INSIGHT

Chair's Report
Elizabeth T. Davis
Georgia Institute of Technology

Reminder: You can send instant email messages to our entire PPTG membership on our listserv hfes-pptg@hfes.org. Also, between *INSIGHT* issues, try checking out our PPTG website for announcements and current information (http://pptg.hfes.org/). Let's stay connected…

Greetings!

This year continues to go well for PPTG! Since January of this year both our membership and our budget have continued to grow. We now have a total of 439 members, and our budget has a balance of $12,270.47 as of early July. We'll be putting some of that money to good use this year at the annual HFES meeting. There's more exciting news and events this year, so read on...

- **PPTG Chair-Elect Nominees.** Once again, it is time to elect new PPTG officers who'll keep our TG strong and thriving. This year we will be electing a new PPTG Chair-Elect and a new Secretary-Treasurer – both will begin their terms in January of 2008. Paul Havig, our current PPTG Program Chair, is our candidate for PPTG Chair-Elect and Keith Jones, on the faculty at Texas Tech, is our Secretary-Treasurer candidate. To learn more about these candidates please see their bio sketches in this issue and at our website (http://pptg.hfes.org). We will be voting electronically via our list-serve, with mail-in ballots for those who do not have access to email.

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- **Save Noontime on Wednesday for Our Annual PPTG Business Lunch Meeting.** Come enjoy a lunch buffet at our annual PPTG meeting on Wednesday, October 3rd, from noon to 1:30 p.m. You'll have a chance to meet our new PPTG officers, learn more about PPTG's activities, voice your desires for PPTG's future, and see our award-winning students receive their certificates and checks!

- **Update on the 2007 HFES Annual Meeting.** The PPTG sessions at our upcoming HFES Annual Meeting look *GREAT*! They start with a discussion on the Neuroergonomics of Visual Cognition – an extremely hot topic these days! Lecture sessions on Aerospace Applications, Perception Theory, Multimodal Cueing, Haptics and Imagery as well as PPTG's Poster contributions follow throughout the week. Paul Havig did an admirable job as our PPTG Program Chair this year in putting together a program from a total of almost 60 submissions. See PPTG's program schedule published in this issue of *INSIGHT* as well as on our website (http://pptg.hfes.org). Paul, thank you!

- **HFES PPTG Student Research Award Winners.** We have two student awards of $500 again this year. That's because our students continue to turn out such valuable research, and we're so very proud of them. One award will go to Randall Spain for his paper "The Effect of Sonification Pulse Rate on Perceived Urgency and Response Behaviors." The other will go to Christopher Brill for his poster entitled "Indexing Cognitive Reserve Capacity: A Multi-Modal Approach." Their award-winning abstracts are published in this issue. Take a look at what they've been up to!

- **Sonification Research Report.** What is sonification? What's it good for? Bruce Walker and Michael Nees explain in their report on the Sonification Lab's research at Georgia Tech. Their interdisciplinary approach encompasses auditory display design, training for users of auditory displays, and individual differences in auditory display perception and comprehension using systems, such as the System for Wearable Audio Navigation (SWAN) as well as bone phones. Georgia Tech's Sonification Research Lab is directed by Bruce Walker and has been highlighted nationally on CNN news broadcasts as well as elsewhere.

- **Seeking Future Research Reports.** We encourage *all* members to submit research reports, and especially encourage student members to tell us about their research. PPTG submits many of these research reports as part of HFES's participation in the Discovery and *Breakthroughs Inside Science* program – a program that seamlessly incorporates research items into TV news programs. Are you interested in contributing a research report? Check out their website (http://www.aip.org/dbis/), and then let us know.

- **PPTG Seeks Sponsors.** Both ASL and Georgia Tech have sponsored PPTG. In fact, these sponsors have helped to pay for our annual business meeting expenses. We now need new corporate and university sponsors so we can continue pursuing our goals of outreach, nurturing, networking, and visibility of PPTG and its members. Sponsors will receive advertisements in *INSIGHT* and on our PPTG website as well as an acknowledgement published in the *HFES Bulletin* for all HFES members to see. Please give me your suggestions (etdavis6[at]earthLink.net). Perhaps your company or university could become a PPTG sponsor? Just let me know.

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Please send Shelley Rosenbaum Lipman, our newsletter editor, items of interest such as research reports, important announcements, job opportunities, and any suggestions for contributions to our future issues of INSIGHT, so she can continue doing a fantastic job. Shelley can be reached at shelley-home+work[at]LipmanFamily.org.

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PPTG Candidate Bios

Paul Havig, Chair-Elect Candidate

Paul Havig is an engineering research psychologist in the Air Force Research Labs (AFRL) Battlespace Visualization Branch (HECV) at Wright-Patterson Air Force Base. He received his B.A. in psychology from the University of California at San Diego in 1989 and his M.S. and PhD in experimental psychology from the University of Texas at Austin in 1995 and 1997, respectively. He started at AFRL in 1997 as a contractor for Logicon working in HECV. In 2001, he switched to a civilian position with the Air Force (still at HECV). His research over the past 10 years has included field-of-view and resolution requirements for digital kneeboards, luminance contrast requirements for maintenance of color recognition, and off-boresight attitude symbology for maintaining situation awareness. His current research includes developing new visualizations for command and control interfaces, interactions of vision and 3D audio, as well as an attempt to develop metrics for 3D displays.

Vision of PPTG's Future. Ever since the first time I attended the Psychonomic Society conference in graduate school in 1987 and only attended perception talks I knew that perception was my field. I have been mostly involved in visual perception, but have dabbled a bit in 3D audio and haptics; frankly, I love anything to do with perception. However, over the years I have remembered that while perception is the first step in the process of existing in the world, we must also take into account everything else we have learned (cognition, decision-making, etc.). As such I think the best way to keep our great TG moving forward is to not only remain the best at the perception part of the game, but also to reach out to other TGs and to start to foster more collaborative relationships. For me at AFRL this is easy to see: all perception is tied to Air so ASTG is a natural link. Likewise, others may be doing research in, say, virtual environments, so VETG is a great connection. We have a very strong TG; the best way to take our TG forward is by pushing collaborations while also sticking to our roots.

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Keith Jones, Secretary-Treasurer Candidate

Keith Jones is an Assistant Professor in Texas Tech University's Human Factors Psychology Program. He received his PhD in 2000 from the University of Cincinnati under the supervision of Dr. Joel S. Warm. Keith's research falls into two areas: human performance and human-computer interaction. His human-performance research has examined whether feedback about the accuracy of verbal distance estimates improves or hinders subsequent non-verbal behaviors. Keith's Human-Computer-Interaction research has focused on Web navigation; however, he has also studied interface design for a variety of applications (e.g., computer-supported cooperative work, distance education, Web browsers for people with visual impairments, and computer games). Before coming to Texas Tech, Keith was an Assistant Professor in Kansas State University's Cognitive and Human Factors Psychology program; before that, he worked for the Air Force Research Laboratory at Wright-Patterson Air Force Base.

Discoveries and Breakthroughs Inside Science

From Lois Smith
HFES Communications Director

I'm writing to ask you to help HFES put out a call for story ideas that might be suitable for development by the Discoveries and Breakthroughs Inside Science project team. If you're not aware of this already, HFES has partnered with the American Institute of Physics on the DBIS program, which produces a dozen 60-90-second science news stories each month that are broadcast over dozens of local TV network affiliates around the country. Data have shown that these clips reach millions of viewers. A list of the stories that HFES has contributed may be found on the HFES Web site at http://www.aip.org/dbis/HFES/. All the stories on the main page of the "Human Factors/Ergonomics in the News" section feature the work of HFES members like you.

The work must meet all of the following criteria in order for HFES to submit it for consideration to DBIS:

a. Describes new, unique, cutting-edge, or similarly newsworthy research or practice

b. Will have an impact on a large segment of the general public

c. Might be implemented within one year

d. Lends itself to visual depiction on television

Story ideas with outreach merit will be developed either for DBIS and/or for the HFES Web site home page or the *HFES Bulletin.*

If you have any questions or would like to submit a story idea, please contact me directly at lois@hfes.org. Thank you!

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Research in the Georgia Tech Sonification Lab: Interdisciplinary Approaches to Nontraditional Information Display

Bruce N. Walker & Michael A. Nees

Digital technology has allowed for the widespread implementation of sounds and auditory displays in common, everyday devices. Research in the Sonification Lab at the Georgia Institute of Technology is examining how sound and other nontraditional means of information display (i.e., beyond visual windows, icons, menus, and pointers) can best be used to communicate information to the user of a human-machine system. While assistive technologies for the visually impaired are one obvious impetus for our interest in sound (and an area where we are actively involved), we believe that sound may also offer a useful alternative to visual information display across a number of different users, tasks, and environments. Sonification—non-speech auditory information display (see Kramer et al., 1999)—is one of our primary research interests, but our work spans a broad range of topics and draws upon the expertise and experience of students, faculty, and collaborators from diverse backgrounds, including engineering psychology, computer science (CS), human-computer interaction (HCI), and computer music, to name but a few. Our ongoing work investigates auditory display design, training for users of auditory displays, and individual differences in auditory display perception and comprehension; primary applications of this research can be found in the System for Wearable Audio Navigation (SWAN), as well as projects on bone-conduction headphones and auditory menus for mobile devices.

Sonification Lab, continued from page 4

Sonification Lab researcher Joseph Patrao demonstrates the System for Wearable Audio Navigation (SWAN). Note the discrete bone-conduction headset in use.

Researchers have long been interested in the potential for sound to display quantitative information, but a number of fundamental decisions must be made regarding the basic presentation of data with sound (see Walker, 2002). One common subtype of auditory displays, broadly referred to as auditory graphs, has typically mapped changes in the frequencies of sounds to changes in values along the visual Y-axis in traditional visual graphs, while the visual X-axis corresponds to the presentation of sounds in time. Such basic auditory graphs have been studied and used with some success in the past, but recent work from our lab shows that performance with auditory graphs can be enhanced by the addition of auditory context (i.e., reference tones, rhythmic clicks, etc., which offer auditory analogues to visual tick marks, axes, gridlines, etc.) and by training the listeners

how to interpret what they hear (Smith & Walker, 2005). In addition to display design, ongoing projects are examining the role of individual difference variables such as musical experience, working memory capacity, and spatial abilities as important predictors of performance with auditory displays (Mauney & Walker, 2007). Recently, we have begun to lay out a theoretical framework for the comprehension of auditory graphs that offers a bridge between established literatures in psychology (ranging from basic perception to mental models), music and music perception (ranging from basic pitch perception to mood), and the fledgling sonification literature (Nees & Walker, 2007). CS and HCI students supplement our efforts to understand the psychology of sonification by developing software to support research and application for sonified displays (e.g., Walker, Lindsay, & Godfrey, 2004; Davison & Walker, 2007).

Beyond quantitative information display, the Sonification Lab is pursuing the use of non-speech audio to aid navigation for visually impaired or sighted people in environments that obscure vision (e.g., a firefighter in a smoke-filled room). The SWAN system employs a variety of sensors, including multiple GPS receivers, cameras, head tracking, and probability maps at pedestrian levels of detail, to determine where a person is located geographically. A wearable computing device merges and fuses these sensor data, and uses spatialized non-speech sounds to guide the user to a destination along a path of virtual auditory beacons (see Walker & Lindsay, 2006). Computer science students have provided support on the sensor fusion, localization, and wearable computing components of the system, while engineering psychology students are working to determine the best audio signals to help the user navigate and are assessing learning and formation of cognitive maps.

The implementation of stereo or spatialized audio for SWAN poses a unique challenge: regular speakers diminish the privacy of the user and are awkward to wear; on the other hand, headphones are compact and private, but cover

Sonification Lab, continued from page 5

the ears. That is, given that the ears are a blind person's most important source of information about the environment, traditional closed-ear headphones that attenuate the environment proved to be unacceptable to users. Research in the Sonification Lab is exploring the psychophysical properties of bone-conduction headsets as an alternative way to deliver the SWAN's audio to the user (e.g., Stanley & Walker, 2006). Our bone-conduction transducers sit on the mastoid (behind the ear) and transmit vibrations directly to the cochlea through the skull, thereby allowing for effective presentation of SWAN audio without covering the ears or blocking environmental input.

Another primary project in the Sonification Lab involves helping the user to navigate not physical space, but interface menus, like those found on desktop computer software or cellular phones. Basic text-to-speech (TTS) technology is a common way to make menus somewhat accessible, but there is so much more that can be done with sound. One approach to enhancing auditory menus has been to add non-speech audio in the form of either brief, abstract music motifs (earcons) or non-abstract, ecologically meaningful sounds (auditory icons). However, we (and others) have shown that using earcons is limited because users need to learn a full set of largely arbitrary sound-to-function pairings. The resulting auditory menus are also not re-sortable, nor do they support inserting new menu items. On the other hand, using auditory icons requires less learning and supports re-ordering, but it is limited in that few computer interface functions have ecologically valid sounds (e.g., what does "Save as HTML…" sound like?). Inspired in part by the success of screen-readers used by the blind, we have recently found a way to circumvent the problems associated with both earcons and auditory icons with the use of *spearcons*—brief non-speech sounds that are automatically generated from the TTS version of the menu items. Our results have suggested that spearcons offer a promising alternative to earcons or auditory icons for auditory menu design (Walker, Nance, & Lindsay, 2006; Palladino & Walker, 2007).

In summary, the Sonification Lab at Georgia Tech takes a multidisciplinary approach to research and development in the area of non-traditional, often audio interfaces. We are contributing to the knowledge and literature with empirical studies, and applying what we learn as we build software and hardware systems that are already making important impacts in a range of real-world settings.

For more on the Sonification Lab, see: http://sonify.psych.gatech.edu, or contact Bruce Walker, School of Psychology and School of Interactive Computing, Georgia Tech, bruce.walker@psych.gatech.edu.

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PPTG Student-Paper and Student-Poster Award Winners

Congratulations to our student winners! Here are the abstracts of the winning paper and winning poster. Look for articles by our winners in the next issue!

The Effect of Sonification Pulse Rate on Perceived Urgency and Response Behaviors
Randall Spain (with James Bliss and Elizabeth Newlin)

Emergency signal researchers have devoted considerable energy to understanding the perceived urgency and performance effects of reliable and marginally reliable discrete auditory signals. Relatively little attention has been paid to aspects of continuous auditory displays. The purpose of the current study was to demonstrate and document the effects of sonification presentation rate on perceived urgency and response behaviors during a simulated patient monitoring task. As expected, participants rated shorter interpulse intervals as being significantly more urgent than longer pulse intervals. Participants also responded faster to patient problems when interacting with a sonification system that used shorter pulse intervals.

Indexing Cognitive Reserve Capacity: A Multi-modal Approach
Christopher Brill (with Mustapha Mouloua and Richard Gilson)

The Multi-Sensory Workload Assessment Protocol (M-SWAP) is a newly developed standardized measure of cognitive reserve capacity. It is consists of a multi-modal counting task administered in a dual task environment. The goal of the present work was to determine further validate the measure by assessing the demand manipulation and perceived workload in a single task environment. Significant differences in performance and perceived workload were observed across demand levels, but not across modalities. These results suggest the secondary task protocol imposes demand consist with the proposed model.

PPTG Preliminary Technical Program
HFES Annual Meeting 2007

Paper/Discussion Sessions

Neuroergonomics of Visual Cognition: Research and Applications
PPTG Session 1 (Panel Discussion)
Tuesday 2 Oct 13:30 – 15:00
Chair: Raja Parasuraman, George Mason U.

Panelists:

1	*Raja Parasuraman*	*George Mason U.*
2	*Yang Jiang*	*U. of Kentucky*
3	*James Thompson*	*George Mason U.*
4	*Maria Kozhevnikov*	*George Mason U.*
5	*Matthew Rizzo*	*U. of Iowa*

Perception in Aerospace Applications
PPTG Session 2
Tuesday 2 Oct 10:30 – 12:00
Chair/Co-chair: Elizabeth Davis, Georgia Tech/George Reis, AFRL

1   *Rob Gray*   *Arizona State U.*
2D vs. 3D Visual Cues for Altitude Maintenance in Low-Altitude Flight

2   *Kelley Parsons, Joel Warm, William Nelson, Michael Riley & Gerald Matthews*
Cornell U., U. of Cincinnati, AFRL
Detection-Action Linkage in Vigilance: Effects on Workload and Stress

3   *Lloyd Tripp, Joel Warm, Gerry Matthews, Peter Chiu & Bruce Bracken*   *U. of Cincinnati,*
AFRL
+Gz Acceleration Loss of Consciousness: Use of G-suit Pressurization and Sensory Stimulation to Enhance Recovery

4   *Jacquelyn Crebolder & Tarra Penney*   *Defence Research & Development Canada*
Use of Continuous Zoom on Electro-optical Imaging Systems: Comparisons between automatic and manual target tracking

5   *Randy Brou, Stephanie Doane, Daniel Carruth, Gary Bradshaw*   *Mississippi State U.*
Pilot Expertise and Instrument Failure: Detecting Failure is Only Half the Battle

Perception Theory and Practice
PPTG Session 3
Thursday 4 Oct 08:30 – 10:00
Chair/Co-chair: Jocelyn Keillor, Defence R&D Canada - Toronto/Harvey Smallman, Pacific Science &
Engineering Group

1   Patricia DeLucia   *Texas Tech U.*
A Multidimensional Model of Space Perception: Theoretical and Practical Implications

2   Harvey Smallman, Maia Cook, Daniel Manes & Michael Cowen
Pacific Science & Engineering Group, Space & Naval Warfare Systems Center
Naïve Realism in terrain appreciation

3   Jocelyn Keillor, Kevin Trinh, Justin Hollands & Michael Perlin
Defence R&D Canada – Toronto, CMC Electronics
Effects of Transitioning Between Perspective-Rendered Views

4   Sarah Chiller-Glaus, Adrian Schwaninger & Franziska Hofer   *U. of Zurich*
Identity Verification from Photographs in Travel Documents: The Role of Display Duration and Orientation on Performance

5   Tammy Ott & Patricia DeLucia   *Texas Tech. U.*
Attention Can Influence the Aperture Illusion: Theoretical and Practical Implications

Auditory, Visual, and Haptic Cueing
PPTG Session 4
Thursday 4 Oct 13:30 – 15:00
Chair/Co-chair: W Todd Nelson, AFRL/ Misty Gripper, Wright State U.

1   Michael LaFiandra & William Harper   *Army Research Lab.*
A Comparison of Soldier Performance on a Target Detection and Identification Task Using Fused Sensor Technology and Current Night Vision Technology

2   Peter Terrence, Justin Morgan & Richard Gilson   *U. of Central Florida*
Dynamic Frequencies and Perceptual Binding in a Combined Auditory-Tactile Task

3   Brian Simpson, Douglas Brungart, Ronald Dallman, Richard Yasky, Griffin Romigh & John Raquet
AFRL, General Dynamics, NASA-Langley Research Center, Air Force Inst. of Tech.
In-Flight Navigation Using Head-Coupled and Aircraft-Coupled Spatial Audio Cues

4   Randall Spain, James Bliss & Elizabeth Newlin   *Old Dominion U.*
The Effect of Sonification Pulse Rate on Perceived Urgency and Response Behaviors

5   Robert Gilkey, Brian Simpson, Douglas Brungart, Jeffry Cowgill & Adrienne Ephrem
Wright State U., Wright Patterson AFB
3D Audio Display for Pararescue Jumpers

Haptics Control and Imagery
PPTG Session 5
Thursday 5 Oct 08:30 – 10:00
Chair/Co-chair: Paul Havig, AFRL/Sehchang Hah, FAA Tech. Center

1   Bin Zheng & Christine Mackenzie   *Legacy Health System, Simon Fraser U.*
Kinematics of Reaching and Grasping with a Tool

2   Bin Zheng & Christine Mackenzie   *Legacy Health System, Simon Fraser U.*
The Control Strategy for Degrees of Freedom in Remote Prehension with a Tool

3   A. Miller, David Strayer & Julie Marble   *U. of Utah, Sentient Corp.*
Neurotechnology for Imagery Analysis

4   Sarah Miller & Wai-Tat Fu   *U. of Illinois at Urbana-Champaign*
The Role of Temporal Sequence Learning in Guiding Visual Attention Allocation

5   Julio Mateo, Robert Gilkey & Jeffry Cowgill   *Wright State U.*
Effect of Variable Visual-Feedback Delay on Movement Time

Poster Sessions

Poster Session 1
Tuesday 2 Oct, 13:30 – 15:00

1   Christopher Brill, Mustapha Mouloua & Richard Gilson   Michigan Tech. U., U. of Central Florida
Indexing Cognitive Reserve Capacity: A Multi-modal Approach

*2   Li Wei Cheng, Cher Wee Ang, Meng Fai Ying & Wei Herng Chan   DSO National Lab.,
Motorola*
Human Factors Evaluation of 360 Panoramic View Camera System for Ground Vehicle

3   Kristin Moore, Joshua Gomer, Suzanne Butler & Christopher Pagano   Clemson U.
**Perception of Robot Passability and Aperture Width during Direct Line of Sight and Teleoperation
Conditions**

Poster Session 2
Wednesday 3 Oct, 10:30 – 12:00

1   Andrea Krausman & Timothy White   U.S. Army Research Lab.
Using the Tactile Modality as a Communication Medium for Dismounted Soldiers

2   Peter Squire, Camilla Knott & Pamela Greenwood   George Mason U., NRC Post-Doctoral Fellow
How many were there? Attentional scaling in the search for multiple targets in young and old

3   Shivashankar Naidu   Wichita State U.
Examining the Effect of Grouping Border Type on Visual Search Performance

4   Christopher Sanchez & Russell Branaghan   Arizona State U. Polytechnic
The Interaction of Map Resolution and Spatial Abilities on Route Learning

*5   Jason Augustyn, Caroline Mahoney, Martha Fletcher & Edward Hirsch
                        U.S. Army Natick Soldier Research, Development, and Engineering Center*
**Watching Where You're Going: An Analysis of the Spatial and Temporal Distribution of Attention During
Walking**

Poster Session 3
Thursday 4 Oct, 13:30 – 15:00

*1   Ernesto Bustamante, Brittany Anderson, Amy Thompson, James Bliss & Mark Scerbo
                                                            Old Dominion U.*
Robustness of the a b Signal Detection Theory Model of Decision Making

2   Kyle Bailey, Melody Carswell & Rusty Grant   Georgia Inst. of Tech., U. of Georgia
Geospatial Perspective-Taking: How well do Decision Makers Choose Their Views?

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About the PPTG

This newsletter is a publication of the **Perception & Performance Technical Group** of the **Human Factors and Ergonomics Society**. The PPTG is interested in research and application of all aspects of perception as it affects human performance. The Newsletter is published four times a year. Items for inclusion should be sent to the Editor.

Membership in the PPTG is open to all. Dues are $5 per year ($7.00 US for outside USA and Canada), which includes a subscription to the Newsletter. Single newsletter copies, including back issues, are available for $2 each. Please send requests to the Editor, with a check payable to the Human Factors and Ergonomics Society.

Questions about advertising in **Insight** should be addressed to Shelley L. Rosenbaum Lipman, editor of INSIGHT.

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CONFERENCE CALENDAR:

HF ES (logo)	**HFES 51st Annual Meeting and 2007 Conference** Meeting of the Human Factors and Ergonomics Society: 1-5 October; Baltimore, Maryland.
(logo)	**HPEE 5th Annual Meeting** (http://hpee.org/_mgxroot/page_10783.html) Meeting of the Human Performance in Extreme Environments: 30 September – 1 October; Baltimore, Maryland. Contact Jason Kring (jkring@HPEE.org) for details.