the brain changes perceptions, we may determine why certain facility designs can calm those afflicted by this disease.

• Neuro-theology research explores how ritual behavior elicits brain states that bring on deep spiritual unity. Understanding how the feeling of “sacred” is present in the mind of a visitor in a religious structure will enable researchers to evaluate more elevating designs.

Work is already well under way on these fronts. In November 2001, the AIA began a groundbreaking project to use neuroscience to study productivity at the Adaptable Workplace Laboratory (see stories, pp. 3 and 9). Sponsored by the Public Building Service of the General Service Administration in Washington, D.C., a team of neuroscientists from the National Institutes of Health will test office workers to determine how their cognitive functions are affected by their architectural setting.

David Kirsh, associate professor at the Department of Cognitive Science at University of California, San Diego, says of the workplace, “To discover the structure of people’s behavior, it was assumed sufficient to observe their movement and look at the goals they have and the methods embodied in their actions. We now know this is inadequate. Behavior is far more complex, more densely interactive than this simple approach assumes.”

Similar discussion has begun regarding health-care facilities. A workshop conducted in Woods Hole, Mass., in August 2002 by the AIA found architects and academics involved in the design of health-care facilities having productive discussions with neuroscientists from government and private laboratories.

Joan L. Saba, AIA, president of the AIA Academy of Architecture for Health and one of the participants, remarks, “It would be fantastic if we could tell our clients not only what was needed for well designed
health care facilities, but why we knew this was so.”

And Alison Whitelaw was instrumental in getting the AIA Chapter in San Diego to organize an Academy on Neuroscience for Architecture, a collaborative effort between the architectural community and neuroscience laboratories located in the San Diego area (see story, below). Research fostered by the Academy will explore techniques to address relevant questions and create linkages between architects and neuroscientists that can provide direction to both disciplines. (For more information, visit www.neuroscienceforarchitecture.org.)

The outlook for the future

When physics was in the process of becoming a science in the 19th century, it would have been too early to ask scientists to give architects tools to properly select light fixtures based on lighting calculations, provide tools for measuring how much energy a building would use, or provide formulas for selecting steel beams. All of these things eventually became possible as physics matured and basic means of measurement were translated into engineering applications. We are now in a similar situation with respect to neuroscience.

How to measure the brain/mind response to experiences in architectural settings is just beginning to be explored. But Terry Sejnowski, a senior scientist at the Salk Institute, notes, “Very highly developed cortical systems that give us as human beings the ability to create enormously complicated structures like buildings also provide us with the ability to appreciate them aesthetically…They somehow resonate with our inner sense of beauty and intuitive understanding of complexity.”

Neuroscientists need to develop new concepts for understanding how the brain enables humans to have such experiences. Architects will be able eventually to ask questions they cannot now imagine. As we develop these new tools of understanding, we will not only know that people have such experiences, but will also be able to answer that all-important question: How? *Eberhard can be reached via e-mail at JEberhard@aia.org.

2003 LEGACY PROJECT

Academy of Neuroscience for Architecture Launched

A two-decade-old research partnership focused on the emerging understanding of the relationship between the brain and the built environment has resulted in the Academy of Neuroscience for Architecture, the Legacy Project of the AIA 2003 National Convention, in San Diego. At that event, Fred Gage, PhD, professor of genetics at the Salk Institute in La Jolla, Calif., joined organizers in announcing the new, formal collaboration of architects and scientists to study how the human brain perceives and responds to cues from architecture.

“We believe that exact scientific data will eventually provide more informed decision-making tools to benefit the architectural design process, which currently relies on a combination of intuition, ‘soft’ scientific information, and empiricism,” says Alison M. Whitelaw, San Diego Architectural Foundation president. The Foundation, with the support of the AIA national component and its leadership, established the not-for-profit academy to collect and disseminate hard scientific data on links that, Whitelaw says, will validate or provide new data to bridge neuroscience research and architecture studies. Whitelaw says the Academy’s San Diego location will take advantage of the area’s nexus of neuroscience experts and activities.

An advisory committee of architects and neuroscientists is developing short- and long-term planning goals, and, with an organizing committee primarily composed of San Diego architects, is working out the Academy’s management, communication, and business matters. Among them are plans to identify potential funding sources, establish workshops, line up projects in architecture education, and develop videos and an Internet site.

John P. Eberhard, FAIA, consultant to the AIA, has identified potential research bridges, some of which are currently under study or testing between the disciplines, including the built environment’s effects on the healing of patients in health-care facilities, productivity in the workplace, enriching the learning experience in K-12 classrooms, and way-finding in complex buildings.

“Neuroscience is in its infancy,” Whitelaw explains. “The potential is absolutely tremendous, and in 10 or 20 years’ time, we’re going to be able to look back and realize how far we as architects have come in learning what it is in the human brain that is affected by the environment and how we respond to the environment. Therefore, we’ll be able to realize that we have the ability to create spaces that allow people to reach their full potential, whatever the kind of use of space we’re talking about.”
Students as a Research Resource

Working together creates a win-win situation

BY KATHRYN H. ANTHONY, PHD, Design Program Chair and Professor of Architecture, University of Illinois at Urbana-Champaign

Finding the resources to support student research as an integral part of the design process can tax any professor, but experience shows that it can be done.

The Graham Foundation, which partially funded my two books, has on occasion helped me acquire research assistants. However, the University of Illinois School of Architecture has never paid for a research assistant. The university at large sponsors a campus research board, to which professors can apply for funding, but it is highly competitive.

Still, avenues exist to pursue such projects. While the majority of architecture-school graduate students pursue design projects for their masters’ theses, a handful here—this year, a grand total of two—focus their masters’ theses on research. Some students also elect to include a research component within their design theses as an independent study course.

One student examined the design of synagogues. He wanted to study user needs, so he surveyed three or four Midwest congregations, modeled on the tried-and-true post-occupancy-evaluation work of Wolfgang Preiser, Assoc. AIA, and Jack Nasar at the University of Cincinnati. The student submitted his research to the Environmental Design Research Association (EDRA) and, because he picked a topic that had not received much coverage, he immediately became one of the “experts” on this subject. He presented his work at the EDRA conference and served on a workshop symposium.

Depending on the situation and available funding, a professor also might oversee research undertaken by a student as independent study for course credit. In this situation, the student calls the shots, and the professor helps during regularly scheduled meetings. This role reversal benefits the professor, too, because he or she must prepare for the meeting with the students.

My productivity zooms when I have student help, so when I have some extra money, I personally fund a student researcher, matching what he or she would make as a research assistant. Students usually do the literature review and summarize all they read into annotated bibliographies. Sometimes, they’ll write a paper. They also help look at the various publication outlets.

On a bigger scale, I have involved an entire class, usually undergraduates. Earlier in my career at Cal Poly, I became interested in the role of the home environment in the ability of couples and families to get along. Together as a class, we developed an interview form, and the students called and interviewed therapists. We pulled the responses together and wrote an article that was published in the EDRA conference proceedings.

More recently, Nasar put out a call for information on post-occupancy evaluation about the architecture of architecture schools. I put my whole environmental behavior seminar class on that project. The 25 students divided into teams; one team each did interviews, observations, surveys, physical traces, and archival information search, all about our architecture school building, Temple Buell Hall. We collected a few hundred responses from regular building users, which added up to fairly large databases that could not have been possible without the whole class’ involvement.

A final plea: While finding ways to involve students in research, we also need to give them the tools to capture the results. It’s possible to graduate with a master’s degree and be a top-notch designer, but write in a way that few people can understand. Ball State University has a very good project to incorporate writing into the design studio. Writing and scholarship must become a more regular part of architecture education, not only for architects, but also for the new generations of educators.
AAF Grants Highlight, Aid Local Design Efforts

The American Architectural Foundation Accent on Architecture grants help local design and civic organizations produce innovative public-education programming. In past years, successful recipients have enlisted architects, educators, community leaders, government officials, and business leaders to enrich the public’s understanding and appreciation of architecture. The 2003 winners are:

**Adaptive Environments**, Boston, with the Boston Society of Architects’ Learning by Design in Massachusetts program, will develop, pilot, and disseminate a model curriculum for after-school youth.

**DESIGNhabitat**, a collaboration among the Auburn University College of Architecture, Design & Construction, DesignAlabama, and Alabama Association of Habitat Affiliates, will develop a guide to improve Habitat House designs.

**Archi-Treasures**, Chicago, the Community Refreshment: Addressing the Sustainability of archi-treasures Public Space Projects program will use its grant to help sustain its 16 public space projects in low- to middle-income neighborhoods across Chicago.

**The Burchfield-Penney Art Center**, Buffalo, will use its grant to fund Smart Growth and Choices for Change, a traveling exhibit.

**homeWORD**, Missoula, Mont., will expand its public charrette process to help the Grove Street neighborhood and other community housing organizations become more proactive in development.

**The Harlem School Initiative**, by the New York Foundation for Architecture through its Learning by Design Program, New York City, will help provide classroom materials for students in Harlem’s architecture programs.

**Preservation Piedmont**, Charlottesville, Va., will put its AAF grant toward the Jefferson School Oral History Project, which, along with architectural and historical documentation of the building, will form the basis of a publication and a conference about the former African-American high school.

**Preservation Worcester**, Mass., Architecture in Movement: Go Building Go! will implement a three-year training process designed to make architecture and creative movement part of Head Start’s curriculum.

**Restoration Radio Program**, Seattle, Radio Eco-City aims to develop a five-part series of 30-minute radio shows featuring interviews and on-location visits to sustainable design sites.

**SCI-ARC**, Los Angeles, will use its grant to bring together community leaders, developers, and architects for a South Central Los Angeles Urban Planning and Redevelopment Workshop.

**Preservation Piedmont**, Charlottesville, Va., will put its AAF grant toward the Jefferson School Oral History Project, which, along with architectural and historical documentation of the building, will form the basis of a publication and a conference about the former African-American high school.

**University of Missouri-Rolla**, Architecture, Art, History: Rolla, Missouri’s Legacy, aims to increase awareness of architecture in Rolla, revitalize the historic downtown area, and develop training materials for a high school mentor day/charrette, a display for the Chamber of Commerce, and an historic walking tour map.

**Vermont Design Institute**, Burlington, Vt., will use its grant for Community Design and Planning: A Manual, a large-format publication with graphics explaining the various community design steps the organization uses and examples from particular places.

These grants are made possible through funding from CNA Insurance Companies and Victor O. Schinnerer & Company, Inc.
GSA Monitors Workspace Basics to Improve Productivity, Efficiency

To find new ideas in building-performance optimization that work, the U.S. General Services Administration (GSA) undertakes research projects in federal facilities across the country. One currently under way on the top floor of one wing of their own headquarters building is the Adaptable Workplace Laboratory, which encompasses 11,000 square feet and houses about four dozen federal-agency workers going about their normal job activities.

To measure the productivity of the office space, researchers from GSA and the Carnegie-Mellon Center for Building Performance and Diagnostics track factors such as temperature control, ventilation, connectivity to electrical/data/voice wiring, lighting, and use of reconfigurable workstation systems.

GSA installed the AWL into its 85-year-old building in Washington, D.C., in 1999. Motivated by the enormous savings potential of creating a flexible retrofit strategy to turn historic spaces into a modern office facilities, GSA, Carnegie-Mellon, and Oudens + Knoop Architects designed a raised-floor, open-office system that can quickly and easily be moved, added to, or removed as necessary. Subsequently, the AIA has partnered with GSA to include neurologically research on how occupants react to their physical surroundings.

Cost efficiency is a primary driver for the GSA research, but so is productivity, which can be linked to user comfort. In their “Post-Occupancy Evaluation of the Adaptable Workplace Laboratory (Phase 1),” the Carnegie-Mellon research team described the AWL system innovations and how they are working.

HVAC
The AWL design separates the ventilation system from the heating and cooling to save energy, minimize duct size, provide fresher air, and allow individualized temperature control. Wall-mounted heat pumps provide the temperature control, and ventilating air comes directly from the outside. The heat pumps also made it possible to remove the window-mounted air conditioners previously used throughout the GSA building, thus allowing more daylight into the space.

Separating breathing air from thermal conditioning eliminates the need to run building-wide air handlers sized for peak cooling loads, which means moving only a tenth of the normal volume of air. Ventilation air is 100 percent fresh, pumped in through heat exchangers and sent to workstations via a 10-inch under-floor plenum.

Connectivity
Also taking advantage of the raised-floor plenums for flexibility is the laboratories’ wiring plan. The AWL electric/data/voice service grid starts at the building’s satellite closets. The building’s riser cabling connects to under-floor wire baskets at the seventh floor, from which the under-floor distribution modules provide each workstation with at least one relocatable outlet box at the floor or through the desk to the work surface.

Researchers noticed that users were supplementing their workstation outlet boxes with six-outlet power strips. The power strips are more accessible, provide more power plugs, and can readily be turned on in the morning and off at night with a single switch. The Carnegie-Mellon study suggested investigation into separating the data/voice from electrical wiring.

Lighting
The AWL design requires two separate lighting levels: 300 lux for ambient lighting, and 500-900 lux for task-surface illumination. Ambient lighting is provided with a series of track uplights at every column line. Adjustable lamps provide task lighting at each workstation.

Another goal was to provide a maximum amount of daylight. Almost all of the AWL occupants took the fullest advantage of the windows, positioning their desks to have a view out the windows from their desk seats. For some people, though, the light is blocked by partitions or storage towers, or they simply are not near a window, and they depend on lamps for task lighting.

Workstation systems
The AWL is testing workstation systems from a number of manufacturers. The resultant discontinuous look of the office space bothers some of the occupants. However, being able to compare the attributes of various systems provides some general lessons the researchers gleaned from the AWL occupants.

• Satisfaction is highest with systems that can be reconfigured by the office occupant without the need for special tools or building-maintenance crews and yet be sturdy enough that people can lean on them.

• Acoustic privacy is an issue for people working on sensitive issues, for meetings, and for working with clients.

• A separate reception area provides a better progression into the space.

• Work surfaces should be large enough to support multiple tasks, and people prefer rectilinear surfaces.

The Carnegie-Mellon research team will continue the study through two more post-occupancy evaluations. In between evaluations, GSA will implement the research team’s suggestions for refinement of the workplace performance. It will take several more years of use before definitive answers can be provided regarding achieved cost savings, but some results are already evident — energy savings, for instance. “The place clearly uses less energy than this building does normally,” points out GSA Office of Business Performance Research Director Kevin Kampschroer. (See related story, right.)

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Currently in its fourth year, the research at the General Services Administration Adaptable Workplace Laboratory (AWL) is already providing valuable information for the GSA Public Building Service, which each year moves 60,000 people into 25 million square feet of new space, points out Office of Business Performance Research Director Kevin Kampschroer.

Among the systems that are proving themselves in the AWL are an energy-efficient air-handling strategy and a combination of an under-floor plenum and flexible furniture systems that cut the cost of space reconfiguration by as much as 90 percent.

“Already, we have confidence in under-floor systems,” Kampschroer says. “We have put into our design guide that we want under-floor systems in all of our new construction. One example is the Oklahoma City Federal Building.”

By providing each space with a heat pump, office workers are able to control their thermal comfort individually. Fresh ventilation comes directly from the outside through a heat exchanger that recaptures roughly 85 percent of the energy to heat or cool that air.

“The quality of the air is extremely good in the space,” Kampschroer reports. “We’ve measured it over and over again, and it’s running, on average, at less than half the ASHRAE standard for carbon dioxide concentrations.”

GSA Research Already Saving Money

The other main cost-saving element pointed up by the AWL research is the flexibility offered by the easily relocated furniture systems. The savings offered by the three different furniture systems GSA tested ranged from 70 to 90 percent, Kampschroer says.

“But from an organizational point of view, this offers some definite advantages,” he says. “It allows organizations—our clients—to experiment. Within the AWL over the past two years, there have already been a couple of reorganizations, and one entire team has been replaced by a different team. Because the nature of the new team’s work is much more independent and less collaborative than their predecessors in that space, the furniture layout needed to be different. They were able to change all that very quickly in just one afternoon.”

Because it is a laboratory studying how office systems work, the GSA AWL has a stripped-down industrial look to its open-office layout incorporating three different modular furniture systems.

An under-floor plenum accommodates wiring and fresh air, allowing maximum flexibility for relocation of workstations, which occupants can reconfigure themselves.

PHOTO © HOCHLÄNDER DAVIS PHOTOGRAPHY
Designing for Research
Tod Williams and Billie Tsien discuss facility programming for the Neurosciences Institute

When the Neurosciences Institute awarded Tod Williams & Billie Tsien, Architects, the commission for its new campus in La Jolla, Calif., the firm had little experience designing facilities to house both empirical and theoretical research. Nonetheless, the client considered the architects’ approach to problem solving a good fit for its mission.

To establish the foundation in 1992, 11 scientists, headed by 1972 Nobel Laureate Gerald M. Edelman, MD, PhD, brought their research program from Rockefeller University in New York City to La Jolla. With guidance from Edelman and the building team, plus research of similar facilities, Williams and Tsien focused their own perceptions, experience, and instincts to create an environment that enhances the process of collective thought, one of the most ephemeral yet essential of human endeavors.

The resulting campus remains a resounding success, both in design achievement (it received a 1997 AIA Honor Award) and client satisfaction. In a recent conversation, Williams and Tsien explained how they developed a contextual design solution for enhancing the process of research.

Q: How did you engage the client staff to find out how they work together?

Williams: The core neuroscience research team had previously worked together at Rockefeller University, and they referred us to their former facilities in New York, which were largely offices and not laboratories. They also referred us to the things they appreciated about the way the campus worked. One element this diverse group of scientists liked was the way they would come together for cultural events and, as a result, share ideas. So one of our paths to understanding the facility program was to research the researchers.

The second approach was to research the existing laboratories at Scripps Research Institute. We also studied Lou Kahn’s Salk Institute, because Dr. Edelman did his initial training there and was able to articulate his admiration and critique of that facility. Ultimately, we researched and discussed how all our findings related to the new site.

Tsien: An important and direct element of our research was looking at these precedents and conditions in existing labs. There’s also an indirect research that always occurs when we’re working on a project, which has more to do with a kind of peripheral vision. We explore the area and look at things that may not seem at first to be relevant, such as noticing that you can watch hang gliders or contemplate mountain vistas from the La Jolla site. Understanding the location. I think this unfocused, more general observation is a very important part of the research for a project because it provides a sense of the surroundings. It’s something that comes into every project we do.

Williams: It also relates to neurological research and understanding the Neurosciences Institute. Thinking is not linear. Another form of research, of course, comes from our own history of work and our ability to critique our own work. With our work, we always strive to grow. We carry to every new project a certain package of knowledge of successes and failures and make our decisions in part based on that history.

Q: What elements of the design have the clients found particularly successful?
Williams: Fortunately, the client is thrilled with the facility. A successful element is what Dr. Edelman calls the peripateia, the way by which one can walk throughout the facility and be stimulated to think, whether thinking alone or conversing with a colleague.

Dr. Edelman noted that he found it difficult to get people who are empirical thinkers, people who work in labs, together with the theoretical thinkers. They are usually quite different types of people. So we created adjacencies that bring these people together, either in general spaces—pathways—or specific locations such as the dining room or the lecture hall and chamber-music auditorium. It was his desire to bring different kinds of minds together that inspired the peripateia, and those specific adjacencies work quite well.

Q: Was there a mood you were trying to establish?

Tsien: Dr. Edelman wanted to create a sense of community, and, to an extent, that sense of community relies on some degree of separation from the rest of the world. So from the beginning, there was a desire to make the place feel like an oasis, a quiet space where you could come and undertake research that isn’t necessarily driven by market pressures. The Institute is not, for example, like a pharmaceutical research facility, the success of which is measured primarily by profit. This is closer to pure research, where the scientists have much more freedom to pursue interests whether or not they are going to have some clearly useful, marketable result. That’s why we believe this place should feel protected, and that’s why, when you enter the courtyard, you feel as if you’re in a separate realm.

Williams: Frankly, we are always trying to find a world within a world or a world apart. So this simultaneously relates to some of our own interests and something we saw as a programmatic requirement.

Q: Did this help in your winning the commission, that your thinking was in tune with the client’s?

Williams: Very much so. One of the things that Dr. Edelman mentioned he appreciated is the East/West nature of our thinking. We are grounded in the Western thought processes, yet have a global perspective as well.

Q: As the users of the facility change over time, how will this facility be able to adapt to changing needs?

Williams: That’s something I’ve worried about. This facility is not like anything else, so how might it change, if need be, to be something else? We tried to design very specifically to the client’s programmatic needs. At the same time, we tried to make it of a level of quality where it would be appreciated and loved for what it is. We designed into it a level of dignity so that it will always be recognized as a serious and engaging place. The labs themselves we based on The Scripps Research Institute models. I’d like to think that the department’s work would continue and Dr. Edelman would sort of clone other young, brilliant neuroscientists.

Of course, the Neuroscience Institute was our client, not Dr. Edelman. So they are the ones who helped ensure this be, and continue to be, a good and useful facility.

Q: Were there any discoveries during the course of this project that you found apply to the creative process in your own firm?

Williams: We’ve always felt that this project has had tremendous power and influence on all of our work ever since.”

Williams: That’s something I’ve always felt that this project has had tremendous power and influence on all of our work ever since. It has raised the bar. It also made me believe even more firmly in the value of thoughtfully considered, unprogrammed space.

Tsien: I agree.
Programmed Knowledge: Chapters Rely on Informal Research

An informal survey of AIA component executives found research focused on member and market issues. Topics included member assessment of products and services, specific types of design services needed by retail clients, and, more ambitiously, outreach efforts that gathered input from many sources and packaged it for their communities.

While not scientific research, Richard Fitzgerald, director of the Boston Society of Architects/AIA, points out that “many of us are engaged in quite another kind of research, a kind of informal, often far-from-rigorous process embodied in the conceptualization, development, and implementation of programs and services based often on intuition, but ultimately yielding an enormous volume of useable information.”

As an example, he pointed to a series of BSA/AIA events over the past several years under the general heading of “A Civic Initiative for a Livable New England.” This aggressive effort involved monthly presentations by smart-growth experts and others, a complementary series of three community charrettes in local cities and towns, and workshops at local and national conventions. BSA is now assembling a publication designed to bring it all together.

“This programming,” Fitzgerald writes, “has generated an enormous amount of information, some anecdotal, some statistical, and it has influenced the work of many of our committees: codes, housing, urban design, sustainable design, regional design, legislative affairs, and others.” It also led BSA/AIA to develop and host a national conference on density this coming September, co-sponsored by the AIA Housing and the Regional and Urban Design committees.

On a smaller scale, AIA San Antonio pointed to “Get Smart! Smart Growth_Smart Living_Smart Money,” a May 2002 event that brought together government officials, developers, architects, and the public to discuss and debate issues around sustainable growth and livable communities.

“Everything we do in program areas generates new information upon which we base the next set of efforts,” notes Fitzgerald. “This is not research in the traditionally understood sense. But what we do every day ought to be viewed in part as research from which we can learn a great deal.”

AIA COF Awards 2003 Research Grant to Study Ties Between Neuroscience and Architecture

The Academy of Neuroscience for Architecture will receive $100,000 to pursue research to answer questions about how the human brain perceives architecture. The proposal, “Fundamental Neuroscience Research and Development for Architecture,” a project presented by John P. Eberhard, FAIA, seeks to define and study links between neuroscience and the built environment.

The grant, named for architect Benjamin Henry Latrobe, is awarded biennially by the AIA College of Fellows for research leading to significant advances in the architecture profession. The award was doubled from $50,000 to $100,000 this year. The jury included Chair Cynthia Weese, FAIA, dean of the Washington University School of Architecture; Thomas W. Ventulett, FAIA, principal of AIA Firm Award Winner TVS & Associates; Robert Geddes, FAIA, Topaz Medallion winner; Robert A. Odermatt, FAIA, former chancellor and founder of the Latrobe Fellowship program; and Sylvester Damianos, FAIA, chancellor of the College of Fellows. The jury complimented all the grant proposals for promoting significant research that strengthens the profession.

The principals of KieranTimberlake Associates LLP, the first Latrobe fellows, applied their 2001 $50,000 grant to a two-year research project, “Master Building in 2010: Architecture, Construction, and Production.” The goal of the research, according to Philadelphia-based architects Stephen Kieran, FAIA, and James Timberlake, FAIA, was to study technology transfer within other industries and apply that knowledge to architecture, construction, materials sciences, and product engineering. KieranTimberlake’s research Web site is www.mb2010.org.
The relationship between environmental design and human behavior spans a broad range of related topics, including building security, crime prevention, defensible space, ergonomic design, lighting design, livable communities, street and roadway design, retail marketing, and workplace productivity.

The National Crime Prevention Institute (NCPI) serves as the nation’s educational and technical resource on crime prevention. In Crime Prevention Through Environmental Design, NCPI enumerates major “crime prevention through environmental design” (CPTED) strategies, excerpted and adapted below.

Provide clear borders
In law, space must be defined to preserve property rights. Boundaries may be identified physically or symbolically. Fences, shrubbery, signs, or changes in elevation may help define borders outdoors, while color definition, changes in surface finishes and ceiling heights, and the arrangement of furniture, plaques, and signs may help define boundaries indoors. Thoughtful design can convey powerful environmental cues that affect the behavior of normal and abnormal users alike.

Provide clearly marked transitional zones
Clearly mark the movement from public to semi-public to private space. As transitional definition increases, the range of excuses for improper behavior is reduced. The user must consciously move into controlled space.

Relocate gathering areas
Place gathering areas in locations with good natural surveillance and access control, and out of the view of undesired users, to decrease the magnetic effect or attraction.

Place safe activities in unsafe locations
Safe activities serve as magnets for normal users and convey to abnormal users that they are at greater risk of scrutiny or intervention. Use caution to assure that a safe activity is not placed in a location that normal users cannot defend.

Place unsafe activity in safe locations
Place vulnerable activities near windows of adjacent, occupied space or within tightly controlled areas to help overcome risk and make users of these areas feel safer.

Improve scheduling of space
Effective and productive use of space reduces the risk and the perception for normal users, while abnormal users feel at greater risk of surveillance and intervention. In commercial settings, well-planned spatial relationships and scheduling may improve profit and productivity, while increasing the control of behavior.

Redesignate the use of space to provide natural barriers
Separate conflicting activities by distance, natural terrain, or by other features to avoid fear-producing conflict. For instance, normal activity on a basketball court may be disruptive and fear-producing for a senior citizen or a toddler in a nearby play area. The threat does not have to be real to create the perception of risk for the normal or desired user.

Increase the perception of natural surveillance
The perception of surveillance is more powerful than the reality. Hidden surveillance cameras do little to make normal users feel safer, while abnormal users do not feel themselves to be at greater risk of detection. Windows, clear lines of sight, and other “natural” surveillance features are often as effective as costly security devices or guards.

Overcome distance and isolation
Locate unsupervised spaces such as restrooms or stairways near supervised or heavily used areas to increase the perception of safety and lower maintenance costs due to vandalism.

Thoughtful design can convey powerful environmental cues that affect the behavior of normal and abnormal users alike.

Order Crime Prevention Through Environmental Design from the AIA Bookstore, 800-242-3737 (option #4) or bookstore@aia.org.

This article is excerpted from AIA Best Practice 17.07.01, “Understanding Human Behavior Leads to Safer Environments.” To download it or any one of the over 100 AIA Best Practice articles, members can go to www.aia.org, select “M” for members at the top of the home page, then select “Search Best Practices” from the menu.
From color in health-care facilities to flexible lab space, the Coalition for Health Environments Research (CHER), a coalition of nonprofit design and health-care organizations, architecture firms, and service providers, undertakes basic research needed to improve health-care design. Members of CHER believe that many health-care environments are planned without a sufficient base of objective knowledge, and have joined forces to remedy the situation. “Many buildings are based on current trends, code minimums, cursory reviews of recent projects, and pet theories,” says CHER Executive Director W.H. “Tib” Tusler, FAIA, FACHA. “Objective studies or evaluations of results are virtually absent.”

Sheer economic sense fortifies the coalition’s goal: Currently, over 14 percent of the U.S. Gross Domestic Product is spent on health care, and more than $18 billion a year is spent on health-care construction.

Starting small
The group currently has a list of more than 30 ongoing or completed projects, all of them small in scale. Its strategy is to build up enough credibility with these smaller studies to then ask foundations to fund study of more complex issues, such as staff stress and turnover. Many of CHER’s research projects are very basic, yet no one has previously tackled them. For example, under Phase One of the “Limiting the Spread of Infection in the Health-Care Environment” study, the 14 most common materials in hospitals were selected and mounted on their substrates to be tested for their ability to harbor and propagate organisms. Phase Two will entail hospital cleaning techniques. “It’s a simple study, but it’s never been done before,” Tusler notes. “Like all the other studies, I talk to many hospital administrators who are dying for this information. They love it.”

We’re in this together
CHER steps beyond the architecture of facility design and, in addition to AAH, includes the two big interior design groups, American Society of Interior Designers and International Interior Design Association, and the American College of Healthcare Architects. CHER’s sustaining members include a number of architecture and engineering firms, and health-care company providers from around the country make up its Provide Council. “The providers are important because we get our agenda, where we decide what research to do, from them,” Tusler notes. “As architects and interior designers, we can’t sit in a box and just come up with ideas.” The providers meet annually to suggest a research agenda.

Developing better guidelines
CHER also undertakes work for the Facilities Guidelines Institute (FGI), which together with the AAH publishes Guidelines for Design and Construction of Hospital and Health Care Facilities, a classic text used by 41 states in whole or in part. The group looks forward to a bright future in architecture research by providing what users and keeping the process simple. “Our strength is listening to providers, as well as to architects and interior designers, and then coming up with an agenda and research studies that are manageable, relevant, and useful to practitioners,” Tusler concludes.

Reference
Learn more about CHER online, www.CHEResearch.org.
Committees Share Insights Learned by Looking

As with the AIA components, a survey of knowledge communities finds research for most of them as less a distinct enterprise and more an exercise in information aggregation inferred through programs and projects. One way these focused groups accumulate this shared knowledge and identify trends is via juried reviews of submitted projects. Among the committees that have been conducting these juried reviews for years are the Committee on Architecture for Education (CAE), Committee on Architecture for Justice (CAJ), Design for Aging Committee (DAC), and Committee on the Environment (COTE).

Trends in education

Innovative teaching and learning methods, coupled with increased interest in educational environments, drive the CAE design-recognition programs. Judges spotted the following trends:

• Small class size produces higher attendance and retention, more positive student-teacher interaction, and higher achievement overall.

• Facilities designed to conserve resources also teach students about sustainability.

• Opportunities and synergies can be found in locating learning environments in the community, rather than concentrating them on campuses.

The state of justice facility design

Among the jury findings in the 2002-2003 edition of the Justice Facilities Review are:

• Juvenile facility design is moving toward “softer” settings, providing a more homelike environment.

• The civic image of courthouses is reemerging, reversing a trend of the 1950s through ’70s when they tended to lack the grandeur that inspires civic pride.

The AIA Design for Aging Center (DAC), in affiliation with the American Association of Homes and Services for the Aging, publishes its juried Design for Aging Review every other year. Entries have demonstrated that the key factor for maintaining satisfaction among seniors is that they be able to exercise choice, both in facilities and services, in continuing care retirement communities, nursing homes, and independent senior living apartments.

• Facilities designed specifically for residents with Alzheimer’s and other forms of dementia illustrate a need for smaller scale, highly familiar environments.

• Although overbuilt in many locations, assisted-living complexes continue to illustrate a more “residential” image and creative programming than nursing homes.

Environmental sensitivity’s day in the sun

The AIA/COTE Top Ten Green Projects highlights architecture that integrates buildings and nature to improve and sustain quality of life. Some observations from the COTE program and the AIA’s work with the U.S. Department of Energy reached intriguing conclusions:

• Client demand for environmentally sensitive design is strong; in some cases, it is an imperative.

• It is possible today to combine passive and active solar-design strategies to create comfortable buildings that produce surplus power using off-the-shelf products.

• Photovoltaic systems are commercially viable.

• Energy, water, and materials conservation strategies can be incorporated with reasonable operational payback periods.

For more information on these design award programs or the knowledge communities that support them, contact AIA Information Central, 800-242-8787 or infocentral@aia.org.
Read More About It

Below are a selection of books on the relationship between human behavior and design. All are available from the AIA national component Library, which can mail them to members throughout the country. These and other titles can be accessed via the online catalog (www.aia.org/library/default.asp) or by e-mail to library@aia.org.

Alzheimer’s Disease: The Relationship Between Selected Wallcovering Patterns and Resident Behaviors in a Special Care Unit, by Margaret Carol Nagy Dobbs, 1990

Applications of Environment-Behavior Research: Case Studies and Analysis, by Paul D. Cherulnik, 1993


Between Buildings and People, by Stephen Willats, 1996

Color and Its Effect on Behavior Modification in Correctional/Detention Facilities, by I.S.K. Reeves, V, AIA, circa 1985

Color and Light in Man-Made Environments, by Frank H. Mahnke and Rudolf H. Mahnke, circa 1987

Colourscape, by Michael Lancaster, 1996

Contemporary Environments for People With Dementia, by Uriel Cohen and Kristen Day, circa 1993


Design for Effective Selling Space, by Joseph Weishar, circa 1992


Educational Facilities: The Impact and Role of the Physical Environment of the School on Teaching, Learning, and Educational Outcomes, by Jeffery A. Lackney, 1994


The Experience of Place, by Tony Hiss, 1990

The Eyes of the Skin: Architecture and the Senses, by Juhani Pallasmaa, 1996

Healing Gardens: Therapeutic Benefits and Design Recommendations, edited by Clare Cooper Marcus and Marni Barnes, circa 1999

House as a Mirror of Self: Exploring the Deeper Meaning of Home, by Clare Cooper Marcus, circa 1995

Intrascape, by Michael Lancaster, 1996


Landscapes for Learning: Creating Outdoor Environments for Children and Youth, by Sharon Sine, circa 1997

Light, Color, and Environment: A Discussion of the Biological and Psychological Effects of Color, With Historical Data and Detailed Recommendations for the Use of Color in the Environment, by Faber Birren, 1982


People, Paths, and Purpose: Notations for a Participatory Envirotecture, by Philip Thiel, 1996


The Origins of Architectural Pleasure, by Grant Hildebrand, 1999

Patterns in Interior Environments: Perception, Psychology, and Practice, by Patricia Rodemann, circa 1999

Place Attachment, edited by Irwin Altman and Setha M. Low, circa 1992

The Power of Color: Creating Healthy Interior Spaces, by Sara O. Marberry and Laurie Zagon, circa 1995

Psychology of Architectural Design, by Omer Akin, circa 1986


Total Workplace Performance Rethinking the Office Environment, by Stan Aronoff and Audrey Kaplan, 1995

Women and the Environment, edited by Irwin Altman and Arza Churchman, circa 1994