



INTRODUCTION

Welcome to another issue of Cognitia! Thank you to everyone who contributed to this newsletter. This issue starts with a message from the new CEDM-TG Chair, Dave Kaber, discussing new initiatives for the TG for 2010.

The CEDM officers would like to thank everybody for their participation in the CEDM program at the 53rd Annual HFES Meeting in San Antonio, TX. An account of the meeting and a look ahead to the conference in San Francisco can be found on pages 2-3. In addition, you will find details about the CEDM student paper competition on page 3. Congratulations to the 2009 student paper competition winners: Nathan Perry, Mark Wiggins, Merilyn Childs, Gerard Fogarty, Will Rodes, Leo Gugerty, Johnell Brooks, Claudio Cantalupo, Randall Spain, and James Bliss.

We are also featuring current research being undertaken at Design Interactive, Inc. on pages 3-4. In addition, you will find information about a call for human performance data from Robert Hoffman and a notice about the 2010 Florida Student Conference on Human Factors & Applied Psychology and on page 5.

A MESSAGE FROM THE CHAIR:
New Initiatives for the CEDM-TG for 2010

By Dave Kaber, Ph.D., CHFP
CEDM-TG Chair
Professor of Industrial & Systems Engineering
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This year the CEDM-TG is pursuing several new initiatives including: (1) expanding forums for member information exchange, (2) supporting member subscriptions to the TG's journal (the Journal of Cognitive Engineering & Decision Making (JCEDM)); (3) facilitating opportunities for member contributions to JCEDM; and (4) supporting student travel to the Annual Meeting and other CEDM-related conferences.

Since the 2009 CEDM-TG business meeting, the TG LinkedIn group site (http://www.linkedin.com/groups?gid=44516&trk=myg_ugrp_ovr)

has realized almost 100 new members for a current total membership of 534. Equally accessible, our Facebook group site (http://www.facebook.com/group.php?gid=7636301315)

has also realized an increase in membership from 125 to 155 since last October. The current CEDM-TG membership, according to HFES, includes 797 persons. By comparison, the new Institute for Ergonomics & Human Factors (IEHF; previously the Ergonomics Society) recently reported a membership of 1500. I think this speaks strongly for the extent of interest in our area and commitment of members. Both the LinkedIn and Facebook sites provide discussion pages, news, job postings and member lists. The Facebook page also allows you to share pictures (e.g., interface snapshots, display images along with comments, etc.).

Related to this, our new Webmaster, Mark Pfaff, has begun to enhance the TG website (http://www.hfes.org/cedm/index.htm). All the latest news for the TG is posted at the home page. Historical issues of Cognitia, our newsletter, are accessible through the site and future issues for 2010 will appear there. I would like to draw your attention to the

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Please direct questions, comments, suggestions, and/or submissions to the newsletter editor, Leigh Baumgart, lab3h@virginia.edu.
Visit the CEDM website at: http://www.hfes.org/cedm/
Please also visit (and join!) -
CEDM on Facebook: http://www.facebook.com/group.php?gid=7636301315
CEDM on LinkedIn: http://www.linkedin.com/groups?gid=44516&trk=myg_ugrp_ovr



“Activities” page as part of the site, which provides detailed information on the current TG initiatives (<http://www.hfes.org/cedm/activities.htm>) I have outlined in this article.

Regarding TG support for member subscriptions to *JCEDM*, this year we decided to subsidize all new nonstudent member subscriptions to the Journal by paying \$30 of the regular \$90 subscription cost for each member that takes advantage of the subsidy. Our near-term objective is to boost the member subscriptions to *JCEDM* with the long-term hope of increased TG member contributions to the publication. Believe it or not, *JCEDM* is entering its fourth year of publication with a steady stream of submissions and high-quality papers in print. The Journal continues to seek interest from our community and broader areas of science.

With respect to the TG facilitating member contributions to *JCEDM*, this year will be the first year in which the outgoing TG program chair (Amy Bisantz) and the incoming program chair (Ellen Bass) will guest edit a special issue of *JCEDM* by inviting authors of annual meeting proceedings papers, presented as part of CEDM technical sessions, to submit expanded versions of their research to the Journal. It is anticipated that current and elect program chairs will coordinate to develop additional special issues for the Journal based annual meeting contributions. The CEDM-TG Program Chairs are also encouraging members that submit panels and symposia to the HFES Annual Meeting to develop special issues based on these contributions for *JCEDM*.

Finally, the CEDM-TG officers recently developed a new proposal for a student travel grant program. We are interested in increasing (or providing for) student attendance of the annual conference; specifically persons who have a paper accepted that otherwise could not afford to attend. We have decided to allocate \$3500 to this new initiative and to make five awards of \$700 each for the 2010 annual meeting. Eligibility requirements for awards include membership in the CEDM-TG and a paper accepted to a CEDM-TG technical session. We have proposed to make all awards on the basis of need, as determined by a committee of CEDM-TG officers from the student applications. The program proposal is currently being reviewed by the COTG (Council of Technical Groups) for matching support. This would open-up the travel grant program to students who are members of any HFES TG with a paper accepted as part of a CEDM-TG technical session at the annual meeting and allow us to possibly make up to 10 awards. Look for additional information on this

new initiative through the CEDM-TG website. It is expected that an application form will be made available by January 31, 2010 and all applications will be due by May 15, 2010.

Thanks for all your interest in the CEDM-TG. Please contact any of the current officers (<http://www.hfes.org/cedm/officers.htm>) if you have suggestions for other TG initiatives that you think might have an impact for our members, members of HFES or our field as a whole.

REVIEW OF CEDM-TG PROGRAM AT 53RD ANNUAL HFES MEETING AND LOOK AHEAD TO SAN FRANCISCO

*By Ellen Bass, Ph.D.
CEDM-TG Program Chair
Associate Professor, Systems and Information
Engineering
University of Virginia*

The CEDM-TG delivered a strong program at the 53rd Annual HFES Meeting. The TG was initially allocated 13 sessions from HFES and was given one additional session upon review of the number of submissions made to the TG. The sessions consisted of 8 lecture sessions (62 papers), 2 symposia (10 papers), 4 discussion panels, and 12 posters. The CEDM-TG also co-sponsored a discussion panel with the Human Performance Modeling (HPM) TG.

The sessions as part of the CEDM-TG program addressed topics ranging from cognitive engineering, cognitive task and work analysis, automated aids, human-automation and human-robot interaction, synthetic agents, human-computer etiquette, Rasmussen's S-R-K, judgment, decision making and expertise, system design and evaluation, and team performance. Thank you to all of the 133 thorough and thoughtful reviewers who made the CEDM-TG program at the 53rd Annual HFES Meeting a success! For the 54th Annual Meeting, we already have 158 people signed up to review proposals. Thank you in advance for your help!

Proposals can be submitted to the 54th Annual Meeting of HFES through February 19th. As in the past year, there are many format types to select from, including colloquia, debates, demonstrations, lectures, panels, posters, symposia, and tutorials. (Please see <http://www.hfes.org/> for additional details.) We



welcome and encourage your proposals to the CEDM-TG. We would especially like to see submissions applying CEDM methods to various domains. If you are working in aviation, driving, emergency response, healthcare, etc., consider the CEDM-TG for submission of domain and discipline specific work. We hope to develop another excellent program for San Francisco and we look forward to your contribution!

Finally, as part of the CEDM-TG business meeting in San Antonio, a scavenger hunt was held to encourage more social interaction among the TG members. Participants were tasked with identifying fellow members who could answer “yes” to a variety of questions. Winners received \$50 gift cards to various restaurants. For fun, Ellen Bass collected the most “yes” responses as shown below, listed in the order of the questions on the survey (and no, she did not know the questions or prize ahead of time). The next time you see these TG members, you can ask them for details.

- Susan Kirschenbaum* knows what CEDM stands for.
- Sherry Chappell* is a member of the HFES leadership.
- Catherine Burns* is a past Chair of the CEDM-TG.
- Thomas Fincannon* has attended three consecutive HFES Annual Meetings.
- Christopher Nemeth* works as a consultant.
- Mica Endsley* owns her own company.
- Amy Alexander* was a presenter at the 53rd Annual Meeting.
- Mark Pfaff* signed up for a technical tour at the conference.
- Anne Adams* is a graduate or is currently affiliated with a university outside of the United States.
- Erik Connors* is a graduate or is currently affiliated with a Big 10 University.
- Joachim Meyer* traveled to the conference from outside the United States.
- Yan Xiao* works in the health care industry.
- David Mendonca* works for the government.
- Bob Wears* was an attendee from the San Antonio area.
- Laura Strate* has three or more pets.
- Nancy Cooke* has a pet that is not a mammal.
- Karen Feigh* is currently an officer for the CEDM-TG.
- Michelle Sublette* was a first time attendee at the conference.
- Linda Ellis* was wearing something red.

WINNERS OF THE 2009 CEDM-TG BEST STUDENT PAPER AWARD

Each year, the CEDM-TG makes three awards to student authors and presenters of submissions to the annual meeting appearing as part of CEDM sessions.

All papers meeting the following criteria are eligible for consideration:

1. The student must be the first author of the paper. Non-student co-authors are acceptable.
2. The paper must be the result of work accomplished by the student while enrolled in an appropriate curriculum.
3. The paper must be part of the CEDM track (not student forum). Papers that are a part of sessions co-sponsored by CEDM are acceptable.
4. The student should make the oral presentation at the annual meeting.
5. When students submit a manuscript through the MiraSmart system, they should identify the paper as student work (click the corresponding checkbox).

The CEDM technical group takes it from there.

Awards include:

- 1st place - \$500 and a plaque
- 2nd place - \$250 and a plaque
- 3rd place - \$100 and a plaque

CEDM-TG student paper awards from 2009 were presented by the outgoing Student Awards and Affairs officer, Thomas Fincannon, at the 2009 CEDM-TG business meeting. Congratulations students!

First Place

Nathan Perry, Mark Wiggins, Marilyn Childs, Gerard Fogarty
Reduced Processing Decision Support for Competent Firefighters

Second Place

Will Rodes, Leo Gugerty, Johnell Brooks, and Claudio Cantalupo
The Effects of Electronic Map Displays and Spatial Ability on Performance of Navigational Tasks

Third Place

Randall Spain and James Bliss
The Effects of Automation Expertise and System Confidence on Trust Behaviors

Each of these papers can be found in the Proceedings of the 53rd Annual Meeting of the Human Factors and Ergonomics Society. For more information about the CEDM-TG Best Student Paper Award, contact Farzan Sasngohar, the Student Awards and Affairs Officer (farzans@mit.edu).



**PROFILES IN PRACTICE:
Design Interactive, Inc.**

Adaptive Training for Adaptive Decision Making

*By Angela Carpenter, Meredith Carroll, and Kelly Hale
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In the highly dynamic submarine environment, all crew members contribute to the safety of the sub, and adaptive decision making skills which facilitate effective monitoring, assessment, and problem solving when faced with cognitively challenging situations are key to their success and survival. From the Radar Operator inside the sub to the Officer of the Deck on the bridge, sailors must be able to effectively monitor and assess a range of different situations and problem-solve when faced with cognitively challenging situations. Design Interactive, Inc., is incorporating advanced neurophysiological measures with traditional performance measures to develop innovative training technology that can diagnose trainee deficiencies and inefficiencies, and adapt training in near real-time to enhance effectiveness and efficiency of decision making skill training.

Currently, training instructors must base their assessments solely on performance outcomes and observation. While traditional performance measures provide some process measures, neurophysiological measures can provide more detailed understanding of trainee state throughout a training scenario. For example, eye tracking captures visual attention, and can be used to assess appropriate allocation of attention based on task segments and scan techniques. Further insights into cognitive state (e.g., workload, engagement) can be captured using electroencephalography (EEG) measures, which can be used to identify times where learning may be negatively impacted by overload or inattention, for example. Processing a comprehensive set of data for a trainee in real-time allows a more detailed understanding of training progression, and provides opportunities to improve the training experience *during a scenario*.

Utilizing Design Interactive's ADAPT framework (Auto-Diagnostic Adaptive Precision Training), the goal is to develop a precision training system that adaptively adjusts to the changing needs of the trainee based on models of cognitive decision making to streamline and accelerate individualized training. Such a training system will collect neurophysiological, physiological, and performance data simultaneously

and diagnose trainee deficiencies and inefficiencies *during scenario performance* for individuals training in a submarine simulation-based training environment. These diagnoses will trigger real time, theory-based adaptations designed to remediate performance issues and accelerate learning.

ADAPT-DM (ADAPT for Decision Making) is based on an adaptive decision making model founded on Wohl's SHOR decision making model (Stimulus, Hypothesis, Option, Response; Wohl, 1981) and Rasmussen's Skills-Rules-Knowledge (SRK) model (Rasmussen, 1983). Integration of the SHOR model and the SRK model provides a foundation for understanding tactical decision making and how it evolves with expertise. They also offer a number of opportunities for identification and evaluation of decision making performance and expertise through changes in cognitive processing that can be measured using neurophysiological indices.

ADAPT-DM is comprised of 3 components: measurement, diagnosis and adaptation. The *Measurement* component utilizes system events, behavioral responses, eye tracking and EEG to capture trainee state in real-time. The *Diagnosis* component determines trainee (a) readiness to learn, i.e. cognitive states that indicate optimal or non-optimal learning state, (b) proficiency, i.e. skill deficiencies in need of remediation, and (c) levels of expertise. Expertise is determined using Sandia National Laboratory's Automated Expert Modeling for Automated Student Evaluation (AEMASE) approach. AEMASE is a process for subject matter experts to rapidly create and update their own models of normative behavior (Abbott, 2006). Based on these diagnoses, the *Adaptation* component then dynamically adjusts the training scenario in order to achieve customized training. Adaptations may include both content and instructional strategy manipulation.

The goal of ADAPT-DM is to individualize the training experience and accelerate the development of a trainee's decision making skills during off-board training. ADAPT-DM will grant instructors access to a more granular level of assessment: allowing them to capture "unobservable" behaviors such as cognitive state and eye gaze patterns. The use of such adaptive training systems is expected to improve the efficiency and effectiveness of simulation-based training, thereby reducing the need for on-the-job instruction, and ultimately reducing training time and cost.



Acknowledgement:

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References:

Abbott, R.G. (2006). Automated expert modeling for automated student evaluation. *Intelligent Tutoring Systems*, pp. 1-10.

Rasmussen, J. (1983). Skill, rules and knowledge: Signals, signs, and symbols, and other distinctions in human performance models. *IEEE Transactions on Systems, Man and Cybernetics*, SMC-13(3), 257-266

Wohl, J. G. (1981). Force Management Decision Requirements for Air Force Tactical Command and Control. *Systems, Man and Cybernetics, IEEE Transactions on*, 11(9), 618-639.

CALL FOR DATA

*By Robert R. Hoffman
Institute for Human and Machine Cognition
Pensacola, FL*

I am seeking data sets to support a project on mathematical modeling of performance data that do not take on a Gaussian distribution. I ask researchers who are studying learning or training to share with me any data sets that reflect performance in the first or earliest trials of task learning. This would include the performance of research participants during the practice trials in the instructional phase, when the participants are first instructed in the tasks that will be performed in the main experimental phase, and are given some practice trials or items. I would welcome data sets from studies of the learning of any sort of task, or studies of any form of task training: learning to control a robot, learning to solve problems, learning to perform multiple tasks in a study of attention, and so forth. While I am particularly interested in data on "trials to criterion," I can use any data sets in which performance on the first and earliest trials is measured on any dependent variables of tasks, including multiple measures. Please correspond with Robert R. Hoffman, Institute for Human and Machine Cognition, Pensacola FL rhoffman@ihmc.us.

Thank you to the previous executive committee for their generous contributions to the CEDM-TG!

- Cathy Burns – TG Chair
- Amy Bisantz – Program Chair
- Ellen Bass – Program Chair Elect
- Jennifer Ockerman – Secretary-Treasurer
- C.S. Nam – Newsletter Editor
- Erik Connors – Webmaster
- Thomas Fincannon – Student Awards

**THE 2010 FLORIDA STUDENT
CONFERENCE ON HUMAN FACTORS
& APPLIED PSYCHOLOGY**

*By Dr. Elizabeth Blickensderfer and Joseph Crimi
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You are cordially invited to attend the 2010 Florida Student Conference on Human Factors & Applied Psychology (HFAP) at Embry-Riddle Aeronautical University (ERAU) in Daytona Beach Florida on April 15, 2010. With great success in the past, the Human Factors Department at ERAU is proud to host the 4th Florida Student Conference.

This conference is designed to prepare students for a professional conference. HFAP follows a similar structure of a professional conference. Students will be asked to submit an abstract and have the option to present their research as a lecture or poster. All the research presented at HFAP will be presented by graduate and undergraduate students. In the past, we had students, faculty, and staff attend HFAP from 10 different Colleges and Universities.

The day of the conference will begin with a keynote speaker. Afterwards there will poster and lecture presentations given by students. A lunch break will then be offered. The afternoon session will again consist of poster and lecture presentations given by students. A panel will then be available for students to ask questions about industry and internships. The day will close with awards presented to the best



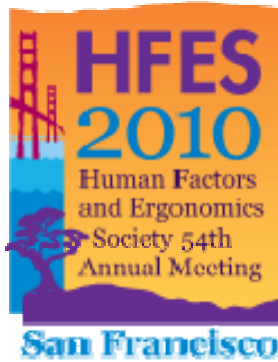
undergraduate research, best graduate research, best overall research, and best design/re-design. For more information on HFAP please visit <http://daytonabeach.erau.edu/coas/human-factors/hfap.html>.

This year HFAP is proud to host the first Design/Re-Design competition. Students will have the opportunity to re-design a product to fit human needs. Students from any college or university are encouraged to participate in this event.

Everyone is welcome to attend HFAP; you don't have to present to attend. If you have any further questions about HFAP please don't hesitate to contact us at 386.226.6790. We look forward to seeing you on April 15, 2010.

Don't forget to renew your membership to HFES and the CEDM-TG for 2010!

Submit conference proposals for the 54th Annual HFES Meeting by February, 19, 2010!



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Newsletter of the Cognitive Engineering and Decision Making Technical Group

Cognitia is published by the CEDM-TG of the Human Factors and Ergonomics Society. For membership information, see the HFES website at hfes.org. Questions, comments, or submissions for publications in this newsletter should be directed to the newsletter editor.

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