



# Augmented Cognition Technical Group

The Augmented Cognition Technical Group was established to serve HFES members who share an interest in knowing or learning how to use modern neuroscience-based tools and methodologies to determine the 'in real time' cognitive state of an individual and adapting the human-system interaction to meet the user's information processing needs based on this real-time assessment. The AC-TG also serves as a forum for fostering the continual design and development of Augmented Cognition science and technology (S&T) and for the exchange and dissemination of information. This approach provides another exciting opportunity for the human factors and augmented cognition fields to promote and leverage S&T breakthroughs, applications, and lessons learned in both fields.

## TECHNICAL FOCUS

Augmented Cognition research and development efforts seek to extend a user's abilities via computational technologies that are explicitly designed to address and accommodate bottlenecks, limitations, and biases in cognition, such as limitations in attention, memory, learning, comprehension, visualization abilities, and decision making. At its core, the AC-TG is concerned with fostering the development and application of:

- Real-time physiological and neurophysiological sensing technologies that can ascertain a human's cognitive state while interacting with computing-based systems;
- Data classification and integration architectures that enable closed-loop system applications;
- Mitigation (adaptive) strategies that enable efficient and effective system adaptation based on a user's dynamically changing cognitive state;
- Individually-tailored training systems;
- Roadmaps for future directions concerning Augmented Cognition S&T and guidelines of use for the technology and user information that may be garnered from it.

Similar to other TGs, such as the Cognitive Engineering and Decision Making (CETG) and the Training TGs, the AC-TG does not focus on anyone application area. The AC-TG aims to discover, develop, and apply neuroscience-based methodologies and tools that can enhance the human-centered approaches and ultimate capabilities of scientists and practitioners working in most any application area—where the focus may be general human-system integration issues, specific human-computer interaction techniques, or a combination of both. Examples of AC-TG application areas include: human-system interface design for complex and information-intensive systems (e.g., command and control, air traffic control, stock market), adaptive training systems for military and industry, brain-machine interfaces for cognitive therapy and enhancement, usability engineering, operator selection, market research, and interactive gaming.

## MEMBERSHIP

The AC-TG draws international members from educational institutions, government agencies and laboratories, military branches and their research laboratories, and a wide variety of consulting, manufacturing, and contracting firms in private industry. The AC-TG was formed to provide an integrated forum within HFES to support the growing interest in Augmented Cognition from HFES colleagues and from colleagues of other varied disciplines, including: human-systems integration, neurobiology, neuroscience, cognitive neuroscience, mathematics, robotics, and computer science and engineering.

The AC-TG and its officers take a particular interest in continuing to provide novel and interactive venues for researchers, scientists, engineers, and practitioners to disseminate and exchange information and understanding and to present late-breaking research and application

results that concern the neurological, perceptual, and cognitive aspects of the burgeoning field of Augmented Cognition. We believe that through such recurrent exchange of ideas and information, today's Augmented Cognition researchers and developers will continue to address basic human factors/ergonomics R&D challenges and put Augmented Cognition tools and methods into practice to develop numerous and diverse applications, including academic research, industrial- and military-fielded operational and training systems, and everyday computing and entertainment applications.

#### BENEFITS OF MEMBERSHIP

The AC-TG performs a variety of functions and services, including: sponsoring technical paper sessions, special symposia, and poster sessions on topics in Augmented Cognition at the HFES Annual Meeting; providing outreach opportunities via collaborations with other relevant TGs and at other international human factors-related meetings, and; recognizing outstanding leadership in the field via its annual presentation of the Leland S. Kollmorgen Spirit of Innovation Award. Members also receive the AC-TG Newsletter and have access to the AC-TG Web site and Internet List Server, which provides important news and events, highlights of current research and development efforts, discussions of current events and issues, and general announcements of interest.

It is not necessary to be an HFES member to join the AC-TG. Additional AC-TG membership information may be found on the Technical Group pages of the HFES Web site (<http://hfes.org>) or through the Augmented Cognition Website ([www.augmentedcognition.org/actg.htm](http://www.augmentedcognition.org/actg.htm))

#### ADDITIONAL READINGS

If you would like to learn more about Augmented Cognition, please consult the following:

- Fabiani, M., Schmorrow, D. & Gratton, G. (Guest Eds.) (2007). Optical imaging of the intact human brain: Physiology, recording devices, methods and applications. Special issue of the IEEE Engineering in Medicine and Biology Magazine, 26(4).
- Russo, M., Thomas, M., Schmorrow D., (Guest Eds. (2007). Operational Applications of Cognitive Performance Enhancement Technologies. In special issue of Aviation Space Environmental Medicine, 78 (supplement 1).
- Schmorrow, D. D. (Ed.) (2005). Foundations of Augmented Cognition. Mahwah, NJ: Lawrence Erlbaum Associates.
- Schmorrow, D. & Kruse, A. (2004) Augmented Cognition. In W.S. Bainbridge (Ed.), Berkshire Encyclopedia of Human-Computer Interaction (Vol. 1, pp. 54-59). Great Barrington, MA: Berkshire Publishing Group.
- Schmorrow, D., Kruse A., Reeves L.M., Bolton, A. (2007). Augmenting cognition in HCI: 21st century adaptive system science and technology. In: J. Jacko, A. Sears (Eds.) Handbook of human-computer interaction (3rd edition) (pp. 1221-1240). New Jersey: Lawrence Erlbaum Associates.
- Schmorrow, D. & McBride, D. (Eds.) (2004). Augmented Cognition [Special Issue]. International Journal of Human-Computer Interaction, 17 (2).
- Schmorrow, D.D., Nicholson, D.M., Drexler, J.M., & Reeves, L.M. (2007). Foundations of Augmented Cognition, 4th edition. Arlington, VA: Strategic Analysis.
- Schmorrow, D.D. & Reeves, L.M., Eds. (2007). Foundations of Augmented Cognition, third edition. Heidelberg, Germany: Springer Berlin.
- Schmorrow, D. D. & Stanney, K.M. (Eds) (2008). Augmented Cognition: A Practitioner's Guide. HFES Publications.
- Schmorrow, D. D., Stanney, K. M., & Reeves, L. M. (Eds.) (2006). Foundations of Augmented Cognition (2nd Ed.): Augmented Cognition: Past, Present, and Future. Arlington, VA: Strategic Analysis, Inc.
- Schmorrow D., Stanney, K.M., Wilson, G., & Young, P. (2006). Augmented cognition in human-system integration. In G. Salvendy (Ed.), Handbook of Human Factors and Ergonomics, 3rd Edition (pp. 1354-83). New York: Wiley.
- Wilson, G. F., Schlegel, R. E., Eds. (2004). Operator Functional State Assessment, NATO RTO Publication RTO-TR-HFM-104. Neuilly sur Seine, France: NATO Research and Technology Organization.