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Integrated Voice and Visual Systems Research Topics

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D. H. Williams
C. A. Simpson
Psycho-Linguistic Research Associates
Menlo Park, California

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D. H. Williams
C. A. Simpson
Psycho-Linguistic Research Associates
Menlo Park, California

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National Aeronautics and
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Ames Research Center
Moffett Field, California 94035

INTEGRATED VOICE AND VISUAL SYSTEMS RESEARCH TOPICS

Douglas H. Williams and Carol A. Simpson

Psycho-Linguistic Research Associates

ABSTRACT

A series of studies were performed to investigate factors of helicopter speech and visual system design and measure the effects of these factors on human performance, both for pilots and non-pilots. The findings and conclusions of these studies were applied by the U.S. Army to the design of the Army's next generation threat warning system for helicopters and to the linguistic functional requirements for a joint Army/NASA flightworthy, experimental speech generation and recognition system.

INTEGRATED VOICE AND VISUAL SYSTEMS RESEARCH TOPICS

Douglas H. Williams and Carol A. Simpson
Psycho-Linguistic Research Associates

During the period of performance for Contract NAS2-11341, Psycho-Linguistic Research Associates (PLRA) performed a series of studies in support of the contract tasks to investigate factors of helicopter speech and visual system design and measure the effects of these factors on human performance, both for pilots and non-pilots. The findings and conclusions of these studies were applied by the U.S. Army to the design of the Army's next generation threat warning system for helicopters and to the linguistic functional requirements for a joint Army/NASA flightworthy, experimental speech generation and recognition system.

These studies have all been reported at appropriate human factors and aerospace technical conferences and published in the proceedings of these conferences in an effort to share the results of the NASA funded research with the academic and industry research community as soon as possible. A list of titles with full references is given.

LIST OF PUBLISHED REPORTS

- Huff, Edward M., Voorhees, James W., Simpson, Carol A., Williams, Douglas W., and Bucher, Nancy M. Voice Interactive electronic Warning System (VIEWS). Final Report, prepared for Office of Project Manager, Aircraft Survivability Equipment, U.S. Army Aviation Research and Development Command, 4300 Goodfellow Blvd., St. Louis, MO 63120, 1983.
- Remington, Roger, and Williams, Douglas H. A chronometric study of visual display symbology. Proceedings of the 6th Digital Avionics Systems Conference. IEEE/AIAA, Baltimore, MD, December 3, 1984.
- Simpson, Carol A., and Navarro, Teresa Pilot preferences, intelligibility, and learnability of two types of computer generated speech. Paper presented at the 107th Meeting of the Acoustical Society of America, Norfolk, VA, May, 1984.
- Simpson, Carol A. and Navarro, Teresa Intelligibility of computer generated speech as a function of multiple factors. Proceedings of the National Aerospace and Electronics Conference (84CH1984-7 NAECON). (pp. 932-940), New York: IEEE, 1984.
- Simpson, Carol A. and Marchionda-Frost, Kristine, Synthesized speech rate and pitch effects on intelligibility of warning messages for

- pilots. Human Factors 26 (5), 509-517, 1984.
- Simpson, Carol A., Marchionda-Frost, Kristine, and Navarro, Teresa, Comparison of voice types for helicopter voice warning systems (SAE Technical Paper Series 841611). Proceedings of the Third Aerospace Behavioral Engineering Technical Conference, 1984 SAE Aerospace Congress and Exposition (pp. 217-224). Warrendale, PA: SAE, 1984.
- Simpson, Carol A. , Speech variability effects on recognition accuracy associated with concurrent task performance by pilots. Proceedings of the Third Symposium on Aviation Psychology (pp. 87-102). Department of Aviation, Ohio State University, Columbus, OH, 1985.
- Simpson, Carol A., Pilot speech performance while talking to a speech recognizer and flying a competitive helicopter pursuit task. (SAE Technical Paper Series No. 851779). Paper presented at the Fourth Aerospace Behavioral Engineering Technical Conference, 1985 SAE Aerospace Congress and Exposition, Oct. 14-17, 1985. Warrendale, PA: SAE, 1985.
- Simpson, Carol A., Selecting cockpit functions for speech I/O technology. Proceedings of the National Electronics and Aerospace Congress (NAECON). Dayton, OH, May 20-23, 1985. (pp. 932-940) New York: IEEE, 1985.
- Simpson, Carol A. and Navarro, Teresa, Comparison of synthesized and human speech characteristics using Semantic Differential scales. Proceedings of the Voice I/O Systems Applications Conference '85, American Voice I/O Society (AVIOS): Palo Alto, CA, 1985.
- Voorhees, James W., Bucher, Nancy M., Huff, Edward M, Simpson, Carol A., and Williams, Douglas H., Voice interactive electronic warning system (VIEWS). Proceedings of the IEEE/AIAA 5th Digital Avionics Systems Conference (83CH1839-0) (pp. 3.5.1-3.5.8). New York: IEEE, 1983.

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