

Institute Insider

The Newsletter of the Institute for Ergonomics at The Ohio State University

At the forefront of Human Factors since 1950 Volume 7, No. 2, Spring/Summer, 2004



Nadine Sarter Heads North

Institute Member to Relocate to the University of Michigan

Dr. Nadine B. Sarter, Associate Professor in Industrial and Systems Engineering and member of the Institute for Ergonomics, has taken a position at the University of Michigan. She will be joining the Center for Ergonomics at U of M in autumn, 2004.

Dr. Sarter earned a PhD in Industrial & System Engineering from Ohio State in 1994. She joined the University of Illinois at Urbana-Champaign in 1996, where she held co-appointments with the Departments of Psychology and Mechanical & Industrial Engineering, as well as with the Beckman Institute.

In 1999, Nadine returned to OSU, as a faculty member in the Industrial, Welding, and Systems Engineering Department, and the Institute for Ergonomics, with a joint appointment in the Department of Psychology.

Dr. Sarter's research in the field of cognitive ergonomics focuses on: multimodal interfaces in support of human-computer interaction and computer-supported cooperative work; human error and error management; attention capture and guidance; and decision support systems, using fields such as aviation, military operations, and modern car cockpits as testbeds.

We here at the Institute for Ergonomics will miss Nadine, and we thank her for all that she brought to the University and to the Institute.

Best of luck in that school up north!

Note: Nadine can be reached, via email, at sarter.1@osu.edu.



Sarter

AT Ohio Director Appointed to Homeland Security Committee

Dr. Douglas Hunt, Executive Director of Assistive Technology of Ohio (AT Ohio), has been appointed to the Private Sector Senior Advisory Committee (PVTsAC) of the Homeland Security Advisory Council (HSAC), by Secretary of Homeland Security Tom Ridge.

Secretary Ridge established the PVTsAC as a subcommittee of HSAC to provide it with expert advice from leaders in America's private sector, on homeland security issues. Dr. Hunt was sworn in on March 10th, 2004, by Homeland Security Deputy Secretary Admiral James Loy.

Dr. Hunt is a nationally known disability advocate and a service-connected disabled U.S. Marine Corp Veteran, and he also serves as a Gubernatorial-appointed Chair of the Ohio Rehabilitation Services Commission. He earned his PhD in Social Work from Ohio State.

President Bush had previously appointed Hunt as a member of the President's Commission on Excellence in Special Education. There, he served as Chair of the Transition from School-to-Work Subcommittee. During the 2000 presidential election, Hunt was the National Chair and surrogate speaker for Americans with Disabilities for George W. Bush.



Hunt

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On the Move



In January, 2004, **Carolyn Sommerich** presented a short course on *Ergonomics Basics* for the Ohio Nursery & Landscape Association (Columbus, OH).



William Marras received the 2004 Bernice Owen Award for Research at the 4th Annual Safe Patient Handling & Movement Conference. This conference was held March 2nd-5th, 2004 in Orlando, Florida.



George L. Smith has been elected Senior Vice President for Technical Networking and member of the Board of Trustees of the Institute of Industrial Engineers. His responsibilities include all IIE's Societies, Divisions, and Interest Groups, including the Society for Work Systems and the highly successful Applied Ergonomics Conference. Dr. Smith is Professor Emeritus and former Chair of Ohio State's Department of Industrial, Welding, & Systems Engineering.



Sue Ferguson gave multiple presentations on *Lifting: How Much is Too Much?* at the Ohio Safety Congress & Expo (Cincinnati, Ohio, March 24th 2004).



Sue Ferguson has been elected to Chair the Human Factors and Ergonomics Society's Industrial Ergonomics Technical Group. This two-year term will begin at the HFES Annual Meeting this September, in New Orleans.



Stu Zweben discussed *The Changing Face of Computing and its Impact on Higher Education* at the University of Minnesota (Minneapolis, January, 2004). In March, he was quoted in the *Columbus Dispatch*, the *San Jose Mercury News*, and the TV show, *Lou Dobbs Tonight*, on changing enrollments in the computer science field. He reported that a decline in the number of undergraduates pursuing majors in computer science is due to several factors, including: a depressed U.S. economy; alternative computer-related programs; and restrictions put in place on computer science departments during the 1990's, when the IT field was experiencing rapid growth.





Institute for Ergonomics' 2003 Year in Review: Research Now Available

The myriad of activities conducted by Institute members in calendar year 2003 have been summarized and is now available, both on-line and in hard copy.

This document provides details of funding for 34 active research projects in 2003, which totaled over \$13 million in income brought to Ohio State. In addition, services provided to businesses, organizations, and individuals outside of OSU (such as technical assistance, training, and research symposia) generated nearly \$150,000.

The *Year in Review: Research* profiles the primary members, researchers, and administrative staff who comprise the Institute. It also contains descriptions of:

- Research project summaries in the following human factors and ergonomics areas:
 - Aviation and Space
 - Disability
 - Healthcare
 - Highway Safety and Automobiles
 - Information Processing
 - Low-Back Disorders
 - Military Planning
 - Applied Physical Ergonomics, and
 - Vision
- Awards granted to Institute members in 2003;
- Research symposia organized by the Institute;
- Technical assistance projects; and
- Training and demonstrations conducted.

The *Year in Review: Research* can be viewed and downloaded from the Institute's web site (<http://osuergo.eng.ohio-state.edu/Institute/index.htm>). Contact us (614-292-4565 or ergonomics@osu.edu) if you would like to receive a hard copy of this document.

OSHA Releases Ergonomics Guidelines for Retail Grocery Stores

On May 28th, 2004, OSHA Administrator John Henshaw announced the release of industry-specific guidelines for the prevention of musculoskeletal disorders (MSDs) in grocery stores. OSHA's *Guidelines for Retail Grocery Stores* provide practical recommendations to help grocery store employers and employees reduce the number and severity of injuries in their workplaces.

These voluntary guidelines (which can be found online, at www.osha.gov/ergonomics/guidelines/retailgrocery/retailgrocery.html) are intended to build upon the progress that the grocery store industry has made in addressing the causes of these injuries.

"Working with trade associations, labor organizations and individual grocery stores, we have developed these guidelines which are practical tools that have been shown to reduce work-related injuries in retail grocery stores," Henshaw said. "It has been a pleasure to work with organizations that strive to improve workplace safety and health and that are willing to develop and share practices like these so others can benefit."

The guidelines emphasize various solutions that have been implemented by grocery stores across the country and have been effective in reducing work-related injuries and illnesses. An *Implementing Solutions* section offers examples of ergonomic solutions that may be used to control exposure to ergonomic risk factors in grocery stores. The section includes corrective actions, including checkout, shelf stocking, bakery, produce and meat departments.

"Many grocery stores have taken substantial steps to address work-related MSDs," added Henshaw, "and these facilities demonstrate methods that are available to better protect workers in grocery stores from injury."

OSHA will be working with trade, labor, and professional organizations to assure these guidelines and other effective practices are accessible and implemented where appropriate. OSHA's free consultation service will be available to assist small employers.

OSHA's role is to assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. For more information, visit www.osha.gov.

PUBLISH

or perish

These recently published articles were written or co-authored by Institute members. Their names appear in boldface type.



Accommodating NAS User Goals and Constraints: Choreographed Responses to Weather Events at Arrival Airports

Philip J. Smith, Amy L. Spencer, Steve Caisse, Carla Beck, Tony Andre, Jimmy Krozel, and Goli Davidson. Presented at the *Human Performance, Situation Awareness, and Automation Technology Conference II*, Daytona Beach, FL (March 22nd-25th, 2004).



Cervicobrachial Muscle Response to Cognitive Load in a Dual-Task Scenario

E. Leyman, Gary A. Mirka, D. Kaber, and Carolyn Sommerich. *Ergonomics*, 47(6):625-645, 2004.

Design Concepts for Distributed Work Systems: One Brigade's Approach to Building Team Mental Models

Jodi Heintz Obradovich and **Philip J. Smith**. Presented at the *Human Performance, Situation Awareness, and Automation Technology Conference II*, Daytona Beach, FL (March 22nd-25th, 2004).

Envisioning Human-Robot Coordination for Future Operations

David D. Woods, James Tittle, Magnus Feil, and Axel Roesler. *IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews*, 34(2):210-218, 2004.

Gender Differences in Prevalence of Upper Extremity Musculoskeletal Disorders.

Delia E. Treaster and **Deb Burr**. *Ergonomics*, 47(5):495-526, 2004.



Handoff Strategies in Settings with High Consequences for Failure: Lessons for Health Care Operations

Emily S. Patterson, E.M. Roth, **David D. Woods**, R. Chow, and J.O. Gomes. *International Journal for Quality in Health Care*, 16(2):125-132, 2004.

Human Factors Barriers to the Effective Use of Ten HIV Clinical Reminders

Emily S. Patterson, A.D. Nguyen, J.M. Halloran, and S.M. Asch. *Journal of the American Medical*



Informatics Association, 11(1):50-59, 2004.

Revised Protocol for the Kinematic Assessment of Impairment

Sue A. Ferguson and **William S. Marras**. *The Spine Journal*, 4:163-169, 2004.

Spine Loading in Low Back Pain Patients During Asymmetric Lifting Exercises

William S. Marras, Sue A. Ferguson, **Deborah Burr**, K.G. Davis, and P. Gupta. *The Spine Journal*, 4:64-75, 2004.



Use of Decision Support Tools To Assist ATC Traffic Management Coordinators in Airport Surface Management.

Amy L. Spencer, **Philip J. Smith**, and **Charles E. Billings**. Presented at the *Human Performance, Situation Awareness, and Automation Technology Conference II*, Daytona Beach, FL (March 22nd-25th, 2004).



Accommodating NAS User Goals and Constraints: Choreographed Responses to Weather Events at Arrival Airports

Authors: Philip J. Smith, Amy L. Spencer, Steve Caisse, Carla Beck, Tony Andre, Jimmy Krozel, and Goli Davidson

Abstract

In this paper, a specific scenario is used to illustrate a concept of operations for dealing with weather events that reduce arrival rates into an airport, and to demonstrate the potential benefits. The primary focus of this concept of operations is the sharing of perspectives between traffic managers and NAS Users regarding priorities for flights that are already airborne at the time that a weather event impacts airport arrivals.

Revised Protocol for the Kinematic Assessment of Impairment

Authors: Sue A. Ferguson and William S. Marras

Abstract

Marras et al. developed a functional motion performance tool that accurately identified impaired low back motion performance, with sensitivity of 90% and specificity of 94%. However, the protocol required testing of five controlled tasks and was relatively time consuming. The purpose of this study was to determine whether a more time-efficient low back motion functional performance evaluation tool with acceptably high sensitivity and specificity could be developed.

Low back functional motion (kinematic) performance evaluations were completed on two groups, consisting of controls (no history of back pain) and low back pain patients. A second low back pain population was also evaluated prospectively to assess recovery. The study population consisted of 335 patients and 374 controls. Thirty acute low back pain patients were monitored prospectively.

Low back motion functional performance was measured using the lumbar motion monitor. A revised discriminant function model was developed using data from only one of the five original functional motion performance control tasks. Prospective study data were used to track differences in recovery time between the revised and original discriminant function models.

The revised model using functional motion performance from the controlled sagittally symmetric task had a sensitivity of 90% and specificity of 92%. When comparing the revised and original model results, the time to recovery was the same in 90% of cases. The revised (more time efficient) testing procedure yielded high sensitivity and specificity.

Use Of Decision Support Tools to Assist ATC Traffic Management Coordinators in Airport Surface Management

Authors: Amy Spencer, Philip J. Smith, and Charles E. Billings

Abstract

This paper discusses the roles and tasks of Air Traffic Control Tower Traffic Management Coordinators (TMCs), who coordinate the flow of surface traffic at major U.S. airports. It examines decision support tools designed to moderate often high workloads placed on TMCs and improve their situation awareness and efficiency. The paper results from several field and simulation studies of surface traffic management at large airports and extensive discussions and knowledge elicitation sessions with subject matter experts. The goals of the studies were to:

- Identify tasks involved in surface management at airports and gain insight into how and by whom these tasks are accomplished;
- Understand how decision support tools (DSTs) could assist TMCs and airline operations personnel in accomplishing surface management tasks;
- Suggest how decision support tools can best be structured to improve surface situation awareness and performance and decrease workload of air traffic control and airline personnel.

Design Concepts for Distributed Work Systems: One Brigade's Approach to Building Team Mental Models

Authors: Jodi Heintz Obradovich and Philip J. Smith

Abstract:

Research on teams engaged in problem-solving tasks suggests that they can generate representations of a problem that differ from those developed by an individual working alone, potentially providing richer or more effective insights into the problem. In this paper, we discuss issues surrounding the building of team mental models that were gained through a series of investigations that included field studies and structured interviews. The results of one U.S. Army Brigade process that enables the sharing of information and expert knowledge in the complex cognitive activity of planning for battlefield operations are presented. Design concepts to support distributed work and the building of common ground and team mental models are suggested.

Upcoming Events

Human Factors & Ergonomics Society 48th Annual Meeting

Mark your calendars and brush up on your jazz! The HFES Annual Meeting will be held at the Sheraton New Orleans Hotel in New Orleans, Louisiana, from September 20th-24th, 2004.

More information and updates, including registration forms, meeting schedules, and technical sessions, can be found at: <http://hfes.org/meetings/2004menu.html>.



Putting Ergonomics Into Practice The Ohio State University's Annual Ergonomics Short Course

This yearly, highly successful course provides the means necessary to integrate ergonomics into the industrial workplace. Participants will: learn about ergonomics principles and the basis of cumulative trauma; use a variety of ergonomic assessment tools; and find out how to design work environments and ergonomics programs for maximum benefit.

The autumn course will be held **October 12th-15th, 2004**.

For more information, contact the Institute for Ergonomics at 614-292-4565 or ergonomics@osu.edu.

2005 Applied Ergonomics Conference

The Institute is proud to again be an academic co-sponsor of the 8th Annual Applied Ergonomics Conference, which will be held March 21st-23rd, 2005 in New Orleans, Louisiana.

This conference is held in conjunction with the Institute of Industrial Engineers (IIE) Society for Work Science.

More information about the conference can be found at <http://appliedergonetw.iienet.org/pages/index.cfm?pageid=133>.

Interested in submitting a paper? Submissions are due August 9th, 2004. Abstracts can be submitted on-line, at <http://www.x-cd.com/applied05/abstract.cfm>.



Central Ohio HFES Chapter Resurrected

Although the Central Ohio Chapter of the Human Factors and Ergonomics Society was formed in 1987, it has been inactive for a few years...until recently.

Through the efforts primarily of Dr. Carolyn Sommerich, this chapter has again begun meeting, hearing interesting speakers, and planning for the future.

This spring, the Central Ohio Chapter hosted two speakers. In May, **Dr. Nadine Sarter** spoke on her work with multimodal interfaces in support of human-computer interaction and computer-supported cooperative work.

In June, the Chapter was honored to have **Dr. Kathryn Sullivan**, President and CEO of the Columbus Center of Science and Industry (COSI), talk about human factors in relation to her work at NASA and as an astronaut.



Sullivan

Additional events currently are being planned for 2004. Visit the Central Ohio Chapter's web site, www-iwse.eng.ohio-state.edu/ISEFaculty/sommerich/centralohhfes/, for updates and additional information, including:

- The purpose of the Chapter;
- Upcoming speakers and other events; and
- Member benefits, dues, and a membership application.

Call for Officers: Nominations currently are being taken for Chapter officers, to begin their terms in September, 2004. To nominate yourself or others, contact Dr. Carolyn Sommerich (614-292-9965 or sommerich.1@osu.edu).

Successful Handoff Strategies for Nurses

A quarterback passing the football to a receiver steps back and calculates the throw, aiming through the opposition to make a successful handoff to his team member. A slight miscalculation or unforeseen opponent blocking the pass means the difference between a positive and negative outcome.

That vulnerability during handoffs is the same in health care. Nurses rely on the handoff to confirm responsibility for patient care, get shift change updates, increase team cohesion and more. One's failure to incorporate effective communication and handoff techniques during the transition could result in errors and other patient safety concerns.

Researchers recently looked at how other settings that have high consequences for handoff failure handle the job of transferring responsibility from one worker to another. The study, published recently in the *International Journal for Quality in Health Care* (2004, 16:125-132), reported on 21 handoff strategies used at NASA Johnson Space Center in Texas, nuclear power generation plants in Canada, a U.S. railroad dispatch center, and an ambulance dispatch center in Toronto.

"We began the study with the assumption that these are high reliability organizations that have been doing shift changes for a long time. We asked: 'What is it that they are doing that might improve the effectiveness and efficiency of the handoff in health care?'" says lead author **Emily S. Patterson**, PhD, a research physical scientist at the VA Getting At Patient Safety (GAPS) Center and volunteer research assistant professor of clinical medicine at the University of Cincinnati. Patterson made several observations after comparing the findings of her study to the handoff strategies she witnessed at several hospitals.

It's How You Approach the Handoff

All four settings in the study used face-to-face handoffs, with verbal updates and interactive questioning. So, outgoing employees would meet with their replacement before leaving the shift. Many nurses, especially those who have several patients assigned to them, use the audio tape shift change approach. Nurses in the intensive care unit, who only have a patient or two under their care, usually have face-to-face handoffs.

Nursing decisions, Patterson says, are usually governed by efficiency, and the audio tape approach is highly efficient. It can also, however, be a good safety strategy if done correctly.

One benefit of the audiotape update between shifts is that nurses often hear not only their own updates, but those of the other nurses coming on shift. The additional information increases their awareness of what else is happening on the floor and might make them quicker to respond to high risk patients.

Another benefit of having nurses listen to the audiotape is that charge nurses, responsible for assigning new patients, hear the tape and, based on what they learn, can make better decision about patient assignments.

There are hospitals, which in the name of efficiency, instruct their nurses to leave after they have heard the information about their patients on the audiotape. That practice loses the first benefit that Patterson mentioned—of hearing about

the status of other patients on the floor. But if a hospital insists on its nurses leaving after their parts of the audio taping, they can at least preserve the benefit of having the charge nurse listen to the entire tape or being briefed by the nurse who has listened to the whole tape.

Patterson also suggests that even nursing staffs that use the audiotape handoff could incorporate an interactive component. Instead of just leaving, a nurse might announce her checking out by saying to the incoming nurse, "I am leaving. Is there anything you want to ask me before I go? That way ... if there is confusion or noise on the tape, or a question about a patient, the nurse has the chance to get any needed information," Patterson says.

Make it Clear: Who's in Charge

One element about the handoff that was valuable in the settings studied was that it was always clear who was in charge. The handoff in each setting involved making a physical change, so everyone on the staff knew who was responsible at the time. "It is not always clear which nurse is actually in charge of the patient if they are both there," Patterson says. "So, we thought maybe there can be a pager, phone or laminated card, something physical that people could see from a distance, that changes hands and makes it clear who is in charge of the patient."

Using Technology to Your Advantage and More

The authors considered the benefits technology might bring to the handoff. "One of the issues that I have seen during the nursing shift change is that if you have a lot of nurses who want to tape before they leave, then you have this bottleneck where several nurses want to tape at the same time," Patterson says. "There is normally only one tape recorder, and sometimes you would see nurses taping as early as one hour before the shift change to avoid the bottleneck. The problem is that a lot has happened since the update. Just even having multiple recorders could solve that problem."

Other strategies to come out of the study include:

- Limiting interruptions during the updating (whether by audiotape or verbal exchange);
- Writing a summary of what occurred on the last shift for the new person coming on; and
- Delaying the transfer of responsibility when concerned about the status or stability of the process.

While mistakes happen during shift changes, handoffs are also an opportune time, Patterson says. The person coming in has a fresh perspective and might better be able to pick up on mistakes that have or could happen. Effective communication is key, she says. And, for the most part, nurses do a good job of handing off their responsibilities. There are just a few simple things that nursing can glean from other industries that might significantly improve health care quality.

written by Lisette Hilton

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