Division of Applied Experimental and Engineering Psychology
Division 21 of the American Psychological Associat

Inside:

Message From the President

By Jerry Krueger, Division 21 President

Midyear Symposium a success story.

Albeit, with some personal bias, I think the 130+ people who participated in and attended our March 7th-8th midyear psychology symposium agree it was a huge success. We had 27 platform presentations, and 17 student posters, including 11 posters from undergraduate cadets at the US Military Academy (USMA) at West Point, NY. There were about 25 USMA attendees, including cadet students and faculty members, so in our meeting, jointly sponsored with APA Division 19, there was a ubiquitous presence of military uniforms. We even had a 90-minute visit by LTG (retired) Bill Reno, a 1961 USMA alum, and a former DCSPER of the Army; and a lengthy visit by LTG (retired) Willard Scott, a former USMA Superintendent who graciously posed for photos with the Cadets.

A considerable conference presence resulted from Dr. **Peter Hancock's** consortium team members who conducted a side-bar progress report meeting for their DoD Multidisciplinary University Research Initiative (a MURI grant) team studying "Optimizing Cognitive Readiness Under the Stresses of Combatant Conditions."

Symposium presentations ranged from making estimates of cognitive performance at high terrestrial altitudes; interface design of Warfighter robotics; to human engineering touch screen operator controls for unmanned aerial vehicles such as Predator and Global Hawk, used recently in Afghanistan; to cognitive job and task analyses of air traffic controllers. The intellectual conversation and research coordination enacted at the conference seemed significant, and covered important matters in our disciplines.

The Army's night vision labs showed us video scenes comparing Image Intensification (night vision goggles) and compared these scenes to those of using thermal IR weapon sights as we watched night vision films of a team of Army Rangers attacking a set of buildings at night. This was followed by a hands-on demonstration of several versions of night vision goggles and thermal sights as we viewed out over the Potomac River at night. This all seemed so timely, given that our armed forces are currently using these systems in actual engagements in Afghanistan.

Attendees were treated to a live demonstration of the Army's Land Warrior computerized infantry fighting system, employing a belt-worn computer, helmet mounted display, and provisions of GPS driver map position location, thermal and I2 sensors, daylight video capability, and wireless digital and voice activated LAN connections among soldiers in small unit operations. The Land Warrior system also includes the Interceptor personal body armor that recently made its wartime debut as it has been employed the past several months to prevent injuries to the torso of soldiers who wear the body armor in our battles in Afghanistan.

The Fort Belvoir, VA officers' club provided a beautiful venue overlooking the Potomac River, much as George Washington saw it 240+ years ago when he lived a mile away at Mt. Vernon. The spring weather was great. Occasionally, a pair of adolescent eagles perched outside our conference room windows and they periodically entertained with a fly-by, once even demonstrating how they feed by diving from altitude into the river for tasty morsels of fish. The eagles provided fitting symbolic presence for the several active and retired colonels in attendance who wore that rank, but also for the rest of us as we continue to demonstrate our patriotic fervor in the aftermath of the tragic events of September 11th.

Thanks for assistance on the Midyear Symposium

We offer our sincere thanks and appreciation to the many people who contributed to making the symposium a huge success. Thanks to **Henry Emurian** at UMBC, for assistance with frequent postings on our Div. 21 web site concerning the announcements and listing the tentative program and registration information etc. Thanks especially to **Richard Kelly** at Pacific Science for the tremendous job he did in keeping track of all attendee registrations, payment of fees, preparation of our fancy APA name badges for the meeting, and for manning the intricate lighting system for the presentations at the meeting. Thanks to **Tom Enright** of Wexford Group, for keeping us squared away on the PowerPoint presentation projection media; to several PM-Soldier Systems employees, our thanks to **Glen Nowak** and **Chris Royal** for treating us to a first class demonstration of the night vision systems, and to **SFC Alton Stewart** and **Mark Hanna** for the live demo of the Land Warrior system. Thanks too to **MS Xenia Chapman** of the Fort Belvoir Officers' Club for ensuring the club and food arrangements were superbly done for the meeting.

Improving our symposium from year to year

We asked attendees for very inexpensively priced registration fees, with liberal discounts for early registration and student participation. Due to the reasonable room rent and food charges of the gracious Ft. Belvoir Officers Club arrangement, and the support provided by our nominal host for the event -- the Project Manager – Soldier Systems office, we netted a financial gain for the 2-day conference. This we share with our colleagues and co-sponsors in Div. 19. Our symposium has not always fared so well the past few years; so perhaps we learned some new ways of doing business here for future reference. If you attended and liked what you saw give us your feedback on what we should retain or improve for subsequent symposia.

Midyear Symposium abstracts to be posted on Division web site

It is our intent to post the abstracts of the Midyear Symposium presentations and posters on our Division 21 web site. They are likely to be posted on the Div. 19 and Potomac Chapter HFES (our co-sponsors) web sites as well. With a bit of clean-up work yet to be done on the abstracts, we anticipate these postings to be available before the end of April. Look for them on our Division 21 web site at:

http://www.apa/org/divisions/div21

Error Likely Situations in Combat are Engineering Psychology Calls for Help

I take particular interest in a March 24th Washington Post news article headlined: "*Friendly Fire Deaths Traced to Dead Battery."* This particular article described findings of an investigation into a December 2001 friendly fire incident in the war in Afghanistan. What is likely to have happened is that a special forces air combat controller, using a Global Positioning System device to help target a Taliban outpost north of Kandahar, made a critical error resulting in casualties on his own team. He first used the GPS device to accurately call in a Navy jet fighter airstrike; then he changed batteries in the GPS receiver before sending similar targeting information to an approaching US Air Force B-52 bomber. However, the air controller must have failed to realize that when he changed the batteries, the GPS equipment re-initialized and instead sent his own

location grid coordinates to the B-52, which subsequently made a perfect airstrike of a 2,000 lb. satellite-guided bomb on his position, landing on a battalion command post occupied by American forces and a group of Afghan allies. Three special forces soldiers were killed; another 20 or so were injured. The news article implied that the Air Force determined this in part required a "need for more training on how the equipment works" solution.

My Army engineer friends at Fort Belvoir were abhorred to hear this on all fronts. For them, and for me, we see this as an Error-Likely Situation which easily could happen in the stresses of combat. The engineers offered at least three design and two procedural changes which could have rectified that situation and made it highly unlikely such a procedural error would occur – of course this post hoc assessment is now long after the terrible facts of another colossal incident that captured the attention of the entire country in December.

The whole episode makes an excellent *error likely design example* to use to cast any argument for why we use the complete systems approach in our engineering psychology and human engineering studies for design of our complex equipment systems. It is why we analyze the dickens out of any sophisticated procedural matters involving complex equipment, including the many ways to communicate information on a dynamic, digitized battlefield. It points out why usability and high-fidelity simulation studies are necessary; why we need to do timeline, link- and task analyses; and why we need to do error-likely assessments before completing the design of our hardware, solidifying our user procedures etc. It illustrates why good training is necessary, but is not sufficient in the face of inadequate human engineering design. In essence, it is a perfect example of what can go wrong in complex operations; and it helps to explain why we engineering psychologists do much of the detailed work, our research, our HFE assessments, etc. that we do, and do so well. I offer this up as a keep this lesson in mind example for your own work.

Our thanks for various Div. 21 continuous work efforts

As we approach the end of my official correspondence through this newsletter's president's column, I thank you all for letting me serve you these three years as president-elect, as president, and next year as your immediate past-president. It is an honor I cherish; it is fun, rewarding, and I have been enjoying it. On behalf of the Division membership, I also want to offer our sincere thanks to all our officers and committee workers, but especially to single out for a special thanks to **Dee Andrews** and **Doug Griffith** for honchoing our annual convention programming chores – this has been an especially tough case this year because of the convention format transition we were undergoing. Thanks to **Sue Kirschenbaum** for continuing to produce an excellent newsletter for all of us; please do take note of the many improvements she has implemented in the past two years or so. A special thanks to **Henry Emurian** who not only has whipped our Division web site into shape and kept it there, but in a busy dual-capacity has given us many hours as the division membership chairman as well. Thanks to **Haydee Cuevas** for keeping our student representation program rolling along. Thanks to **Wendy Rogers** for maintaining our Division List Serve; and to **Henry Taylor** and **David Schroeder** for being our institutional memories and always being there to help out in a pinch on anything we ask them to do.

Thanks everyone, and I hope to see many of you at the APA Convention in Chicago in August.

From the Mid Year Meeting

The photos here show some of the posters and presentations from the Mid Year Meeting held at Ft. Belvoir, VA in March. Prizes were also awarded for best student presentation and best poster. Abstracts of the winning papers are provided here, both to honor the winners and to serve as an example of the kind of excellent work that is being done. The full set of papers can be found on the division website: http://www.apa.org/divisions.div21/

Congratulations to all the students!

Posters and Demonstrations at the Mid Year Meeting:

Photos by Dave Schroeder

Award of Best Poster

Understanding Target Detection Performance
When Receiving Visual or Auditory Cues

Dave C. Cibik and Erich W. Meyerhoff

United States Military Academy'
Department of Behavioral Sciences and Leadership

Abstract

Since 1991, the Army has been developing Land Warrior (LW), a combat system for the individual soldier. This experiment analyzes the use of audio and visual cues in target detection and applies these results to the LW system. Fifteen participants were presented with photographs in which targets were either cued or uncued. In the cued conditions, three methods of cueing were utilized: an audio cue, a visual cue, or both. Length of time to locate the target was measured and compared across conditions. Results indicate that use of only audio cues produced significantly longer target detection times than no cue, visual cues, or visual and audio cues. This research has important implications for designing a target detection system for Land Warrior. Future research should examine whether the findings reported herein can be replicated if the visual display is a HUD.

Advisor: COL Lawrence G. Shattuck, Ph.D.

Best Student Presentation Award

Synchronized and De-Synchronized Video
Communications:
Factors Affecting User Comprehension

Joshua G. Morino, Erika Reiner,
Christina Canelli, and Anna Feliz

United States Military Academy
Department of Behavioral Sciences and Leadership

Abstract

Use of telepresence in both military and civilian settings has increased with the availability of technology. However, computer and bandwidth limitations make audio and video de-synchronization common. Two studies analyzed user comprehension of information presented in various conditions of video and audio synchronization and de-synchronization. The first study utilized a total of eighty participants and compared comprehension between four groups: synchronized audio and video, audio only, and two de-synchronized conditions where audio was followed by video or video was followed by audio. Researchers found no significant differences between any of the groups, negating the opinion that comprehension increases with the presence of video. The second study, with a total of ninety participants, compared comprehension of both native and non-native English-speaking individuals in videotapes that were either synchronized or de-synchronized. Results indicated that there is a significant decrease in user comprehension when a person is presented with de-synchronized audio and video from a non-native English speaker. Implications of these findings are discussed. Additional research is proposed to determine whether o not the results reported herein generalize to tasks other than comprehension.

Advisor: COL Lawrence G. Shattuck, Ph.D.

2003 Division 21 Mid-Year Symposium

We are encourage each of you to develop a presentation or panel session for the upcoming 2003 mid-year symposium. Students are actively encouraged to either attend or participate by making a presentation. The meeting will include a student poster session. The mid-year symposium will be held early in March in the Washington, DC area. An exact date and location have yet to be determined. In keeping with tradition, the symposium will be a joint effort of Divisions 19 and 21. The theme will be focused on *Measuring and Maintaining Performance in Complex Environments*. We are interested in presenters who have been involved in research designed to assess performance on the battlefield, in military and civilian aviation, air traffic control, and other modes of transportation. We welcome submissions from scientists involved in other complex work environments including industry and the nuclear regulatory area. We hope to focus a session on advances in the measurement of operator performance and human error. If you have any questions or would like to propose a presentation or panel, please contact either Dave Schroeder or Scott Shappell by phone (405 954-4846), fax (405 954-4852), or e-mail David_Schroeder@mmacmail.jccbi.gov or Scott_Shappell@mmacmail.jccbi.gov.

Spotlight on Educating Our Future Professionals: West Point Undergraduate Engineering Psychology Program

Interview with Colonel Lawrence G. Shattuck

By Haydee M. Cuevas
Student Representative

In this issue, we introduce the undergraduate Engineering Psychology program at the United States Military Academy (USMA) in West Point, New York. Colonel Lawrence G. Shattuck, who serves the dual role as both program manager and director of the Engineering Psychology Laboratory, graciously provided us with answers to our questions about his program. First, we will provide basic information about the curriculum, students, and faculty. Then, we will present the highlights of a study reported by Colonel Shattuck that was aimed at evaluating an interdisciplinary approach to meeting the program's goals. The final section includes some personal remarks from current students about why they chose to pursue engineering psychology as their field of study.

How old is the undergraduate program (i.e., year of inception) and what is the current enrollment?

The Engineering Psychology program at USMA began in 1984. Enrollment varies from 15 - 25 cadets in the junior and 15 - 25 in the senior class, for a total enrollment of 30 - 50 cadets at any given time.

What courses constitute the curriculum for this major?

During their junior and senior years, in addition to their core courses, students enrolled in the Engineering Psychology program take a prescribed sequence of 12 additional courses (ten core and two electives) that constitute their academic major, including Biological Psychology, Sensation & Perception, Cognitive Psychology, Experimental Psychology, Applied Problems & Statistics, Computer Systems, Human Factors Engineering, Seminar in Human Error, Human-Computer Interaction, and Engineering Psychology Design & Application. Elective tracks include decision making, human performance, organizational design & management, and computer systems.

How do students come to choose this major?

In the fall of their sophomore year, cadets are given the opportunity to visit each of the 13 academic departments here at the Academy. All the departments actively recruit cadets. We have a slight advantage in that our department (Behavioral Sciences and Leadership) teaches all plebes (freshmen) a general psychology course. In that course the instructors have the ability to relate course materials to the various majors offered by our department. Many of the cadets that sign up consider their general psychology instructor to be influential in the selection process.

What competencies do the faculty seek to instill in their graduates upon completion of the program?

Chief among the beneficial outcomes that flow from the prescriptive curriculum design of the program is the ability to consider the Engineering Psychology major a four-semester educational and developmental experience. Courses later in the program benefit from and build upon the methodologies, theories, and skills taught early in the program. In addition, faculty members can expect increasingly sophisticated levels of critical thinking and communication as a cohort of students progresses through the program. This systematic experience is governed by five program goals. At the end of the four-semester Engineering Psychology program, all students are expected to accomplish the following:

- *Apply knowledge of human performance to operational readiness and total system design.*
- *Design, conduct, analyze, and report research in human performance and human-machine interaction.*
- *Evaluate research in human performance and human-machine interaction.*
- *Participate as the human factors representative on an interdisciplinary research/design team.*
- *Report and defend work in oral and written format.*

Do students have the opportunity to pursue graduate education in human factors/engineering psychology upon completion of the program?

Cadets have the opportunity to pursue graduate degrees in human factors on their own at the completion of their 5 year service obligation. Or, in some instances, the Army will fund their graduate education later in their military career if they are selected to return to West Point as instructors in the Engineering Psychology program or if the officer is assigned to a position in which a human factors degree would be necessary (the latter is rare). Most cadets that graduate from the program express a strong desire to get an advanced degree in human factors.

What are the research interests of the faculty?

Our Engineering Psychology Laboratory vision statement gives you an idea of our research interests:

> *To provide a learning environment in which faculty and cadets partner in the investigation of Command and Control (C2) issues by leveraging military and academic expertise, using state-of-the-art Engineering Psychology facilities and proven field research methods. Specific areas of expertise within the military C2 domain include: communication of intent, cognitive integration, decision making, display design, and situational awareness.*

How does the program propose to take an interdisciplinary approach to educating our future professionals?

Based on both internal and external evaluations, the Engineering Psychology program has been successful in accomplishing most of the program goals during the last several years. The methodological and theoretical foundation the students receive in their junior year provides the basis for conducting sound research, analyzing and reporting their findings, and participating in the design process to improve system performance. However, all of these goals can be accomplished without ever leaving the physical or intellectual bounds of the Engineering Psychology program. The fourth program goal - *having students participate as the human factors representative on an interdisciplinary design team* - was rarely accomplished. In order to address this limitation, a study was conducted to evaluate the effectiveness of involving students in interdisciplinary senior design projects. [Editor's note: For details see below.]

In this study, Engineering Psychology students worked together with students from the Department of Civil and Mechanical Engineering on four projects: design of a mechanical grabber for a paraplegic, development of situation awareness metrics, design of a head mounted device to aid children with cerebral palsy, and design of a car for a national collegiate mini-Baja competition. Results indicated that, overall, the Engineering Psychology students believed that the design team experience helped them achieve the program's goal. Additionally, they reported that their coursework had prepared them well to fulfill their roles as human factors "experts" on the design team. In turn, the students from the engineering departments also valued the contributions made by the Engineering Psychology members of their design teams. Specifically, some engineering students highlighted the Engineering Psychology students' ability to convert theory into practice and their emphasis on considering the user in the design process. One final lesson that the Engineering Psychology students did learn from this interdisciplinary experience was the importance of having a *common frame of reference* with the other members of the design team. Engineering Psychology students who had taken the required five-course engineering sequence in the discipline in which their design project was based (e.g., mechanical, systems, etc.) found it much easier to communicate effectively and have credibility with the engineering student team members.

What do the students have to say about why they chose engineering psychology as their field of study?

What follows are excerpts taken from comments USMA Engineering Psychology students made when asked this question:

- "Best of both worlds: People and machines . . . and how to make them work better together."
- "I love the blend of psychology with design and engineering . . . allows for a lot of flexibility in the workplace."
- "Engineering Psychology is a very practical major that provides a better understanding of how humans operate so that modern technology can accommodate people."
- "I'm a very curious person. I have fun learning about how things work. It only seemed logical to bring the two areas together and learn how to adapt tools to how humans function."
- "I've failed the 2% rule (being 2% smarter than the machines you use) enough times that I want

to learn how to design machines and make them user friendly."

- "The diversity and real life use of and need for Engineering Psychology really interest me. I enjoy studying the limitations and capabilities of humans while applying it to functional design. Engineering Psychology allows me to follow guidelines all while using creativity and an understanding of human behavior."
- "I wanted to become a part of a field where I could make a significant and positive impact on the lives of people. I wanted something that was based on engineering principles but that concentrated on humans."

These remarks echo the banner displayed on the program's website: "*Psychologists study humans. Engineers design machines. Engineering Psychologists study and design human-machine interaction*." With quality education such as that offered by the Engineering Psychology program at USMA, our future human factors professionals will be well prepared to meet the challenges faced in their investigations of the interaction between humans and machines.

*Portions of this article were reported at the 45th Annual Meeting of the Human Factors and Ergonomics Society. For more information, visit the program's website (http://www.dean.usma.edu/bsl).

Validating Undergraduate Human Factors Education Using Interdisciplinary Design Projects

By Lawrence G. Shattuck,
United States Military Academy

In many undergraduate and graduate human factors programs, students spend much of their time in classes taught by human factors professors. They venture out of their departments only to take required courses or to meet a human factors interdisciplinary academic requirement. For their senior projects or Master's theses, they return to the shelter of the human factors laboratories. This traditional approach to educating human factors practitioners provides a firm foundation in domain content and research methodology. However, upon graduation, few practitioners will ever work in such a 'pure' environment. It is more likely that they will be integrated into a multidisciplinary group responsible for product design, development, testing, and evaluation. This paper describes a venture in which undergraduate human factors students were assigned to engineering design teams for their senior projects. This venture was undertaken to better prepare them for the nature of human factors work in professional settings.

The choice before the Engineering Psychology program architects was either to seek better ways to provide students with inter-disciplinary opportunities or to eliminate the program goal. The former was problematic, given the complex and structured nature of the Academy curriculum. The latter was a less than desirable alternative because the interdisciplinary experience was considered to be essential to the developmental process that would prepare students for their professional career as Army officers, as well as a possible eventual career as human factors practitioners. The Engineering Psychology faculty chose the former.

As the popularity of the Engineering Psychology program at the Academy grew, faculty in other academic departments began to appreciate the manner in which the Engineering Psychology students could enrich their own student projects. During Academic Year 2000 - 2001, Engineering Psychology faculty undertook a concerted effort to develop interdisciplinary senior design projects and to overcome the obstacles that have hindered these projects in the past. Examples of obstacles included differing grading criteria, course structures, project goals, and, department cultures.

METHOD

Four interdisciplinary projects were developed, three with the Department of Civil and Mechanical Engineering and one with the Department of Systems Engineering. Seven students from the Engineering Psychology program volunteered to participate in the projects. Two students were assigned to each of three projects and one student was assigned to the fourth project. (The four projects are described below.) At the end of the semester, the Engineering Psychology cadets turned in APA-style reports and participated in oral presentations with the engineering design team colleagues. A series of structured interviews was conducted with three groups:

- Engineering Psychology students who were members of the interdisciplinary design teams.

- Design team students from the engineering departments.
- Faculty advisors of the design teams from the engineering departments.

Mechanical Grabber Design Project

A local VA hospital requested students at the Academy design and build a mechanical grabber for a male paraplegic with limited movement in his upper extremities. The grabber was needed to assist him in his daily activities (i.e., meal preparation, hygiene, etc.). The Engineering Psychology students performed a behavioral task analysis by observing him in both his home and his work environment. The students also developed a functional abstraction hierarchy and examined his reach envelope. These products were used to shape the design of the mechanical grabber developed by the mechanical engineering students. Upon construction of the prototype, the Engineering Psychology students applied their knowledge of testing and evaluation to analyze the grabber as the patient used it.

Development of Situation Awareness Metrics

Systems Engineering students were assigned the project of assessing the situation awareness of soldiers wearing Land Warrior equipment. (The Land Warrior system includes advanced communications equipment, a global positioning system, and a wearable computer.) Two Engineering Psychology students joined them and conducted a thorough literature review of situation awareness. Then they developed a contextually based set of metrics and benchmarked them with a group of domain experts. At the end of the semester they tested their metrics using a networked computer simulation that emulated the Land Warrior equipment. Their findings were passed on to their Systems Engineering colleagues and incorporated into the report provided to the equipment developer.

Special People in the Northeast (SPIN) Project

Mechanical Engineering students were asked by the SPIN organization to create a head mounted device to aid children suffering from cerebral palsy. The device was needed to help severely handicapped children to color, write, and interact with specially designed computer systems without the assistance of school staff members. Two Engineering Psychology students studied the literature to better understand the condition, conducted a behavioral analysis to determine the range of motion of the children and the type of tasks they wanted to perform, and provided design recommendations to the Mechanical Engineering students. After the device was built, the Engineering Psychology students systematically evaluated the performance of the children.

Mini-Baja Design Project

A team of Mechanical Engineering students volunteered to design and build a car to enter in the national collegiate mini-Baja competition. Critiques of cars built for previous competitions described a lack of human factors considerations. Therefore, this year's team included an Engineering Psychology student. The student examined previous cars to identify design flaws, studied the tasks associated with the competition, collected anthropometric data on the drivers for this year's competition, and made design recommendations for the seat, the steering and braking mechanisms, and the console displays.

RESULTS

All four design projects were completed by mid-May 2001. Upon completion of the projects, design team members and the academic advisors were interviewed to determine the contributions made by the Engineering Psychology students and the degree to which the experiences satisfied the Engineering Psychology program goals. The Engineering Psychology students believed that the design team experience helped them achieve the program goal of participating as the human factors representative on an interdisciplinary research/ design team. On a nine-point Likert scale (1 = didn't achieve the goal; 9 = completely achieved the goal) the median student rating was 8.0.

Engineering Psychology Design Team Members

Engineering Psychology students reported that their course work prepared them well for the interdisciplinary design team experience. Most students cited their Experimental Psychology and Human Factors Engineering courses as contributing the most to their success. (Experimental Psychology as taught at USMA is actually a methodology course in which students are taught how to conduct research, analyze data, and report their results.) Engineering Psychology students also reported that they were well prepared to adopt theoretical perspectives and conduct literature reviews that informed the design process. In addition, these students also believed they were much more focused on the needs of the users

than their engineering department design team members. The engineering students were more likely to begin building prototypes after little or no consideration of the user. The Engineering Psychology students also found it very useful to be familiar with the design process used by the engineering student on the team. (All students at USMA are required to take a five-course engineering sequence in one of seven different engineering disciplines. Those Engineering Psychology students who had taken their five-course sequence in the discipline in which their design project was based (i.e., mechanical, systems, etc.) found it much easier to communicate effectively and have credibility with the engineering student team members.)

Faculty Advisors from Engineering Departments

The four faculty advisors from the engineering departments were also interviewed after the projects were completed. All the advisors indicated that having the Engineering Psychology cadets on the design teams was beneficial to the project. From their perspective, the Engineering Psychology cadets provided a theoretical perspective had been missing from the projects. Three specific contributions cited in the interviews were their abilities to conduct literature reviews, the user-centered perspective they adopted, and the systematic methodology they employed to both gather data from the users and to test the design prototypes. The faculty advisors confirmed that those Engineering Psychology students who were enrolled in the five-course engineering track in which the project was based had a common frame of reference with the design team members from the engineering departments.

Design Team Members from the Engineering Departments

Students from the engineering departments also saw the value of having the Engineering Psychology students as members of their design teams. Again, the students from the engineering departments indicated that those Engineering Psychology students that understood the design process used by the team were seen as more central to the success of the project. A few comments were made concerning the ability of the Engineering Psychology students to convert theory into practical recommendations that would influence the prototype design. One student indicated that the design process used by his engineering department included a requirement to consider the user. This student felt that, to some extent, the contributions of the Engineering Psychology students overlapped with the work of the engineering students.

DISCUSSION

The experiences of the Engineering Psychology students in these interdisciplinary projects were not unlike what human factors practitioners face every day in the world in which they work. In that sense, these projects were not only successful in accomplishing the program goal of having Engineering Psychology students participate as the human factors representative on an interdisciplinary research/design team, but the projects also introduced them to the challenges of the profession.

The Engineering Psychology students learned that it is important for them to have a *common frame of reference* with the other members of the design team. In these student projects the common frame of reference usually centered on the design process employed by the engineering department. Every opportunity was taken to educate the engineering students on the theories, tools, and methods employed by the Engineering Psychology students. However, it was evident that the engineering students expected the Engineering Psychology students to learn and conform to the engineering department design process.

The perceived value of the Engineering Psychology student's contribution was a function of the extent to which they became *team players*. It was evident from the in-progress student presentations which teams were integrated and which were not. On one team the engineering students referred to the Engineering Psychology students as "the human factors guys" and gave them a chance to present their work separately from the engineering portion of the presentation. On other teams, Engineering Psychology students were fully integrated into both the presentations as well as the project itself. Engineering Psychology students were encouraged to work at becoming team players. In addition to performing those human factors tasks that were expected of them, they were encouraged to build bridges with the engineering students by attending brainstorming sessions or by helping the engineering students assemble the mini-Baja race car.

Another parallel between the student projects and the real world is the *negotiation* that took place between the students from the engineering departments and

the Engineering Psychology students. At the initial meetings, the engineering students told the Engineering Psychology students what they expected from them. For the most part, the engineering students wanted answers to questions they had. Once the engineering students had the answers their plan was to begin the design process apart from the Engineering Psychology students. The advisor of the Engineering Psychology students stepped in and explained that the Engineering Psychology students could make valuable contributions throughout the design process. These early meetings set the stage so that the engineering students had appropriate expectations for what the Engineering Psychology students could contribute to the project. Of particular value was the usability testing that the Engineering Psychology students engaged in throughout the design process. (The engineering students were content merely to assess the structural integrity of the prototype.)

A final lesson learned by the students involved in the project concerned *administrative issues*. Faculty and students from multiple departments had to resolve various differences in grading requirements, report formats, presentation styles, and meeting times. In addition, some projects had limited budgets. The Engineering Psychology students learned that in interdisciplinary projects there are multiple, competing requirements and limited resources. Their success as human factors practitioners is, at least in part, a function of their ability to successfully compete for limited resources by convincing engineers of the value they add to the project.

These student projects were a successful venture not only because they achieved the Engineering Psychology program goal of having students participate as the human factors representative on an interdisciplinary research/ design team, but also because they were a microcosm of the real world. Interdisciplinary design teams appear to be an excellent way to validate the four-semester Engineering Psychology program. Joining Engineering Psychology students with traditional engineering design teams introduces the Engineering Psychology students to the challenges they will face as part of interdisciplinary work groups in the future. Engineering Psychology students were confronted with the realization that they were viewed as the human factors experts. This challenged them to expand their knowledge of human factors methods, tools, and theories. These projects also afforded Engineering Psychology/ Human Factors faculty the opportunity to educate engineering students and faculty about what our discipline has to offer designers, programmers, and engineers.

Organizational Information

Posters and Videos Wanted for Psychotechnology Track at Chicago Convention

Doug Griffith, Chair, Psychotechnology Track

Specialized Thematic Tracks developed by Clusters of Divisions are one of the new features of the 2002 Annual Meeting. Cluster B consists of Divisions 5, 13, 14, 19, 21, and 23. One of its tracks features a Psychotechnology Theme. It is scheduled for Saturday Morning, August 24. Dave Woods will be delivering the keynote address. The address will be followed by a panel consisting of Debbie Boehm-Davis, Bill Macey, Frank Landy, Allen Parchem, and Alan Nicewander. The session begins with a conversation hour/poster/video session. You are invited to propose posters or videos for this session. Any topic relevant to technology and psychology is welcome. Please submit proposals to

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If there are any question you can contact Doug at 703 803 0100 x4120

Elections: Candidate Bios

DIVISION 21 PRESIDENT-ELECT

DOUG GRIFFITH, Ph.D.

In 1974 Doug Griffith received his Ph.D. in psychology from the University of Utah. His area of concentration was human information processing. In the same year he started working for the Army Research Institute's Field Unit at Fort Hood Texas.

There he conducted human factors field evaluations for the Army's major field testing activity, TCATA . Evaluations ran the gamut from the Pershing Tire Changer to the first automated command and control system for the Field Artillery, TACFIRE. He also conducted research into the use of mnemonics and mnemonotechnics in military training. In 1981 he moved to the Environmental Research of Michigan (ERIM) in Ann Arbor, MI where he began working on image interpretation of nonconventional sensors, such as synthetic aperture radar (SAR) and Multi-Spectral Imagery (MSI). Research concerned assessing the utility of the imagery and evaluation of the effects of different processing and display techniques on the quality and utility of the imagery. He also worked on training issues for nonconventional imagery. At ERIM he developed computer-assisted instruction for software programs. He also served as the principal scientist on a research program into the use of computers by the blind and visually impaired. This and related work was summarized in an article he published in *Human Factors* [1]. In 1990 he moved to the D.C. area where he became active in the Potomac Chapter of the Human Factors and Ergonomics Society. He has served as treasurer and president of the chapter. During this time ERIM also underwent several transformations going from a not-for-profit research institute to a for profit research institute. In 1989, ERIM was purchased by Veridian and is now part of Veridian Systems Division. In Washington, his work has expanded to other areas of the intelligence community. He recently finished work on a project to develop cognitive aids to counter denial and deception. In 2000, he worked as the liaison between the Potomac Chapter and Division 21 for the mid year meeting. in 2001, he served as co-chair for the meeting. He is currently serving on the APA's Ad Hoc Group On Psychology in the Workplace. He is also the Chair of the Psychotechnology Track for the 2002 APA meeting.

STEPHEN L. GOLDBERG, Ph.D.

I have twenty-seven years experience working as a Research Psychologist for the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI). I have moved around some and have varied experiences working at ARI Headquarters in Alexandria, Virginia, Armored Forces Research Unit at Ft. Knox, Kentucky, and as ARI Liaison Office at the Army's Training and Doctrine Command, Ft. Monroe, Virginia. For the last 12 years I've been Chief of ARI's Simulator Systems Research Unit in Orlando, Florida. I received a doctorate in Cognitive Psychology from the State University of New York at Buffalo in 1974.

I am currently serving as the Chairman and US National Leader of the Training Technology Panel of The Technical Cooperation Program, a program that fosters collaborative research between the US, UK, Canada, Australia and New Zealand. From 1996-2000 I served as US National Leader to a NATO Research Study Group investigating human factors issues in the use of Virtual Reality technology for military purposes.

My research unit investigates training and performance issues in the use of simulators and simulations. We started and have maintained one of the few Virtual Reality Labs focused primarily on behavioral issues.

I've been an active participant in American Psychological Association Divisions. I am a past newsletter editor, Secretary and President of the Division of Military Psychology and am currently Member at Large of Division 21.

Division 21 sponsors two major events each year, its mid-year symposium and its program at the American Psychological Association Convention. The mid-year symposium is doing fine of late. The convention program is another story. As evidenced by Bill Howell's recent article in the newsletter the level of participation in the APA program has reached new lows. Much of the work of the division takes place at the convention. To get more people involved, we need greater attendance at the convention. As a member of the executive committee I get to vote on the new members joining our division. We are attracting younger people and they need to be encouraged to participate in the divisions programs, in particular the convention program. They are the new blood we need to revitalize the division and make the convention an event our members want to attend.

[1] Computer Access for Persons Who Are Blind or Visually Impaired: Human Factors Issues," *Human Factors,* 32, pp. 467-475, 1990.

MEMBER AT LARGE FOR THE DIVISION 21 EXECUTIVE COMMITTEE

REGINA COLONIA-WILLNER, Ph.D.

Regina Colonia-Willner is a very active participant in Div. 21 activities, especially our annual convention programming. For example, Regina served as Div. 21's Program Chair for the 1999 Convention in Boston. For that convention she organized a comprehensive program of more than 30 hours of events and obtained the co-sponsoring and co-chairing of 20 other Divisions, Boards and Mini-Conventions – thus giving Division 21 wide spread visibility among APA Divisions and Groups. Among the many symposia she has assembled over the years, additional visibility for Division 21 was achieved through the IT symposium she chaired at the 2000 APA Convention in Washington ("Information Technology Breakthroughs: Building Opportunities in the New Millennium") which was co-chaired and co-listed by 14 Divisions.

Since the year 2000 Regina represents Division 21 on the APA Committee on Women in Psychology (CWP) Network, and she belongs to and frequently interacts with many Divisions and related Groups within APA. She is also an active member of the Human Factors and Ergonomics Society, the American Psychological Society and the American Association for the Advancement of Science.

Regina is the vice-president for Research and Development of Modus OSI Technologies, Inc., an IT consulting firm. She also assists domestic and international customers in gaining competitive business advantages in electronic self-delivery products by applying scientific methods. Fluent in five languages, she has extensive international work experience.

Regina Colonia-Willner earned her Ph.D. in Applied Experimental Psychology from the Georgia Institute of Technology. Her dissertation was awarded the Division 21 George E. Briggs Award. Her research has been published in distinguished scientific journals such as the APA's *Psychology and Aging*, *Proceedings of the Human Factors and Ergonomic Society*, and the *International Journal of Behavioral Development*, among others.

MARK ST. JOHN, Ph.D.

Mark St. John received his PhD in psychology in 1990 from Carnegie Mellon University. He then joined the department of cognitive science at the University of California, San Diego as an assistant professor. While there, he investigated language comprehension, artificial neural networks, and mechanisms of implicit learning. He won the Faculty Excellence in Teaching Award from Eleanor Roosevelt College at UCSD in 1995. In 1996 he moved to Pacific Science and Engineering Group in San Diego where he is a senior scientist and director of the cognitive systems division. He investigates the human factors and psychology of supervision and decision making in complex, real-world environments. Current research projects include the design and use of 3-D displays and the design and use of supervisory displays to improve automation reliability and user trust. In 1998 he won the Earl Alluisi Early Career Achievement Award from the American Psychological Association, Division of Applied Experimental and Engineering Psychology. In 2001, he chaired the Division 21 program at the APA convention in San Francisco.

Representative to APA Council Report

By Henry L. Taylor
Division 21 Council Representative

The Council of Representatives met at the Capital Hilton Hotel, Washington, D.C. February 15-17, 2002. A plenary session of council was conducted February 14,2002, prior to caucus/coalition meetings; the consent agenda was approved.

2002 Final Budget

The Council approved the 2002 final budget of $91,769,400 with a net deficit from operations of ($1,585,600). This represents a variance of (1,083,200) from the preliminary budget passed August, 2001. The primary reasons for the variance are:

A. Member dues and fees were reduced ($400,200) based on receipts to date.

B. Royalties/Licensing/ Rights reduced ($2,035,000) based on 2001 actual licensing experience.

C. Sales on the *Publication Manual* increased $512,500.

D. Grants & Contracts increased $1,353,000. This is a normal variance since the publications budget considers only awarded efforts. The awards since August 2001 account for the difference.

E. Benefits increased ($512,200) due to health insurance cost increase.

F. Production revenue increased $ 282,200 since more production costs than expected were absorbed in 2001.

G. Stipends/Tuition (Grants) increased ($360,500) as a result of the Minority Fellowship Program funded by NIMH. Cost increase was totally offset by grant revenue.

H. Computer Equipment/ Furniture $218,200 as a result of a credit due APA in January 2002 from vendor.

I. Depreciation/Bad debt$284,200due to a planned reduction in capital equipment purchase.

The Council also authorized APA management to do what is necessary to ensure that the deficit for 2002 is no greater that the ($1,585,600) deficit and requested the CEO to develop a plan to achieve a balanced budget by 2004 including substantial progress toward a balanced budget in 2003.

2001 Financial Operations Summary

The current financial situation is not good. The net loss from operations was ($2,369,100) which represents a variance of ($1,506,900) from the deficit projected in August 2001. This large increase in the deficit was the result of the following factors:

A. Royalties/Licensing/ Rights reduced ($1,813,000) due to lower than projected licensing fees for *PsycOUT*. The impact of this large variance was minimized by a hiring freeze for the fourth quarter 2001.

B. Sales were larger, $829,900 than expected for the *Publication Manual.*

C. Grants and Contracts ($291,700) due to lost revenue as a result of the delay of the Third Women's Health Conference.

D. Convention/Conference fees were lower than projected ($446,300) due to lower registration at the annual meeting in San Francisco.

E. Consulting & Contracting ($743,000) doe to outside legal expenses and extra help.

F. Special Projects and other Expenses had a $865,000 positive variance due to the reductionin grant activities noted in C above.

Investments

APA had a net loss of approximately $500,000 in investments during the year.

Ethics Code Revision Update

There was extensive discussion concerning the ethics code update. The current period for member comment on Draft 6 expired March 15, 2002 and Draft 7 will be published based on the comments received. A final vote is expected at the August 2002 meeting of Council.

Permanent Status of the American Society for the Advancement of Pharmacotherapy

The Council approved the request.

Recognition of Family Psychology as a Specialty in Professional Psychology

CRSPPP recommended approval and Council approved the request.

2003 APA SCIENTIFIC AWARDS PROGRAM: CALL FOR NOMINATIONS

The American Psychological Association (APA) invites nominations for its 2003 scientific awards program. The **Distinguished Scientific Contribution Award** honors psychologists who have made distinguished theoretical or empirical contributions to basic research in psychology. The **Distinguished Scientific Award for the Applications of Psychology** honors psychologists who have made distinguished theoretical or empirical advances in psychology leading to the understanding or amelioration of important practical problems.

To submit a nomination for the Distinguished Scientific Contribution Award and the Distinguished Scientific Contribution Award for the Applications of Psychology, you should provide a nomination form, a letter of nomination, the nominee's current vita with list of publications, up to five representative reprints,

and the names and addresses of several scientists who are familiar with the nominee's work.

The **Distinguished Scientific Award for Early Career Contribution to Psychology** recognizes excellent young psychologists. For the 2003 program, nominations of persons who received doctoral degrees during and since 1993 are being sought in the areas of:

- social;
- behavioral and cognitive neuroscience;
- perception, motor performance;
- applied research (e.g., treatment and prevention research, industrial/organizational research, educational research);
- individual differences (e.g., personality, psychometrics, mental ability, behavioral genetics).

To submit a nomination for the Distinguished Scientific Award for Early Career Contribution to Psychology, you should provide a letter of nomination, the nominee's current vita with list of publications, and up to five representative reprints.

To obtain nomination forms and more information, you can go to the Science Directorate web page (www.apa.org/science/sciaward.html) or you can contact Suzanne Wandersman, Science Directorate, American Psychological Association, 750 First Street, NE, Washington, DC 20002-4242; by phone, (202) 336-6000; by fax, (202) 336-5953; or by E-mail, swandersman@apa.org.

The deadline for all award nominations is June 1, 2002.

From the Editor: Assuring the Future of Our discipline

Susan S. Kirschenbaum, Newsletter Editor

I want to call your attention to the strength of the student participation at the recent Mid Year Meeting and to the series of pieces we are running on educating the next generation. In the last issue, our Student Representative, **Haydee Cueva,** introduced this series with an overview. In this issue she focused on the program at United States Military Academy (USMA), West Point, New York. **COL Larry Shattuck** follows with the report of a study on the effectiveness of inter-disciplinary projects, as part of the educational experience at West Point. In the next issue Haydee will be describing the program at Embry-Riddle Aeronautical University in Daytona Beach, Florida. Her effort and energy are greatly appreciated. Her contributions serve as an excellent example of what we "elders" in the field have to gain from the next generation of Engineering Psychologists. They also encourage us to believe in a next generation. We all know that there are many question still unanswered, much theory yet to be developed, many phenomena yet to be explained. Because we work at the intersection between humans and the built world, we know that the challenges will continue to grow because technology is changing so quickly. And so, we are happy to know that the next generation has already demonstrated the ability and willingness to extend our work.

Now, here comes the hard part. So far, I have enjoyed the fruits of our success in growing a new generation, but that is not enough. The real goal on this editorial is to encourage you, the current membership, to follow Larry Shattuck's example and get your students involved. Bring them to conferences and symposia! Encourage them to present posters and papers! Get them actively involved in the Division! Next year let's have students and faculty advisors from many more schools! The students are our future!!!!

Division Convention Program 2002

Thursday Aug 22

0800-0950

Symposium Combat Readiness and Fatigue - Chair Peter Hancock

Combat Readiness and Fatigue: Preliminary findings of the MURI research program

Peter Hancock, University of Central Florida

Combat Readiness and Fatigue: Laboratory investigations of individuals

Jeanne Weaver, University of Central Florida

Combat Readiness and Fatigue: Laboratory investigations of individuals

Clint Bowers and Shawn Burke, University of Central Florida,

Combat Readiness and Fatigue: Field studies regarding stress in individuals

Wayne Harris, University of Minnesota

Discussant: Raja Pavasuramm, Catholic University of America

1000-1050

Human Factors Research in NATO – Chair Dr. Dee Andrews

North Atlantic Treaty Organization (NATO) Human Factors Research: An Organizational and Problem Centered Perspective

Invited Speaker: Dr. Kenneth Boff, Air Force Research Laboratory

Distributed Mission Training Research in the North Atlantic Treaty Organization (NATO)

Dr. Herbert Bell, Air Force Research Laboratory

Friday Aug 23

0800-0950 Div 21 Outgoing Executive Committee Meeting – breakfast finger foods

1000-1150 Stress and the Workplace – Chair Eduardo Salas

Stress and Performance: Implications for Design

Shatha Samman and Eduardo Salas, University of Central Florida

Demand Transition in Pharmacy Workload, Performance Efficiency and Stress

Sean Reilley, Dianne Tranam and Anthony Grasha, University of Cincinnati

Avoiding medical error in the hospital - Mission possible?!

Yoel Donchin, M.D., Hadassah Hebrew University Medical Center

1500 Presidential Address Transferring Engineering Psychology from one sector of society to another. Are we better for it?

Gerald P. Krueger, The Wexford Group

Div 21 General Business Meeting

1600-1800 Joint Social with Divisions 14, 19, 21

Saturday Aug 24

1500-1650 **Taylor Award Winner Address** – The effects of stress of human performance

Peter Hancock, University of Central Florida

Briggs Award Winner Address – Attention and trust biases in augmented reality: examining the effects of image realism, interactivity, and the presentation of cueing symbology

Michelle Yeh, The MITRE Corporation,

New Division 21 Fellow Address –The what of the why of error: The systems approach

Sue Bogner, Institute for the Study of Medical Error

Sunday Aug 25

0800-0950 **Incoming Div 21 Executive Council Meeting**

1000-1150 **Human Factors in Aviation – Chair Brian Schreiber**

Luminance Contrast Requirements for Color Recognition in Helmet Mounted Displays

Paul L. Havig and Gary L. Martinsen, Air Force Research Laboratory

Validating on Unmanned Aerial Vehicle Reconnaissance Synthetic Task

Brian T. Schreiber and Donald Lyon, Lockheed-Martin Inc., and Elizabeth Martin, Air Force Research Laboratory

The Impact of Culture in the Cockpit

Kathleine A. Wilson, C. Shawn Burke, and Eduardo Salas, University of Central Florida,

1000-1150 **Performance Issues – Chair Robert W. Proctor**

Performance on a Web-Based Tutoring System for JAVA Training
Henry H. Emurian, University of Maryland, Baltimore County

Violations of the Spatial Compatibility Principle: Theoretical and Applied Implication
Robert W. Proctor and Kim-Phuong L. Vu, Purdue University

Effects of Multimedia on Knowledge Acquisition
Ernesto A. Bustamante, Shanta N. Sammen, Clint Bowers, and Eduardo Salas, University of Central Florida

1200-1350

Symposium **Stress, Fatigue, and Performance of Shiftworkers in a Dynamic Safety Critical Occupation - Chairs D. J. Schroeder and T. E. Nesthus**

Air Traffic Controllers' self –reported occupational stress, anxiety, and well-being

D. J. Schroeder, T. E. Nesthus and C. Cruz, FAA Civil Aerospace Medical Institute

Sleep duration, subjective fatigue, and mood reported during four different workshift schedules

T. E. Nesthus, K. Holcomb, C. Cruz, L. Dobbins and J.T. Becker, FAA Civil Aerospace Medical Institute

Neuroendocrine and circadian rhythm changes associated with clockwise and counter-clockwise, rapidly rotating shift schedules

Boquet, C. Cruz, C. Detwiler, and T. Nexthus, FAA Civil Aerospace Medical Institute,

Hypothalamic-pituitary-adrenocortical activity is related to decrements in performance on a vigiliance task.

C. Detwiler, A. Boquet, C. Cruz and T. Nesthus, FAA Civil Aerospace Medical Institute,

Notice

If you are not on the Division 21 list serve (if you have not received any announcements in the last month) send an email to Wendy Rogers, wr43@prism.gatech.edu.