from Research to Reality

Winter 2009

Liberty Mutual Research Institute for Safety

CAUTION: Your Safety Warnings May Not Be Working

Research Links Accident Scenario Training to Improved Warning Comprehension

How Can Companies Maximize Warning Effectiveness?

Vol. 12 No. 1

CAUTION:
Your Safety Warnings May Not Be Working

Safety warnings are everywhere – on machinery, road signs, medication bottles, electronics, cleaning solutions, and food items...the list goes on. In the workplace, safety warnings are meant to help workers make decisions to avoid actions that could lead to injury, illness, or even death. They are an important, and often required, part of a company's overall safety strategy. But are workplace safety warnings effective in mitigating risk? Not always.

Studies suggest that warning compliance rates are low, ranging anywhere from 17 to 37 percent.[1] "There are many possible reasons for this," says Mary Lesch, Ph.D., cognitive researcher at the Liberty Mutual Research Institute for Safety. "The warnings may be improperly designed or placed, or they can become overly familiar, such that they are no longer noticed or thought about. Or, despite the warnings, some people may simply choose to engage in risky behaviors." Lesch also notes that workplace factors such as time pressures, distractions, and cultural differences may hamper a worker's ability to process a warning, which may contribute to noncompliance (see chart right).

Traditionally, safety warning research has examined how warning variables (such as font size, color, and use of symbols) and receiver characteristics (such as age, gender, and risk-taking behavior) impact warning effectiveness. "These studies provide good information for the design and implementation of more effective warnings," Lesch explains. "However, at the Research Institute, we take the issue a step further by investigating the cognitive processes that underlie the effects of these variables."

Researchers in the Institute's Center for Behavioral Sciences apply cognitive and psychological theories to study how individuals process safety warnings. "The essential question underlying our research is this: How can we maximize the effectiveness of workplace safety warnings in the face of cognitive responses to factors such as multitasking, distraction, or aging?" says Lesch.

"With the information we gain, we hope to develop recommendations for improving warning comprehension so that workers have the information they need to make better safety decisions," notes Lesch. "If we're successful, workers will suffer fewer injuries and employers will experience reduced losses."

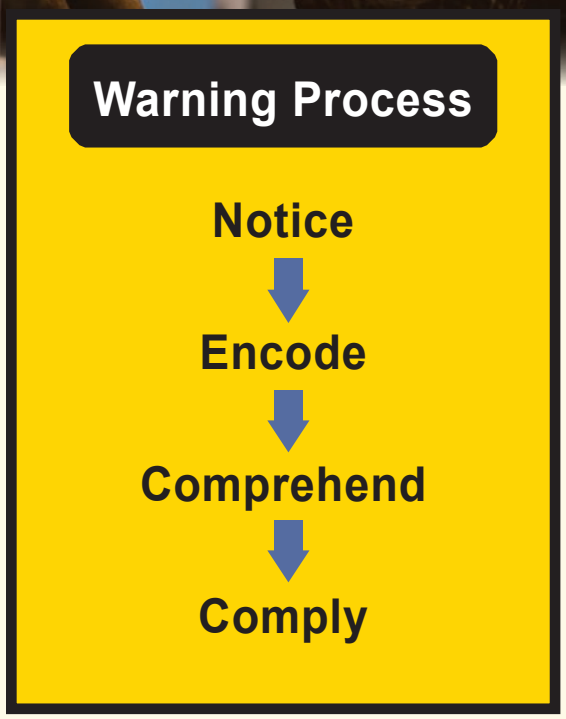
Center Focuses on Behavioral Aspects of Workplace Safety

Established in 2007, the Center for Behavioral Sciences (CBS) is the Liberty Mutual Research Institute for Safety's newest research unit. Its mission is to investigate behavioral, cognitive, and organizational factors surrounding workplace injuries and highway collisions. CBS research scientists explore topics such as risk communication, organizational safety climate, alternative work systems, and driver performance.

"Most people associate workplace safety research with the physical factors that can impact safety, such as job design, protective equipment, and worker-to-tool interface," says Marvin Dainoff, Ph.D., director of the Institute's Center for Behavioral Sciences. "However, it is just as important to understand the thought processes and organizational factors that may contribute to unsafe behaviors in the workplace."

Investigators from the Center for Behavioral Sciences collect observations and employee feedback to better understand the psychological factors related to workplace safety. Studies cover a wide range of factors, from individual risk perceptions, to the effects of training, to organizational safety climate. "By studying how such factors impact behaviors," explains Dainoff, "we can improve our ability to identify effective workplace safety strategies."

The Research Institute has long recognized workplace safety as a real-world issue involving human behaviors. As Dainoff notes, the CBS team's behavioral research "rounds out the Institute's multidisciplinary approach to understanding and addressing workplace safety concerns. Ultimately, the findings improve our ability to develop effective and comprehensive safety solutions."



An individual's ability to process warnings involves four basic human information processing components: notice, encode, comprehend, and comply. A failure of any one of these components increases the likelihood that a warning will be ineffective.[2]

Among the many factors that have been shown to influence these processes are warning variables (such as font size, color, explicitness, and use of symbols) and receiver characteristics (such as age, gender, vision, familiarity, and risk-taking style). And, while many studies examine the impact of these variables on warning effectiveness, Institute researchers focus their studies on the underlying mechanisms that mediate the effects of such variables, such as memory and cognition.

Footnotes: [1]DeJoy, D.M., "Consumer Product Warnings: Review and Analysis of Effectiveness Research," *Proceedings of the Human Factors Society 33rd Annual Meeting*, pp. 1068-1072, 1989, cited in Adams, A., Bochner, S., and Bilik, L., "The Effectiveness of Warning Signs in Hazardous Work Places: Cognitive and Social Determinants," *Applied Ergonomics*, Vol. 29, pp. 247-254,1998. [2]Rogers, W.A., Lamson, N., and Rousseau, G.K., "Warning Research: An Integrative Perspective," *Human Factors,* Vol. 42, pp. 102-139, 2000.

Accident Scenario: Ear Protection Required

As a construction worker, your work environment contains a lot of noise. You've been instructed to wear ear protection and to get your hearing checked once a year. You usually wear ear protection, but sometimes it gets in the way, and you don't bother with it. You sometimes have ringing in the ears or they feel like they're stuffed up. You didn't really worry about it because it goes away eventually. But, you just had your annual exam, and the news wasn't good – you have a hearing loss. The technician explained that repeated exposures to loud noise can lead to permanent, incurable hearing loss. In the future, you'll be more careful to wear ear protection when working in noisy environments.

Research Links Accident Scenario Training to Improved Warning Comprehension

More than a decade ago, the Liberty Mutual Research Institute began conducting research on workplace safety warnings. Early studies focused on individual warning components, examining how features, such as font size, color, and format, affect a warning's effectiveness. The findings from that research were incorporated into recommendations for improved warning design. Today, the Institute applies a more contemporary, behavioral research approach, by examining the underlying cognitive processes that affect warning comprehension. The information gained is used to develop strategies to help businesses get the most out of their safety warnings.

"Successful transmission of the safety message is only one part of the risk communication puzzle," explains Institute Research Scientist Mary Lesch, Ph.D. "It's critical that workers understand what the warning means, are able to recall that information quickly, and are thinking about the relevant safety information at the time of risk." One way to help maximize warning effectiveness is through training. "Our early research in this area suggested that relatively simple training conditions can dramatically improve warning comprehension in terms of accuracy and speed of response," notes Lesch.

In 2003, Liberty Mutual researchers set out to further test training effectiveness. Forty-four, working-age adults participated in a study, which compared the effects of two training methods on workers in two different age groups. Half of the participants comprised a younger group (ages 20-35) and half comprised the older group (ages 50-70). Prior to training, researchers administered a pretest to both groups to test their comprehension of 92 workplace safety symbols. On separate trials, each symbol was paired with either a correct explanation of the symbol's meaning or an incorrect, but plausible, explanation. Researchers measured the participants' response accuracy and timing for each symbol presented. They also asked participants to rate their confidence in their answers on a scale of 0 (not at all confident) to 5 (certain).

Following the pretest, participants were divided into two mixed-age groups and were presented with either verbal label training or accident scenario training. The

verbal label training paired safety warning symbols with labels to describe their meaning. The latter training paired symbols with real-world accident scenarios that illustrated the nature of the hazard, the required or prohibited actions, and the possible consequences of failure to comply. Immediately after training, researchers administered a post test which measured participants' response accuracy, speed, and confidence. Two weeks later, another post test was administered to measure how long the benefits of training lasted.

The findings, presented in "A Comparison of Two Training Methods for Improving Warning Symbol Comprehension" (*Applied Ergonomics*, Vol. 39, pp. 135-143, 2008), indicated that both training conditions improved performance. However, the accident scenario training increased comprehension to a greater extent (36%) than the verbal label training (30%). Furthermore, participants responded to warnings more quickly following the accident scenario training and were more confident in their responses.

With respect to the age comparisons, the study found no differences in comprehension for older and younger groups prior to training, however younger adults did tend to respond more quickly. After training, younger participants showed greater improvement than older adults in terms of accuracy and composite confidence scores. However, older adults improved their reaction times to a greater extent than younger participants (most likely due to the much slower reaction times for older adults on the pre-training test). Therefore, younger participants appeared to benefit to a greater extent from the training. Benefits persisted for both groups at the two-week follow-up.

To further examine the benefits of accident scenario training, researchers conducted another more focused study in 2004. "In the 2003 study we just looked at the use of accident scenario training to reinforce the meaning of the symbol. This time, we wanted to examine whether such training improved people's understanding of required or prohibited actions or of what might happen as a result of failure to comply." As in the prior study, participants (48 working-age adults) took a pretest in which 34 warning symbols were paired with both correct and incorrect, but plausible, meanings. After that, participants received accident scenario training on all of the symbols. Immediately following and two weeks after training, our researchers measured comprehension across three knowledge types (verbal label, required/prohibited actions, and potential consequences of failure to comply).

In addition to the comprehension measures, researchers examined whether the training had shifted people's perceptions of control. "We wanted to determine if accident scenario training increased the participants' sense of being able to prevent an injury through compliance," states Lesch. "This is an important measure, because if people don't believe their actions will prevent an accident, they may not comply." Researchers also examined ratings on intent to comply and perceived hazard. "A lot of research shows that perceived hazard is a strong predictor of compliance….so we wanted to find out if accident scenario training impacted hazard perceptions."

"We wanted to determine if accident scenario training increased the participants' sense of being able to prevent an injury through compliance. This is an important measure, because if people don't believe their actions will prevent an accident, they may not comply."

According to the findings presented in "Warning Symbols as Reminders of Hazards: Impact of Training" (*Accident Analysis and Prevention*, Vol. 40, No. 3, 2008), training benefits were observed on all dependent measures. Comprehension improved from 43 to 82 percent correct, reaction times were reduced by about two seconds and level of confidence in correct responses increased by 23 percent. Ratings of perceived hazard, intent to comply, and perceived control over accident/injury involvement also increased. These benefits, which persisted at the two-week follow-up, suggest that accident scenario training can be used to help prevent accidents and injuries by ensuring that responses to warnings are "sure and swift."

Lesch, principal investigator on the study, explains the benefits of this research in real-world terms: "When people see a warning, it is critical that they not only understand it, but understand it right away. The miliseconds that are saved in reaction time could very possibly save a life."

Test Your Knowledge...

What do the following warning symbols mean?

1. 

a) Contents may shift
b) This medication may cause bloating
c) Yield to rotary traffic
d) Pressurized system

2. 

a) No penguins allowed
b) Jacket and tie not required
c) No wait service, serve yourself
d) Refrigerate, don't freeze

3. 

a) This medication may cause dizziness
b) Don't open before vehicle stops
c) Don't run into walls
d) Slippery surface

4. 

a) No ventilation
b) No excel spreadsheets
c) Do not operate with guard removed
d) No fly-swatting

5. 

a) Intended to prevent pregnancy
b) Do not take if you may be pregnant

Answers are at bottom of page 7.

Remembering to be Afraid:

Applying Theories of Memory to the Science of Safety Communication

What does memory have to do with safety communications? More than you might think. According to a Research Institute literature review published in *Theoretical Issues in Ergonomics Science* (Vol. 6, No. 2, 2005), applying psychological theories of memory to warning research can yield valuable insights on how to maximize warning effectiveness.

The review argues that warnings may be more effective as reminders of the presence of a known hazard than as a means of educating or persuading. For example, many Americans know that individuals below a certain weight and height should not sit in airbag-facing seats. However, they may not remember this fact, or the specific height and weight restrictions, without prompting. A well-designed and appropriately-placed warning serves to remind vehicle operators and riders of this known hazard each time they enter the car.

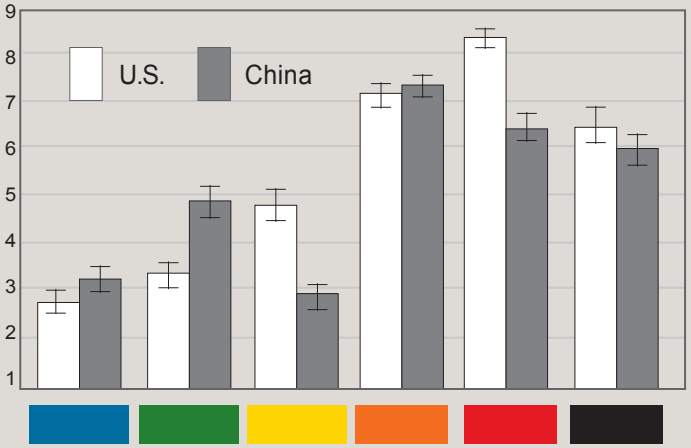
How can the function of warnings, as reminders, be optimized? The review findings suggest the need for more research that incorporates psychological theories of memory to investigate this question. Such studies would take into account what we already know about memory and find ways to improve people's ability to be thinking about warning information at the most relevant time – when deciding whether or not to engage in a potentially risky behavior. The review also suggests the importance of measuring speed of recall, in addition to accuracy, in attempting to assess warning effectiveness.

Does Culture Matter?

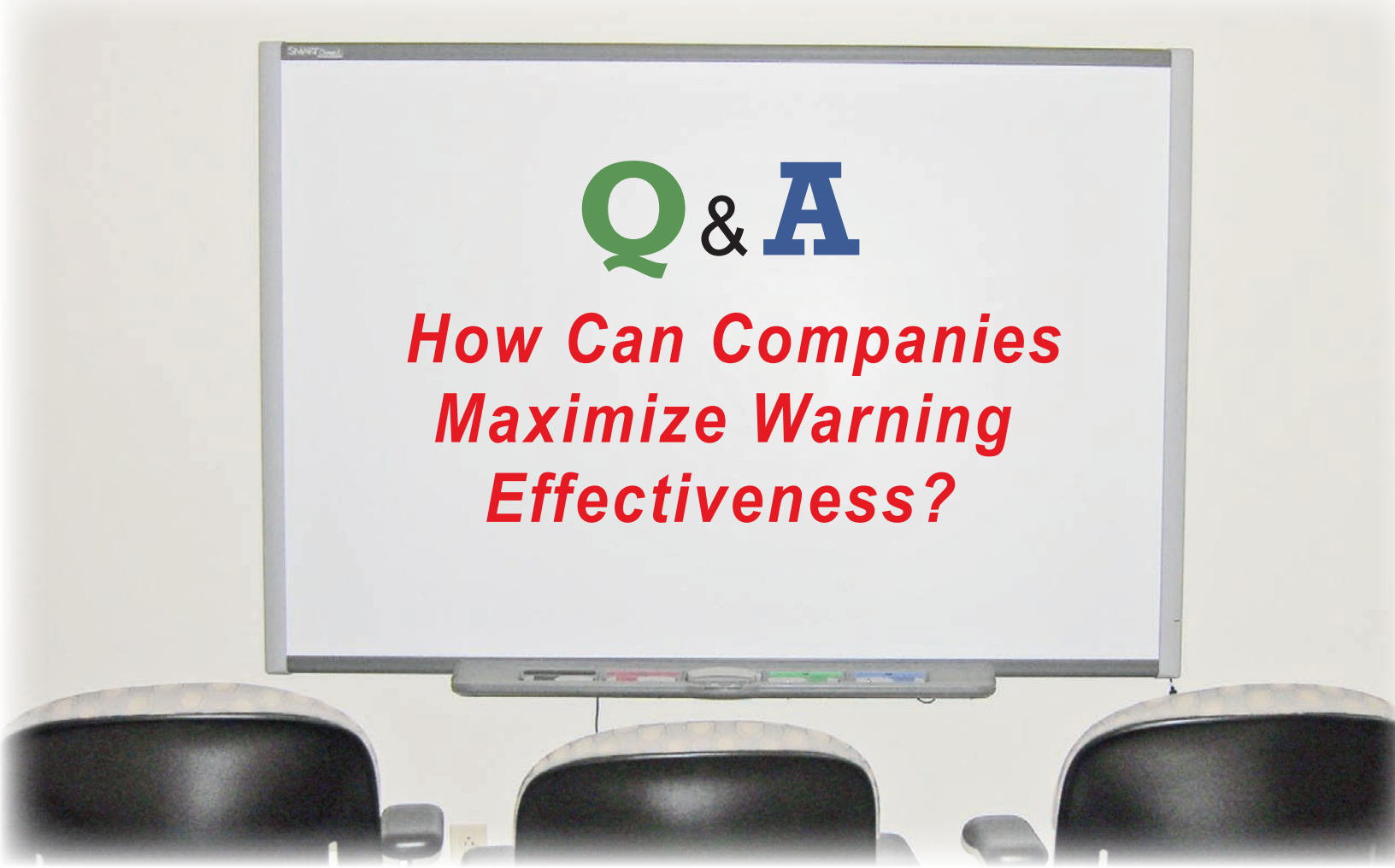
A Cross-Cultural Comparison of Perceived Hazard in Response to Warning Components

The American National Standards Institute (ANSI) recommends the use of specific colors, signal words, and symbols for use in hazard warnings. In today's global marketplace, many experts advocate *international* standards for hazard warning components. However, cultural differences in language and perception may lead to misunderstandings that increase injury risks.

To further investigate this issue, Institute researchers launched a cross-cultural study with Tsinghua University in China. In this study, 43 Chinese and 41 American participants rated the hazard level of various ANSI-recommended warning components. Researchers found that the Chinese and the American groups varied significantly with respect to perceived hazard associated with different colors (see chart right). For example, contrary to the typical American response, Chinese participants perceived a significantly higher degree of hazard with green rather than yellow. These and other findings suggest that current warning standards may not be equally effective across different populations.



Perceived hazard associated with different colors: U.S. versus China



Q & A

How Can Companies Maximize Warning Effectiveness?

To gain a field perspective on warning symbols and their use in the workplace, we spoke with Paul Myers, a technical director with Liberty Mutual Loss Control Advisory Services. A 29-year veteran in the area of risk management and loss control, Myers offered some interesting insights into the role of workplace warnings in a company's overall safety strategy and provided several research-based tips for maximizing warning effectiveness and compliance.

Q *Why are safety warning signs important in the workplace?*

A It is not always possible to eliminate or "design-out" injury risks associated with workplace systems and processes. In fact, the Consumer Products Safety Commission estimates that product-design regulations can, at best, address about 80 percent of all consumer product-related injuries.[1] With that fact in mind, safety communications, including safety warnings, should be an integral part of a company's comprehensive safety strategy.

Q *What is the specific role of safety warning signs in a company's safety strategy?*

A The way a company addresses risk includes the following hierarchy of control options:

- **Elimination** of the risk through design.
- **Substitution** of less-hazardous materials, processes, tools, or equipment.
- **Engineering controls** including guards, safety devices, ventilation system, enclosures, etc.
- **Warnings** to inform workers of a hazard and how to avoid it.
- **Administrative controls** including training, feedback, and work procedures.
- **Personal protective equipment** such as eye protection, hard hats, gloves, etc.

When elimination, substitution, and engineering controls are not viable, or their use does not reduce risk to an acceptable level, then warnings need to be used.

Companies should recognize that, although warnings are relatively low on the hierarchy of control strategies, their use is an important and necessary part of the inte-

grated combination of solutions that will help reduce the risk of hazards.

Q ***What are some of the specific challenges companies face in getting workers to comply with safety warnings?***

A Probably the biggest obstacle to safety warning compliance is **over-familiarity**. That is, people tend to tune out safety messages after they have been exposed to them for a period of time. This is especially true when employees have never experienced or witnessed the negative consequence of a hazard. Our research has demonstrated that accident scenario training can help improve employees' responses to warning signs (see page 3). This type of training pairs pictographs with real-world accident scenarios written in the second person to personalize the scenario.

For this type of training, a company can use actual accident scenarios from its own past loss experience or borrow from the following online resources:

- Occupational Safety and Health Administration's Accident Report Fatal Facts
- National Institute for Occupational Safety and Health Alerts and Fatal Assessment and Control Evaluation (FACE)
- U.S. Department of Labor Mine Safety and Health Administration Safety Hazard Alerts
- Centers for Disease Control's Morbidity and Mortality Weekly Report

Workers also tend to ignore warnings when they believe that the **cost of compliance** is greater than the risk of non-compliance. For example, office workers are likely to ignore a "Safety Glasses Required" warning posted on the door to the plant if they have to return to their desk to retrieve their safety glasses. However, if the plant keeps a supply of reusable safety glasses at the entry point to the plant, the likelihood of warning compliance will increase.

Increasingly, **language and cultural differences** also provide an obstacle to warning compliance. Experts suggest that nearly 150 foreign languages are spoken in the United States, and more than 23 million Americans speak a language other than English in their homes. The American National Standards Institute (ANSI) recommends the use of pictographs to better communicate a warning sign's hazard information across language barriers. However our research shows that different cultures may perceive symbols meanings differently. Clearly, more research is needed in this area.

Q ***What are some "best practices" companies can implement to help improve the effectiveness of safety warnings?***

A Research suggests that the following best practices can improve warning effectiveness, and should be implemented whenever possible:

- **Use pictographs** in addition to written warnings to increase understanding and comprehension.
- **Locate the warning sign so that physical interaction is required**.
- **Provide accident scenario training** to improve comprehension and reaction to the warning message while reducing the impact of familiarization.
- **Use multiple methods** to convey the warning: operator manuals, standard operating procedures, job safety analysis, etc.
- **Reduce the cost of complying** with the warning.
- **Increase the cost of not complying** with the warning.
- **Use multimodal formats** to present the warning: visual, auditory, and tactile.

[1]Celuch, K., Lust, J., and Showers, L., "A Test of a Model of Consumers' Responses to Product Manual Safety Information," *Journal of Applied Social Psychology*, Vol. 28, pp. 377-394, 1998.

Answers to test, page 5: *1. d) Pressurized system 2. d) Refrigerate, don't freeze 3. b) Don't open before vehicle stops 4. c) Do not operate with guard removed 5. b) Do not take if you may be pregnant*

NEWS

Research Institute Appoints New Research Operations Director

The Research Institute is pleased to welcome Richard Fleck, M.B.A., as the new director of research operations. Mr. Fleck (pictured at left) will support the Institute's strategic planning and will oversee administrative, technical, and communications functions. In this role, he will manage the daily activities of a technically diverse operations staff. As a key member of the leadership team, he will work closely with senior staff to manage the Institute's overall performance and enhance its effectiveness. "I am delighted to have Rick as a key member of our leadership team," says Research Institute Director Ian Noy, Ph.D. "Rick's rich technical knowledge and experience in research administration combined with his people management skills will enhance the impact of our program."

Mr. Fleck brings 20 years of research administration and accounting experience to the Institute staff. Most recently, he served as the director of Research Administration at Children's Hospital (Boston, MA). In this role, he developed and implemented long-range strategic plans to integrate the Office of Sponsored Programs and Research Finance; led the development of a cross-functional, online grant management system; acted as advisor to the vice president of Research Administration on trends and policies affecting sponsored research; and served as a member of various high-level hospital committees. Prior to this, he held positions of increasing responsibility with Massachusetts Eye and Ear Infirmary and Tufts University Medical School.

Mr. Fleck graduated summa cum laude from the University of Massachusetts, Boston, MA, with a master's degree in Business Administration and earned his bachelor's degree in Business Administration from Washington and Jefferson College, Washington, PA. He is a member of the National Council of University Research Administrators and the Society of Research Administrators.

"I am delighted to join the Research Institute," says Mr. Fleck. "It is a unique research environment with some of the best and brightest minds in the field of occupational health and safety. It's a pleasure to be a part of the organization, and I'm looking forward to contributing to it."

Professional Safety Names Courtney to Editorial Board

Theodore K. Courtney, M.S., C.S.P., director of the Research Institute's Center for Injury Epidemiology, was recently appointed to the editorial board at *Professional Safety*. A monthly publication of the American Society of Safety Engineers, *Professional Safety* presents the latest in health and safety technical knowledge to more than 30,000 subscribers worldwide.

New Website Design Unveiled

Have you seen the Institute's newly designed website? Click to www.libertymutual.com/researchinstitute to check out our new look and improved navigation. Remember to bookmark the address so that you can visit our website for the latest news, publications, collaborative updates, and more.

Top NIOSH Officials Visit Institute

Senior officials from the U.S. Center for Disease Control, National Institute for Occupational Safety and Health (U.S. CDC, NIOSH) recently visited the Research Institute to discuss research collaboration and scientific cooperation between the two organizations. Pictured above (l to r) are Frank Hearl, P.E., chief of staff, Office of the Director and Christine Branche, Ph.D., acting director, U.S. CDC, NIOSH, Research Institute Director, Ian Noy, Ph.D., and Theodore Courtney, M.S., director of the Institute's Center for Injury Epidemiology and manager of extramural programs.

Vol. 12, No. 1

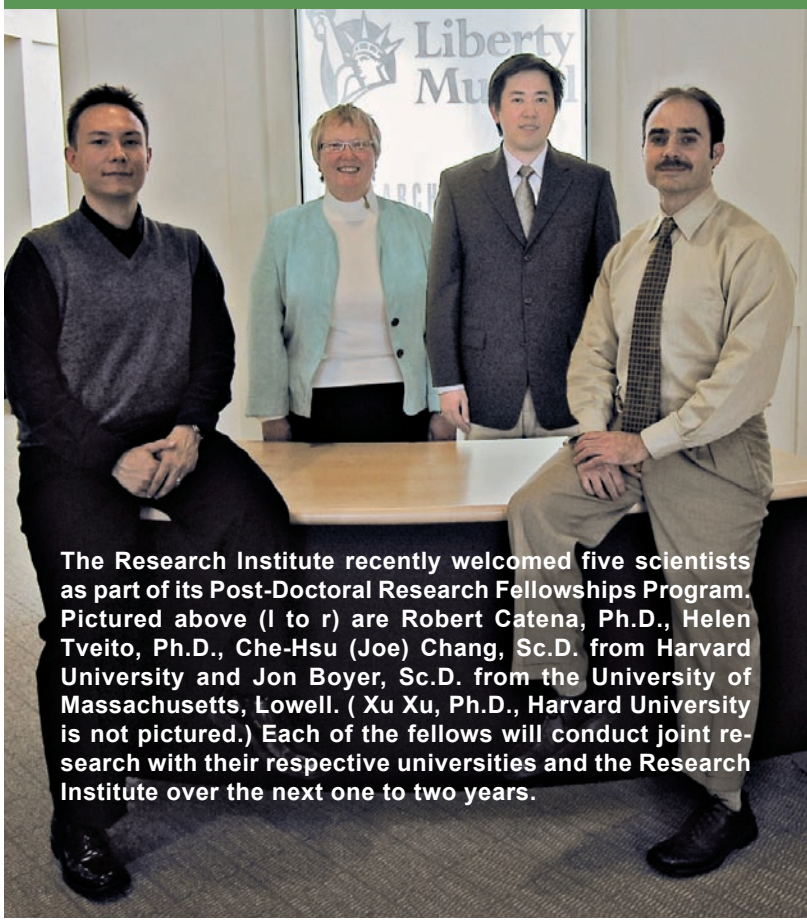
Horrey Wins Best Paper Award for Driver Distraction Research

Liberty Mutual Research Scientist William J. Horrey, Ph.D. (pictured at left) received the 2008 Research Institute Best Paper Award for the study, "Driver-Initiated Distractions: Examining Strategic Adaptation for In-Vehicle Task Initiation" (*Accident Analysis and Prevention,* Vol. 41, pp. 115–122, 2009). The internal award program recognizes accepted papers from the prior year that best reflect excellence in experimental design and scope, and overall quality. The winning paper, co-authored by Research Scientist Mary F. Lesch, Ph.D., presented the findings of a study that explored whether or not drivers delay their decision to perform an in-vehicle task based on their knowledge of the upcoming road demands.

For the study, 20 drivers drove an instrumented van around a closed test track with varying driving demands and difficulties. Researchers asked the drivers to perform one of four in-vehicle tasks – phone conversation, read a text message, find an address, or pick up an object from the floor of the vehicle. The drivers were able to decide when to initiate the task; however, the driver needed to complete the task within a set deadline. Although drivers were fully aware of the relative road demands, the findings indicated that they did not tend to strategically postpone tasks until driving conditions were easier—a finding that was consistent across the different tasks. "We also found that drivers frequently made driving errors while performing the tasks," says Horrey. "Since drivers have control over many in-vehicle distractions, interventions that focus on strategic decisions and planning may improve driver safety."

In addition to Horrey's winning paper, two research scientists received honorable mention. Helen Marucci-Wellman, M.S., Sc.D., received second place honors for the paper "A Survey of Work-Related Injury in a Rapidly Industrializing Commune in Vietnam" (Wellman, H.M., Leamon, T.B., Binh, T.T., Diep, N.B., Wegman, D.H., and Kriebel, D., *International Journal of Occupational and Environmental Health*, Vol. 15, No. 1, 2009). Third place was awarded to Barbara S. Webster, B.S.P.T., P.A.-C,. for the paper "Geographic Variation in Opioid Prescribing for Acute, Work-Related, Low Back Pain and Associated Factors: A Multilevel Analysis" (Webster, B.S., Cifuentes, M., Verma, S., Pransky, G., *American Journal of Industrial Medicine*, Vol. 52, No. 2, pp. 162-171, 2009).

Post-Doc Program in Full Swing



The Research Institute recently welcomed five scientists as part of its Post-Doctoral Research Fellowships Program. Pictured above (l to r) are Robert Catena, Ph.D., Helen Tveito, Ph.D., Che-Hsu (Joe) Chang, Sc.D. from Harvard University and Jon Boyer, Sc.D. from the University of Massachusetts, Lowell. (Xu Xu, Ph.D., Harvard University is not pictured.) Each of the fellows will conduct joint research with their respective universities and the Research Institute over the next one to two years.

Special Issue of *Ergonomics* Focuses on Slips, Trips, and Falls

The journal *Ergonomics* recently released a special issue (Volume 51, Issue 12) dedicated to slips, trips, and falls. The issue covers a broad range of topics from research to practice, including accident analysis, biomechanics, injury prevention, perception, and tribology of slips, trips, and falls. Featured papers originated at the 2007 International Conference on Slips, Trips and Falls that was held at the Research Institute.

"The diversity of the papers contained within the journal reflects the complexity of slip, trip, and fall incidents and reinforces the fact that we have much to learn about their causes," says Wen-Ruey Chang, Ph.D., a Liberty Mutual research scientist who served as the guest editor of the special issue. "The papers help to identify challenges, opportunities, and directions for future slips, trips, and falls research."

In addition to Dr. Chang, Liberty Mutual scientists that contributed to the journal include Melanye Brennan, M.S.; Chien-Chi Chang, Ph.D.; Theodore Courtney, M.S., C.S.P.; Yueng-Hsiang Huang, Ph.D.; Mary Lesch, Ph.D.; David Lombardi, Ph.D.; and Santosh Verma, M.B.B.S., M.P.H.

Conferences

International Ergonomics Conference - Humanizing Work and Work Environment 2008: December 22-24, Pune, India

- Do Women Respond Differently Than Men During Cart Pushing on High and Low Frictional Walkways? – R.V. Maikala, Ph.D.

88th Annual Meeting of the Transportation Research Board: January 11-15, Washington, DC

- Do Drivers' Estimates of Distraction Become Calibrated to Their Actual Distracted Driving Performance with Greater Exposure? – D.G. Kidd, M.A., B.S.

29th International Congress on Occupational Health: March 22-27, Cape Town, South Africa

- Occupational Safety Surveillance in the 21st Century: Breaking Ground in Xuan Tien Commune, Vietnam – H. Marucci-Wellman, M.S., Sc.D.
- Slips and Falls in Food Service Workers: A Preliminary Analysis of a Multidisciplinary Approach to Risk Factor Assessment – S.K. Verma, M.B.B.S., M.P.H.

Ergonomics Society Annual Conference: April 22-23, London, UK

- Occupational Safety: Charting the Future – Y.I. Noy, Ph.D.

14th European Congress of Work and Organizational Psychology: May 13-16, Santiago de Compostela, Spain

- Corporate Financial Decision-Makers' Perceptions of Workplace Safety: Medium- Versus Large-Size Companies – Y.H. Huang, Ph.D.

10th International Forum on Primary Care Research on Low Back Pain: June 14-17, Boston, MA

- Patterns of Opioid Use in Non-Complicated Work-Related Acute Low Back Pain – M. Cifuentes, M.D., M.P.H., Sc.D.
- Targeting Modifiable Risk Factors: Investigating the Link Between Risk Identification and Clinical Decision Making During the Consultation – W.S. Shaw, Ph.D., P.E.
- Exploring the Relationship of Early MRI Testing for Work-related Acute Low Back Pain with Medical Utilization and Disability Outcomes – B.S. Webster, B.S.P.T., P.A.-C.
- Recovery and Recurrence Following Return to Work After Disabling Work-Related Low Back Pain – Injured Workers' Perspectives – A.E. Young, Ph.D.

13th International Conference on Human-Computer Interaction: July 19-24, San Diego, CA

- Examining the Effects of Workstation Design Satisfaction, Computer Usage, Supervisory and Co-Worker Support on Perceived Physical Discomfort and Psychosocial Factors – M.M. Robertson, Ph.D., C.P.E.

Publications

Bell, J.L., Collins, J.W., Wolf, L., Grönqvist, R., Chiou, S., Chang, W.R., Sorock, G.S., Courtney, T.K., Lombardi, D.A., and Evanoff, B., "Evaluation of a Comprehensive Slip, Trip, and Fall Prevention Program for Hospital Employees," *Ergonomics*, Vol. 51, No.12, pp. 1906 – 1925, 2009

Benjamin, K.L., Pransky, G.S., and Savageau, J.A., "Factors Associated with Retirement-Related Job Lock in Older Workers With Recent Occupational Injury," *Disability and Rehabilitation*, Vol. 30, No. 26, pp. 1976-1983, 2008

Chang, W.R., Li, K.W., Filiaggi, A., Huang, Y.H., and Courtney, T.K., "Friction Variation in Common Working Areas of Fast-Food Restaurants in the USA," *Ergonomics*, Vol. 51, No. 12, pp. 1998-2012, 2009

Lesch, M.F., Chang, W.R., and Chang, C.C., "Visually Based Perceptions of Slipperiness: Underlying Cues, Consistency, and Relationship to Coefficient of Friction," *Ergonomics*, Vol. 51, No. 12, pp. 1973-1983, 2009

Verma, S.K., Lombardi, D.A., Chang, W.R., Courtney, T.K., and Brennan, M.J., "A Matched Case-Control Study of Circumstances of Occupational Same-Level Falls and Risk of Wrist, Ankle and Hip Fracture in Women Over 45 Years of Age," *Ergonomics*, Vol. 51, No. 12, pp. 1960 -1972, 2009

Wasiak, R., Pransky, G.S., and Atlas, S.J., "Who's in Charge? Challenges in Evaluating Quality of Primary Care Treatment for Low Back Pain," *Journal of Evaluation in Clinical Practice*, Vol. 14, No. 6, pp. 961-968, 2009

A Message from the Director...

Dear Readers,

Safety warnings are part of the fabric of modern-day living. At home, at work, and in any number of places in between, such communications are intended to help prevent actions and decisions that can lead to injury, illness, and even death. Yet, despite all good intentions, studies show that safety warnings are often ineffective.

This issue highlights the Research Institute's ongoing program in hazard communication, which aims to improve the design and effective use of workplace warning signs. From early studies examining the impact of simple training interventions on warning comprehension; to investigations of the role of memory, age, and culture; to explorations of sophisticated "accident scenario training" methods, our research helps inform the interventions and strategies that help companies improve warning effectiveness.

On an administrative note, I am pleased to announce that our team of directors is now fully in place with the recent addition of Richard Fleck, M.B.A., as director of operations (see p. 8). In addition, our post-doctoral fellowship program is in full swing, with five fellows on board from Harvard University and the University of Massachusetts Lowell.

Finally, I invite you to take a look at our redesigned web site (see p. 8). We hope you will visit the site often to stay updated on the latest Institute developments.

Y. Ian Noy, Ph.D.
Vice President and Director

from Research to Reality

Liberty Mutual Research Institute for Safety
71 Frankland Road
Hopkinton, MA 01748
USA

From Research to Reality® is a publication of the Liberty Mutual Research Institute for Safety, an internationally recognized occupational safety and health research facility. Through its broad-based investigations, the Institute seeks to advance scientific, business-relevant knowledge in workplace and highway safety and work disability. The Institute's findings are published in the open, peer-reviewed literature and often serve as the basis for recommendations, guidelines, and interventions used by industry to help reduce workplace injury and related disability.

E-mail: researchinstitute@libertymutual.com

Liberty Mutual

Photo credits: Cover, p. 1: Jetta Productions, Iconica, Getty Images; p. 3: Alexander Walter, Digital Vision, Getty Images. All other photos property of Liberty Mutual.