

Institute *for* Ergonomics



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

At the forefront of Human Factors since 1950 Vol. 3, No. 2, Summer 2000

New Program Director Named

In March, the Institute for Ergonomics named a new Program Director--**Gary Allread**. Gary recently earned his Ph.D. at The Ohio State University under the direction of Dr. Bill Marras. While a graduate student, Gary conducted research related to causes of occupational low-back disorders. He also has spent the past several years consulting to numerous industrial clients, including establishing ergonomics processes in clients' facilities and conducting ergonomics job analyses. Welcome, Gary!



Author of OSHA's Proposed Ergonomics Standard to Give Talk

David Cochran, a University of Nebraska professor and currently Special Assistant for OSHA's proposed ergonomics program standard, will be the

"I believe not all of industry is up to snuff on [ergonomics] or we wouldn't have a problem."
– David Cochran, Ph.D.

"Ergonomics for the New Millennium"

The Human Factors and Ergonomics Society's 44th Annual Meeting and the International Ergonomics Association's XIVth Triennial Congress will be held jointly in San Diego, CA, from July 30th through August 4th. Check the web for more information (<http://iea2000.hfes.org/>), including specifics on the technical program.

These Institute members will be giving plenary addresses at the conference:



- **David Woods:** "Complementarity and Synchronization as Strategies for Practice-Centered Research and Design" (August 1, 8:30- 9:45)
- **Bill Marras:** "Occupational Low Back Disorder Causation and Control" (August 3, 8:30- 9:45)
- **Larry Fine:** Title not yet available (August 4, 8:30- 9:45)

Also, the Institute will have a booth in the Exhibition Hall (space #59). Stop by and say hello!

guest speaker for the Institute's Seminar Series. The date is **Thursday, June 15th**, at 11 am in Room 263 Dreese Labs, on OSU's main campus. This one-hour talk is sure to generate much discussion and debate. Call the Institute (614-292-4565) with any questions.

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...On the Move

The 1999 Earl Alluisi Award for Early Career Achievement was given to **Nadine Sarter** by the American Psychological Association, Division of Applied Experimental and Engineering Psychology.



Bill Marras received the 1999 Jack A. Kraft Innovator Award from the Human Factors and Ergonomics Society, in recognition of his work in using unique methods of applying ergonomics principles to help society, particularly in developing ways to assess the risk of low-back injury in the workplace.



Nadine Sarter and W.A. Olson were awarded the "Best of Track" paper at the 18th Digital Avionics Conference in St. Louis, MO (October, 1999), for the paper, "Informed Consent in Distributed Cognitive Systems: The Role of Conflict Type, Time Pressure, and Trust."



"IT Workforce Development: A Provider's Perspective" was

the title of a December presentation given by **Stu Zweben** to the Central Ohio Information Technology Forum (Columbus, OH).



Gary Allread gave the presentation, "Quantifying the Risk of Physical Injury in Physically Demanding Maritime Tasks" at the Maritime Human Factors 2000 Conference (Baltimore, MD, March 13th)



The Institute was well-represented at the Ohio Safety Congress & Expo, (Columbus, OH, April 3rd-April 6th). **Bill Marras** spoke on current trends in back research. **Gary Allread** gave an update on OSHA's proposed ergonomics standard and sat on a panel discussing this proposed rule.



Bill Marras was awarded "Best Paper" for his presentation titled, "Potential LBP Mechanisms of Psychosocial Job Stress" at the International Society for the Study of the Lumbar Spine

Annual Meeting (Adelaide, Australia, April 13th). Co-authors were Kermit Davis, Catherine Heaney, and Anthony Maronitis.



Stu Zweben was selected by the Columbus Technical Council as their Technical Person of the Year for 2000.



Bill Marras has been selected as a member of the National Academy of Science's "Workplace Musculoskeletal Disorders" research committee, a group funded by Congress to investigate the status of the science associated with the work relatedness of musculoskeletal disorders. The committee consists of 18 researchers, half MDs and half Ph.D.s. The report, due in early 2001, is in response to the proposed OSHA ergonomics standard.



Emily Patterson and **Phil Smith** attended The Fifth Conference on Naturalistic Decision Making (near Stockholm, Sweden, May 26th-28th). Emily spoke on "The Natural History of Technology Change: How Introducing Bar Coding Changes Medication Administration." Phil talked on "Alternative 'Rules of the Game' for the National Airspace System in the United States."



Getting to Know You

Ever want to put a face with a name? Are you passing fellow “ergonauts” on campus, not even knowing you share a common career or research goal? To help rectify this, we will be including photos and descriptions of people who are a part of the Institute. In this issue, we have highlighted Ph.D. students who are studying cognitive and physical ergonomics.



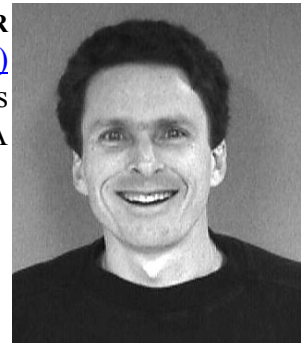
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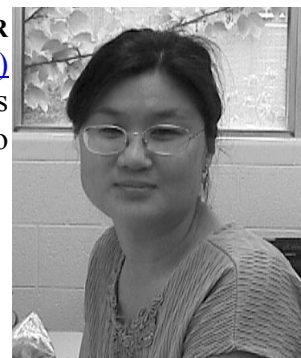
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Research Corner

This column features some of the Institute's recent research projects.



“Longitudinal Observations of Low Back Pain Recovery”

Sue A. Ferguson, Ph.D.

Most low-back pain recovery studies evaluate one outcome measure at one point in time. Return-to-work, symptoms, activities of daily living, and functional performance have been commonly used outcome measures. The first goal of this project was to evaluate these four previously used outcome measures at several points in time. The second goal was to predict outcome as a function of time and recovery measure. The outcome measures of working status, symptoms, and activities of daily living were assessed using questionnaires.

Functional performance was evaluated using the Lumbar Motion Monitor. These outcome measures were evaluated every two weeks, for three months. Psychological factors, psychosocial factors, physical job demands, and personal factors that may influence recovery also were evaluated. Discriminant function analysis was used to predict outcome at a specific visit, given the confounding

factors and any previous conditions. The cross-validation error rate for the discriminant function results ranged from 0-15%.

The results shows discrepancies among the four outcome measures in their indication of recovery. This is the first study to compare multiple outcome measures at several points in time after a low-back pain episode.



“The Natural History of Technology Change: How Introducing Bar Coding Changes Medication Administration”

Emily S. Patterson, Ph.D.

The current interest in improving patient safety and reducing adverse events in health care has led to interest in the use of bar coding to verify medications are correct immediately prior to administration. The result is a natural experiment on the impact of new technology on human performance in a complex setting.

Observations at two hospitals in the process of implementing a particular bar coding medication verification system revealed familiar patterns of

transformation and adaptation. First, new vulnerabilities in the process of medication administration as a result of missing information about pending and discontinued medication orders were identified. Second, the increase in documentation activities during the high-tempo period of the medication pass encouraged adaptations that bypassed the bar coding system. Third, the automated collection of data about the time a medication was administered artificially raised timely medication administration over other patient care goals.

These observations increase our understanding of how the process of medication administration functions and add to the knowledge base of how technology change impacts cognition and collaboration. The findings generate insight into short- and long-term design post-conditions to improve system usefulness and reduce unintended side effects following the introduction of the new technology.

This work was done, in part, for the Veteran's Administration Midwest Patient Safety Center of Inquiry: Marta Render-Director, David Woods and Richard Cook-Associate Directors.

WORK HEALTHY: A Guide to the Ergonomic Office by Liesel Nusbaum

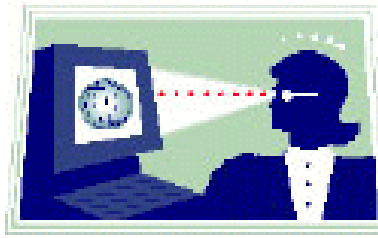
Did you know that being too close to your monitor throughout the day causes dust build up on your corneas due to static on the screen? Or that maintaining a "correct" posture at a computer keyboard is just as exhausting and causes as much discomfort as slouching all day long? Since nearly 40 million people today rely on computers, and our usage and dependence on them increases, it is even more important to develop healthy work habits.

Ergonomics, simply stated, fits the workplace to the person. Since you spend a third of your day or more at work, you should be as physically comfortable as possible. When you're comfortable, your productivity will increase and your work-related health issues should diminish.

Setting Up A Healthy Office

Eyes

1. Keep computers dust-free to improve visibility.
2. Angle computer monitors for better vision; they should be properly ventilated and flicker-free.
3. Use an anti-glare screen to reduce eyestrain.
4. Keep monitor perpendicular to windows.



Head/Neck/Spine

1. Your spine should be in its "neutral" position, allowing for the natural inward curve of the lower back, outward curve of the mid back and the inward curve of the cervical spine.

2. Line the top of the monitor screen with your natural line of vision. This causes less stress on the neck. Make sure your feet are flat on the floor or supported by a foot rest. Knees should be bent no more than 90°. Have enough clearance under the workstation to move your legs around freely, without hindrance.

3. Use telephone headsets. They free up the hands and eliminate the strain placed on the neck and shoulders from cradling the receiver between the ear and the shoulder.

4. When reading off documents, use document holders to reduce neck and eye strain.

Chairs

1. The seat pan should be at least 18" wide and height adjustable with a "waterfall" edge, allowing for proper circulation in the back of your legs. If your thighs are com-

pressed on the seat pan, your chair is too high.

2. Make sure the backrest is adjustable and supports your low back.

Arms/Wrists

1. Your arms should be vertical at your sides; elbows at a 90° angle. You should not have to hold your arms up at the shoulders.

2. Use your wrist rests to rest, but when typing, keep wrists and hands straight or slightly downward.

3. When using your mouse, keep it next to the keyboard; you should not have to stretch or reach for it.

4. Take frequent breaks. Every 10 minutes or so, look away from the monitor, close eyes momentarily, gazing at a distant object and blinking frequently. Every 20 minutes or so, get up, stretch, or do other work that takes you away from the computer.

5. Use a reminder to take breaks. There is software available now to help you.

Environment

1. Use overhead lights that give soft, non-glaring illumination and/or task lighting for a specific work space. Lighting for the computer should be slightly dimmer than general office lighting.

2. Keep the office temperature the recommended 73° - 79° in the summer and 68° - 74.5° in the winter.

(continued on page 7)

(continued from page 6)

3. Work surfaces should be height adjustable and have rounded edges, which avoids cutting off circulation when limbs rest against them.

4. Sound covers placed over impact printers and ambient or "white noise" (a small fan) can help create a peaceful environment.

Remember, one size does not fit all. When you get into a car, you adjust mirrors and seats for your body, so treat your workplace the same way. An ergonomically proper workstation should do the work for you.

Liesel Nusbaum operates her own advertising/marketing research firm, Synergy Creative. She also serves as a marketing research contractor for CareerBuilder, Inc.

Updated Web Site

The Institute has updated its web site. This site includes descriptions of the research and education programs offered, more specific information about cognitive and physical ergonomics, lists of Institute faculty, staff members, and other members, and links to their web sites. The site's address is <http://osuergo.eng.ohio-state.edu/institute/index.htm>.



Publish or Perish

The following research articles, authored by Institute members, have recently been published.



Cook RI, Render ML, and Woods DD, Gaps in the continuity of care and progress on patient safety, **British Medical Journal**, 2000, 320:791-794.

Davis KG and Heaney CA, The relationship between psychosocial work characteristics and low back pain: underlying methodological issues, **Clinical Biomechanics**, 2000, 15(6):389-406.

Davis KG, Jorgensen MJ, and Marras WS, An investigation of perceived exertion via whole body exertion and direct muscle force indicators during the determination of the maximum acceptable weight of lift, **Ergonomics**, 2000, 43(2), 143-159.

Jorgensen MJ and Marras WS, The effect of lumbar back support tension on trunk muscle activity, **Clinical Biomechanics**, 2000, 15:292-294.

Marras WS, Jorgensen MJ, and Davis KG, Effect of foot movement and an elastic lumbar back support on spinal loading during free-dynamic symmetric and asymmetric lifting exertions, **Ergonomics**, 2000, 43(5):653-668.

Sarter NB and Alexander HM, Error types and related error detection mechanisms in the aviation domain: an analysis of ASRS incident reports. **International Journal of Aviation Psychology**, 2000, 10(2):189-206.

Sklar AE and Sarter NB, Good vibrations: the use of tactile feedback in support of mode awareness on advanced technology aircraft. **Human Factors**, 1999, 41(4):543-552.



The Mind & the Body:
Responding to Human Needs in
the Workplace

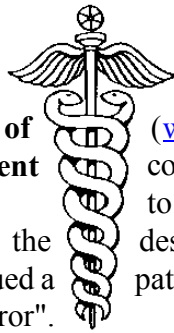
Patient Safety News

Health Care Leaders, Politicians See Human Factors at the Center of Improvements in Patient Safety

In December 1999, the Institute of Medicine issued a report on "medical error". The report used "guestimates" of injuries as a result of care to spur politicians and others to action. The solutions proposed that all place human factors at the center of prospects for improving patient safety.

The action was swift and furious, with many organizations at national, state and local levels debating the issue and possible new programs. Leaders in health care speak of adopting a systems approach, borrowing from past research on human performance and are preparing to invest new resources. **David Woods** has been active in the patient safety movement that inspired the Institute of Medicine report and in the current political process both as President of the Human Factors & Ergonomics Society and as a founder of the National Patient Safety Foundation.

Many resources are available on how the research base in human performance and complex system failures can be



used in health care. Contact Dave (woods.2@osu.edu) for copies of several pieces used to tutor health care and that describe the history of the patient safety movement.

Institute for Ergonomics Wins Center Grant on Patient Safety from Veterans Health Administration

The Veterans Health Administration is one of the leaders in the patient safety movement. Among their initiatives, they have funded four Centers for Inquiry on Patient Safety. The Institute, in partnership with the Ohio VHA network, and with researchers at the University of Chicago is leading one of these centers – The GAPS Center.

The research theme of the Center is gaps in the continuity of care. The Center is also concerned with how to build a culture of safety and is developing a Theater of Safety as a case-based method to facilitate learning about how safety is created in the interconnected world of modern health care systems. For more information about the Center and its activities, email David Woods, the Center's Associate Director (woods.2@osu.edu).

Presidential Address on the Web

David Woods was President of the Human Factors and Ergonomics Society last year. His presidential address at the annual meeting (Sept. 28th, 1999) is available on the web as a multimedia production. The title is "W3: Watching Human Factors (and others) Watch People at Work."

The talk can be viewed at <http://csel.eng.ohio-state.edu/hf99/>. This multimedia production incorporates about 40 minutes of fairly high quality video/audio with animations, synchronized still images, and a simple navigation bar.

In the production, Dave covers a wide range of topics in human factors around some oversimplification fallacies. It is a different kind of introduction to cognitive engineering than reading a paper or book chapter.

Viewing this production will require: Quicktime 4.1; a web browser; and direct internet connection. Enjoy the show!



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