Message from the Chair

September brings us to the latest edition of the EDTG Newsletter and eve of the HFES’ 49th Annual Meeting. This year the EDTG program covers everything from office ergonomics to walkway accessibility. Check out the overview on p. 3. In addition, please plan to attend the EDTG business meeting held jointly with the Macroergonomics TG on Wed., Sept. 28, from 3:30 to 4:30 PM.

While traveling to the meeting you might encounter some of the same issues Rob Hall notes in his article on Design Meets Security (p. 1). Perhaps those airports should have checked out Research Design Connections (p. 6) for the latest evidence on physical environmental design. On another design topic, this issue also brings a change of guard. Many thanks to Rani Lueder for her tireless work as EDTG webmaster. Spring Hull has assumed this position and hopes to unveil the revised website within the next few months. Lastly, I continue to encourage everyone to contribute short articles or items of interest to other EDTG members through our list-serv (hfes-edtg@hfes.org), newsletter or website. Hope to see you in Orlando!

—Michele Marut
Michele.Marut@respironics.com

EDTG NEWS
Environmental Design Technical Group Newsletter
Human Factors and Ergonomics Society

Design Meets Security: Museums & Airports
Rob Hall, Environmetrics

Notes on museums and airports
Museums are places in which the concerns of human factors/ergonomics practitioners merge with the interests of interpreters, museum evaluation staff and audience advocates. The usability of a museum is determined by a host of things, not the least of which is being able to find the entry door. The situation was compounded when those who did find the door entered a stark space that contained nothing but cash registers and ticket sales. Again, observational studies showed that, during periods of low traffic, almost one-third of people who came in through the door turned and went out again.

Interviews with some of these people alerted us to another issue we had not seen initially ourselves. On the opposite side of the ticket foyer was a row of glass doors leading out into an area in which some of the museum’s collection of small maritime vessels were moored. Above these doors the mandatory “Exit” signs had been placed. Some peo-

Continued on page 2
User-centered design, cont.

“Airports, like hospitals, tend to be places awash with emotion, and often, anxiety.”

Consider sending us a brief description of one of your recent projects to be included as a feature article! Digital photos are welcome.

Calendar

The OPWG’s (Open Plan Working Group) Corporate Consortium XIII, September 20, 2005, Minneapolis, MN, USA. OPWG—a research group concerned with improving the open-office concept through building performance & occupancy quality research. Andrew Laing of DEGW; Adrian Leaman of Usable Buildings Trust, UK; Arnold Levin, Mancini-Duffy. Contact Sherry Role, sherry@orfieldlabs.com, 612.721.2455


National Ergonomics Month (NEM) is October, 2005. Please visit http://hfesnem.org/leadership.htm to read about the Honor Roll and if interested enroll as a member.


Symposium on Zen Sitting and Western Seating: Technological challenges for a new world of Zen—East / West and Mind / Body Interactions; November 28, 2005; Advanced Research Institute for Science and Engineering, Waseda University, JAPAN. Questions?—Shunji Yamada, zen-chair@jcom.home.ne.jp; 03-3204-0387

Please send your group’s future plans so that we can include them in this calendar of upcoming events!
Dear Environmental Design members,

Here’s a sneak preview of what the Environmental Design TG will be offering at the HFES ’05 Annual Meeting in Orlando, Florida, September 26-30. The EDTG has been allotted two sessions and a poster. The first session will be held on Tuesday afternoon and will feature Environmental Design papers only. The second session will be held on Friday—a joint session with Macroergonomics—featuring three papers from the EDTG and two papers from Macroergonomics. The poster will be presented on Thursday afternoon. Here are the abstracts for the 11 accepted EDTG papers:

TUESDAY—3:30-5:00
ENVIRONMENTAL DESIGN SESSION

DOES ERGONOMIC CHAIR DESIGN AFFECT THERMAL COMFORT?

Alan Hedge, Jason Jagdeo, Cornell University; Masaya Saito, Sapporo School of the Arts

The effects of foam, mesh and gel chairs on thermal comfort and productivity were investigated. Thirty-six subjects, 18 men and 18 women, were tested in same-sex triads with each subject sitting on one of the 3 chairs for 1.5 hours. Subjects wore light clothing (shorts, t-shirt, socks and sneakers) with a low clo value. Skin and body temperature were measured. Thermal comfort votes and body thermal data were collected every 30 minutes. Climate conditions were controlled (air temperature of 22.4°C + 0.1°C and 21.1% ± 1.0% relative humidity). Results showed a gender difference in thermal comfort, women voted that the environment was significantly cooler than did men by the end of the experiment. There were no differences between the chairs in thermal comfort votes, skin and body temperatures, body movements or productivity.

COMPUTER DISPLAY VIEWING ANGLES: IS IT TIME TO SHED A FEW DEGREES?

Paul Allie, KOALA Ergonomics Consulting; Cynthia Purvis, Hewlett-Packard Company; Doug Kokot, KOALA Ergonomics Consulting

The angle at which a computer display is viewed may have an impact on the musculoskeletal and visual comfort of the user. Although scientific literature regarding viewing angles has grown in the past decade, a research gap still remains. As a result, one is challenged to design workstation solutions that satisfy the performance requirements of both the musculoskeletal and visual systems, and at the same time, adapt to individual preferences. The following recommendations are offered based on a “middle ground” approach where research findings regarding eye comfort, neck comfort and user preferences are all taken into account: (1) the top of the display screen should be placed at or lower than 5° below the horizontal line of sight; and (2) the center of the display should be positioned no more than 25° below the user’s horizontal line of sight. These recommendations create a viewing angle range that is less than current recommendations stated in ergonomic standards for VDT workstations.

A CRITICAL ANALYSIS OF THE USABILITY AND DESIGN OF ALUMINUM WHEELCHAIR RAMPS


A common method to improve accessibility for pedestrians and wheelchair users is the widespread use of ramps. Ramps for handicapped access are required by the Americans with Disabilities Act. The ADA has specific guidelines for many aspects of ramp design. Although these specifications detail ramp requirements, they do not necessarily guarantee that a ramp will be trouble-free for users. A recent study that evaluated how
wheelchair users perceive differences in slope and cross slope revealed design problems for modular aluminum ramps. The purpose of this paper is to identify aluminum ramp design issues that resulted in usability difficulties for wheelchair users in that study. When designing an environment, it is critical that a wide range of users tests it. This paper demonstrates that attempting to provide greater accessibility in one area may create new barriers in another.

**SITTING OR STANDING FOR COMPUTER WORK – DOES A NEGATIVE-TILT KEYBOARD TRAY MAKE A DIFFERENCE?**

*Alan Hedge, Cornell University; Jason Jagdeo, Cornell University; Anshu Agarwal, Cornell University; Kate Rockey-Harris, Cornell University*

The effects of using an electric height-adjustable work-surface, with and without the addition of a negative-tilt keyboard tray, on wrist posture, comfort, typing performance and body movements was studied. Eighteen subjects experienced four test conditions: typing while sitting with the keyboard on a flat surface or negative tilt keyboard tray, and standing with the keyboard on a flat surface or negative tilt keyboard tray. Results show that the most neutral typing wrist posture (least wrist extension) was maintained when sitting rather than standing. There was a slight wrist posture benefit with the negative tilt tray for both sitting and standing. Sitting with a negative-tilt tray was the most comfortable condition. Sitting was more comfortable than standing. No performance differences between conditions were found. When sitting there was more foot movement than when standing. When standing there was more weight shifting than when sitting.

**EVALUATING THE EFFECTS OF FROST HEAVE ON THE FEASIBILITY OF COMPLIANCE WITH EXISTING WALKWAY ACCESSIBILITY STANDARDS**

*Alison G. Vredenburgh, Vredenburgh & Associates, Inc.; Kevin Williams, New York State University*

Existing American standards specify criteria for maximum walkway running and cross-slope. Many regions of the United States experience seasonal weather changes. Winter snow can cause frost heave of concrete that can change the slope of concrete sections throughout the year. The current study evaluates the extent of these seasonal changes on walkway slope. The findings indicate that the fluctuation of running and cross-slope makes it impossible to comply year-round with existing standards.

**THURSDAY—1:30-5:00**

**POSTER SESSION**

**IMPACT OF ENVIRONMENTAL DESIGN FEATURES: DOES COLOR SCHEME INFLUENCE TRANSPUTED ATTRIBUTIONS?**

*Sae Lynne Schatz, University of Central Florida; Clint A. Bowers, University of Central Florida; Heather C. Lum, University of Central Florida*

Businesses invest millions in their environmental designs, hoping that they will communicate “the right” message and influence consumers’ perceptions and behaviors. This investment is based on a set of beliefs that are widely held in the design community; however, there has been little attempt to validate them. As a first effort towards validation, we conducted a two-part study. We examined designers’ beliefs about the impact of room color, in general, and evaluated the specific anecdotal principle that deep, red hues appear expensive. The results suggest that beliefs regarding the behavioral affects of color are quite prevalent. For the second part of the study, we created three illustrations of a restaurant, each featuring various shades of red. Sixty-two participants rated their opinions of the restaurants. The results suggest that a discrepancy exists between designers’ beliefs and the public’s reactions. We recommend the use of attribution theory and policy-capturing to resolve this.

**FRIDAY—8:30-10:00**
JOINT SESSION ENVIRONMENTAL DESIGN AND MACROERGONOMICS

EFFECTS OF REDUCING ENCLOSURE ON PERCEPTIONS OF OCCUPANCY QUALITY, JOB SATISFACTION, AND JOB PERFORMANCE IN OPEN PLAN OFFICES

Jay L. Brand, Haworth, Inc; Thomas J. Smith, Orfield Labs, Inc, University of Minnesota

Results from two field studies are reported: a quasi-experiment of changing from 60–64 inch to 36–42 inch partition heights at a multi-national corporation, and a comparison of two office areas at a global manufacturer. In the first study, both control and experimental participants endured moving, but only the experimental group experienced any change in partition height. A quantitative, subjective survey provided work environment ratings before, immediately after, and six months after the change. The results show that in general, this was a negative change for users, although some non-significant trends suggested that—defined at the group level—one or two outcomes may have been positive. Using a much more extensive instrument, the second study found several differences in occupant ratings of workplace design as a function of differences in the physical environments. A framework is outlined for interpreting these results in terms of individual (i.e., privacy) and group (i.e., communication) needs.

THERMAL EFFECTS ON OFFICE PRODUCTIVITY

Alan Hedge, Wafa Sakr, Anshu Agarwal, Cornell University

A field study was conducted to investigate the associations between indoor thermal conditions and productivity for computer workers in an insurance company. Thermal environment conditions and productivity were logged every 15 minutes for 9 women workers for 16 consecutive work days. Results showed an association between thermal conditions and productivity, which was highest when conditions fell in a thermal comfort zone and lowest when conditions fell below this zone. The findings have important implications for the design and management of workplaces.

FUNCTIONAL CHARACTERISTICS OF USERS IN TASKS ASSOCIATED WITH GROCERY RETAIL CHECKOUT: A LITERATURE REVIEW

David A. Ringholz, Georgia Institute of Technology

The intent of this literature review is to examine existing research on functional characteristics and limitations of individuals engaged in tasks associated with grocery retail checkout. The resulting data will be used to generate performance criteria to guide the development of grocery retail check-stands and facilitate comparisons between highly varied populations. Target populations for this study are wheelchair users, standing users, elderly individuals and women who are pregnant. Comparing the characteristics of these individuals can contribute to understanding of key user requirements for this and related tasks in addition to providing a context for future research in the area of retail workstation optimization through the application of universal design principles.

ERGONOMIC EVALUATION IN A BEVERAGE AND FOOD SERVICE APPLICATION


A global beverage and food company contracted the authors to evaluate the current store design to enhance speed of service and minimize the potential for employee injury. This assessment involved observations, interviews, physical measurements and link analyses at three high-volume locations in Southern California and three international stores in Singapore and Malaysia. The study examines two frequently performed tasks (preparation of café’ latte and mocha ice blended beverages). While the design was deemed to be adequate for the tasks performed, the analysis identified four areas for improvement. These areas include: location of cups, removal of espresso machine components, accessibility of visual display terminals, and replenishing ice. Further, the analysis included macroergonomic considerations for management control and organizational
ERGONOMICS IMPLEMENTATION, THE RIGHT WAY AND THE WRONG WAY

Boris Povlotsky, ErgoNostic.com

This paper illustrates some of the challenges of ergonomics implementation within the diverse manufacturing, office environments, and machinery/product design, including steel, chemical and automotive/tractor industries. We intend to analyze and review the roots of problems from different perspectives and recommend as which ergonomics approaches are likely to succeed or fail. Most importantly it is imperative to find the actual cause(s) of problem(s) before looking for appropriate ergonomics solution(s) and consensus of acceptance by end users. The presented material is based on the experiences of both authors in human factors engineering and ergonomics, in industry and academia and in various countries around the world such as the former Soviet Union, the Far East, Europe and the United States. In the same time it is impossible in short paper to cover all aspects of this subject.

Research Design Connections
Sally Augustin

The EDTG and the Research Design Connections newsletter both seek to ensure that built environments enhance human experience by reflecting the latest research on human-place interactions and industry best practices. Research Design Connections (RDC) is an excellent source of readily-applicable information about current design-related research and design best practices for people who create, manage, and use spaces. RDC helps readers create more effective built environments, meet more of their clients’ needs, keep on top of the expanding field of research-backed design, and communicate more effectively with clients and peers.

We provide up-to-the-minute material about the ways physical environments can help create desired human experiences, enhance productivity, increase creativity, improve health, reduce stress, increase safety, and, in general, support people’s welfare. Previous articles have covered research related to workplace, health care, retail, restaurant, urban landscape, school, residential, museum, park, and even zoo design, for example.

Research Design Connections gathers information from hard-to-access academic sources and from practitioner-researchers and integrates it into a concise, convenient package for a practicing design professional. RDC presents relevant material in straightforward prose, tables, and photos that emphasize the link between current research and design solutions. We search recent research from the fields of biology, psychology, anthropology, sociology, and design, among others, for subject matter. The design experts on RDC’s Editorial Board draw on their decades of collective practical experience to make sure that the articles in our quarterly newsletter are immediately useful and inspiring. Their extensive experience in applying environment behavior research has been extraordinarily useful to Research Design Connections since it began publishing three years ago.

For additional information on Research Design Connections, visit www.researchdesignconnections.com.

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