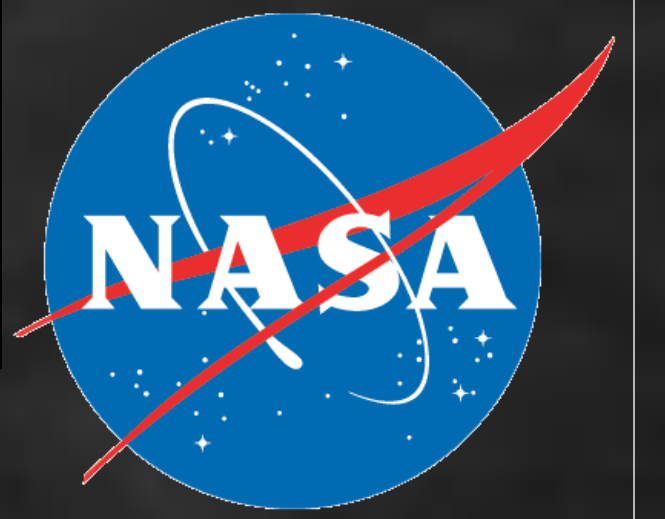


Operational Applications of Autogenic Feedback Training Exercise as a Treatment for Airsickness in the Military



National Aeronautics and Space Administration

Human Systems
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Psychophysiology
Research Lab

Introduction

Airsickness is experienced by about 50% of military aviators some time in their career. Aviators who suffer from recurrent episodes of airsickness are typically referred to the Naval Aerospace Medical Institute (NAMI) at Pensacola where they undergo extensive evaluation and 8 weeks of training in the Self-Paced Airsickness Desensitization (SPAD) program. Researchers at NASA Ames have developed an alternative mitigation training program, Autogenic Feedback Training Exercise (AFTE) that has demonstrated an 80% success rate for improving motion sickness tolerance ².



Figure 1

Background

Airsickness is a motion sickness in the flight environment and is experienced by about 50% of aviators sometime in their career. It can cause flight performance degradation and affect motivation. Autogenic Feedback Training Exercise (AFTE), combines the application of physiological and perceptual training techniques, such as autogenic therapy and biofeedback. AFTE is a proven method to train astronauts and cosmonauts to voluntarily control their physiological responses¹.

Methods



Figure 2

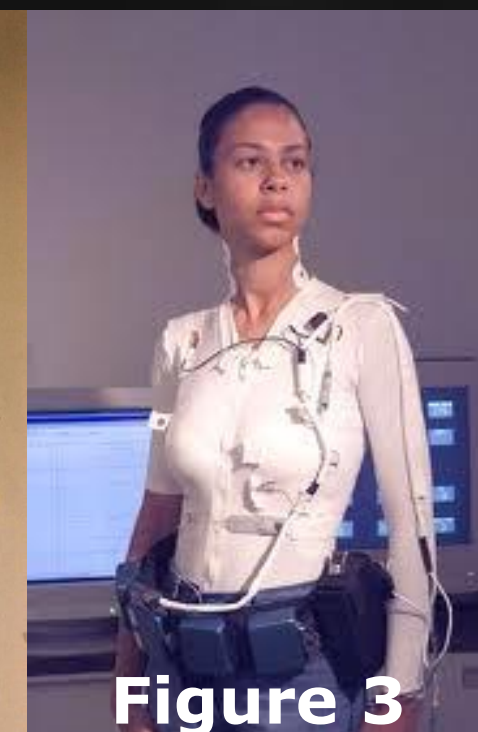


Figure 3

Equipment: An ambulatory monitoring system (Figures 2 and 3) was used to measure physiological responses, such as heart rate, respiration rate, skin temperature, and skin conductance level ².

Acknowledgements

First and foremost, I would like to thank my mentors of the psychophysiology department Drs. Pat Cowings and Bill Toscano for giving me the opportunity to work in their laboratory. Also, I would like to thank Maggie Dominguez for all her support.

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Methods (cont'd)

Rotating Chair: The method used to evaluate subjects improvement in motion sickness tolerance after AFTE is shown in figures 4 and 5.

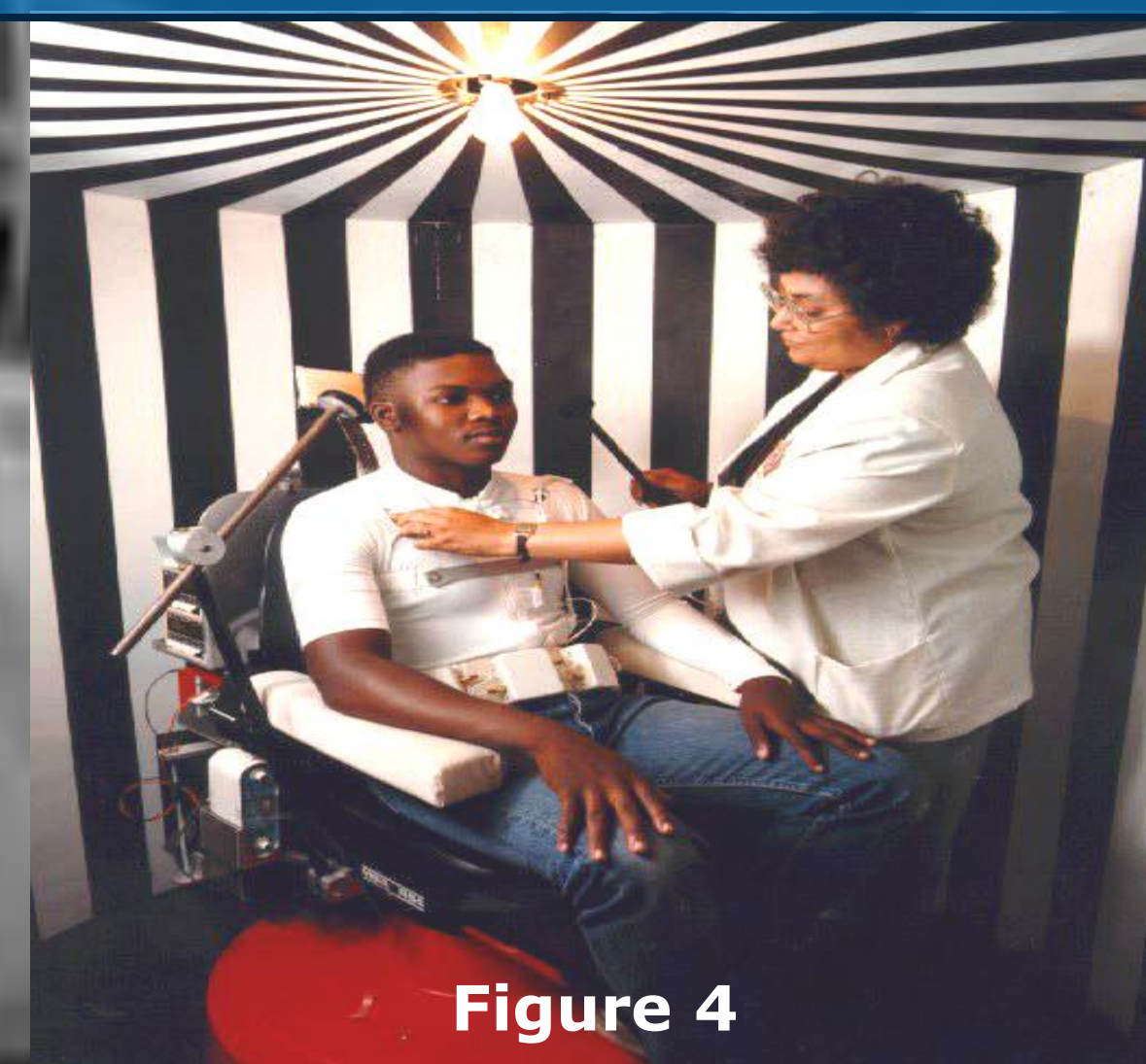


Figure 4

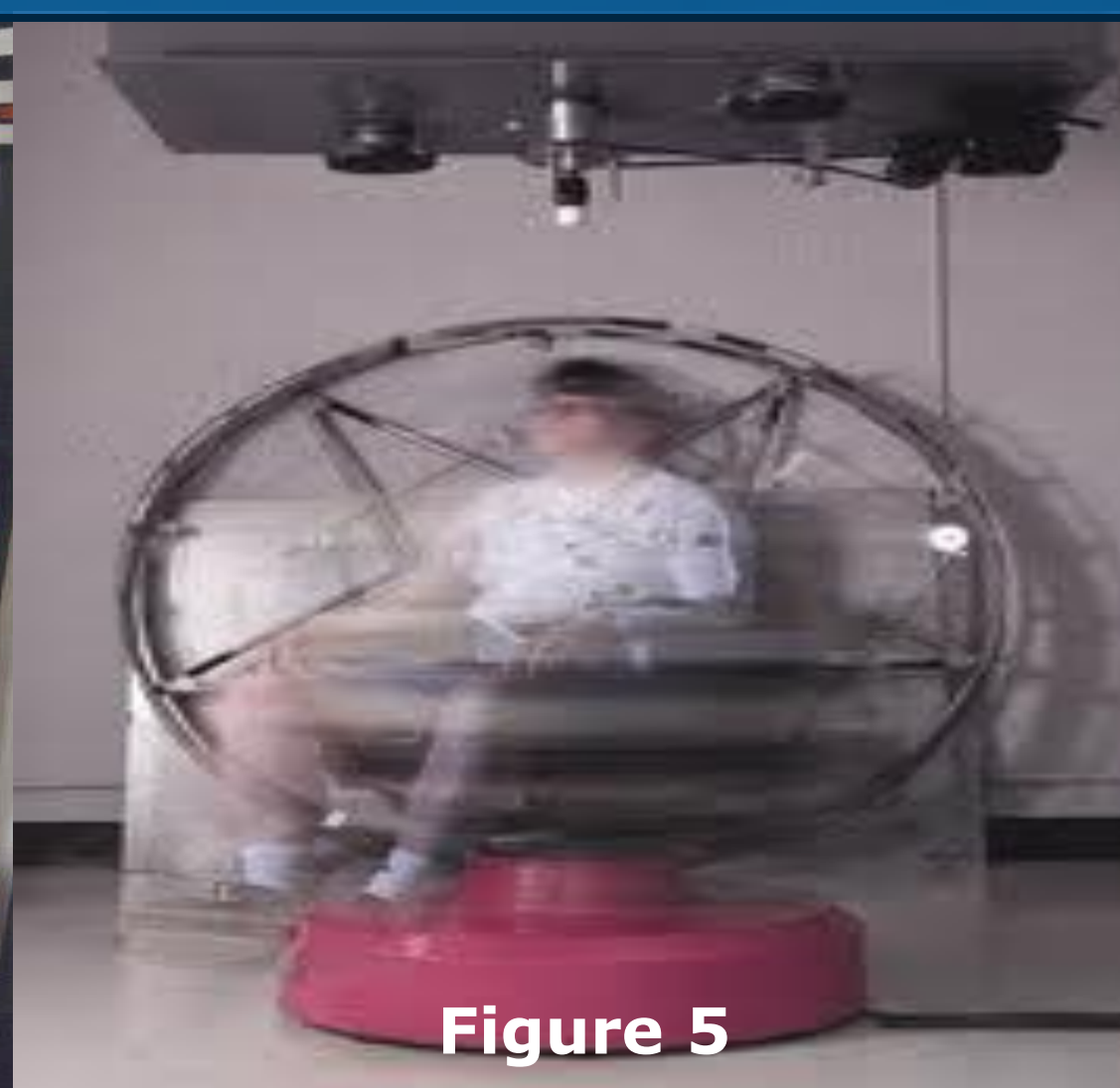


Figure 5

Procedures

Subjects

Thirty aviators from the Navy Training Wing and Army combat helicopter pilots participated in this experiment. All participants were stationed at the Naval Aerospace Medical Institute (NAMI). Airsickness training with AFTE was delivered over the internet.

Rotating chair test

Motion sickness testing was conducted in a rotating chair. During rotating chair tests symptoms of motion sickness were monitored and physiological responses were continuously recorded. After 10 minutes of resting baseline (no rotation), the chair was rotated to 6 rpm (0.628 rad/sec.) and then increased by 2 rpm (0.219 rad/sec.) every 5-minutes¹. Subjects were directed to make 150 head movements at 45 degree angles in four directions (front, back, left, and right) every 5 minutes. The test was terminated if subjects experienced severe motion sickness or if they requested to stop.

Autogenic Clinical Laboratory System (ACLS): AFTE training software requires 2 computers and 4 monitors at both the trainer and trainee locations. This system can display up to 20 different physiological responses in numerical and analog format. The trainer can select which physiological measures were viewed as feedback to the subject.

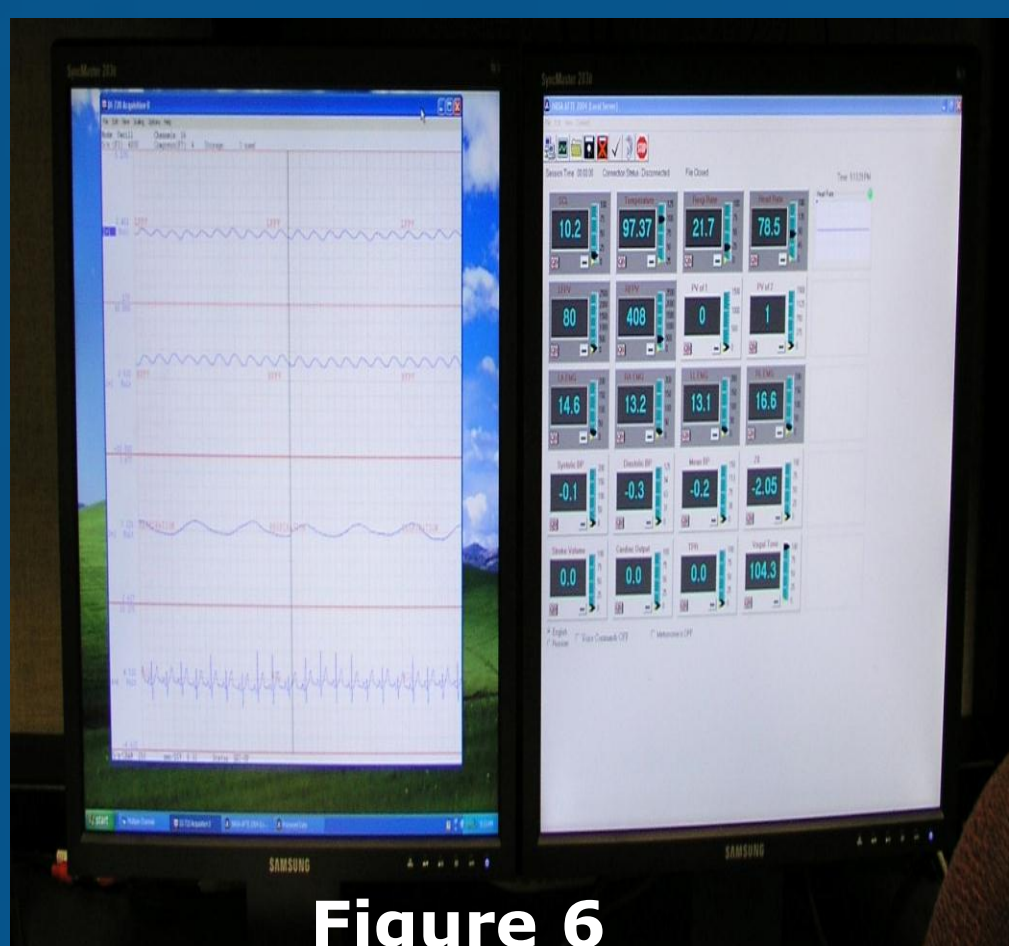


Figure 6



Autogenic Feedback Training Exercise

AFTE involved training participants to control specific physiological responses with both visual and auditory feedback¹. In this study, subjects were given 6-8 hours of training. Figure 7 is an example of one training session which is 30 minutes in duration and includes alternating trials of relaxation and arousal. Subjects learned to recognize and control bodily sensations associated with both increases and decreases in their physiological responses.

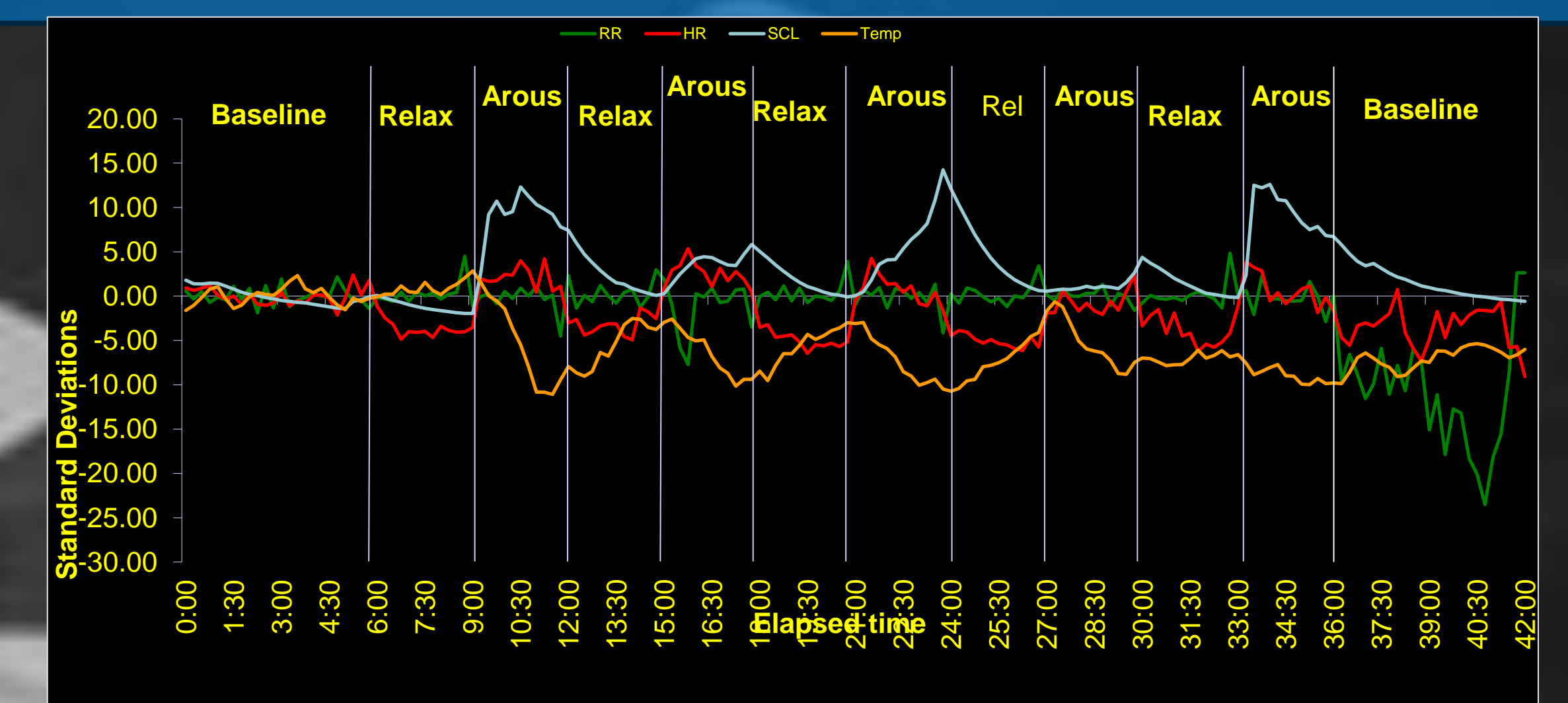


Figure 7: Z-scores of physiological responses during training

Results and Conclusions

To date, 5 out of 7 aircrew were returned to active duty flight status. Figure 8 shows the total numbers of rotations achieved by each participant before and after AFTE. Criteria for success in controlling motion sickness was 500 rotations achieved following training. AFTE is proven to be effective and more cost effective than other similar training programs (SPAD). AFTE may also have benefits for other medical, commercial, and military applications.

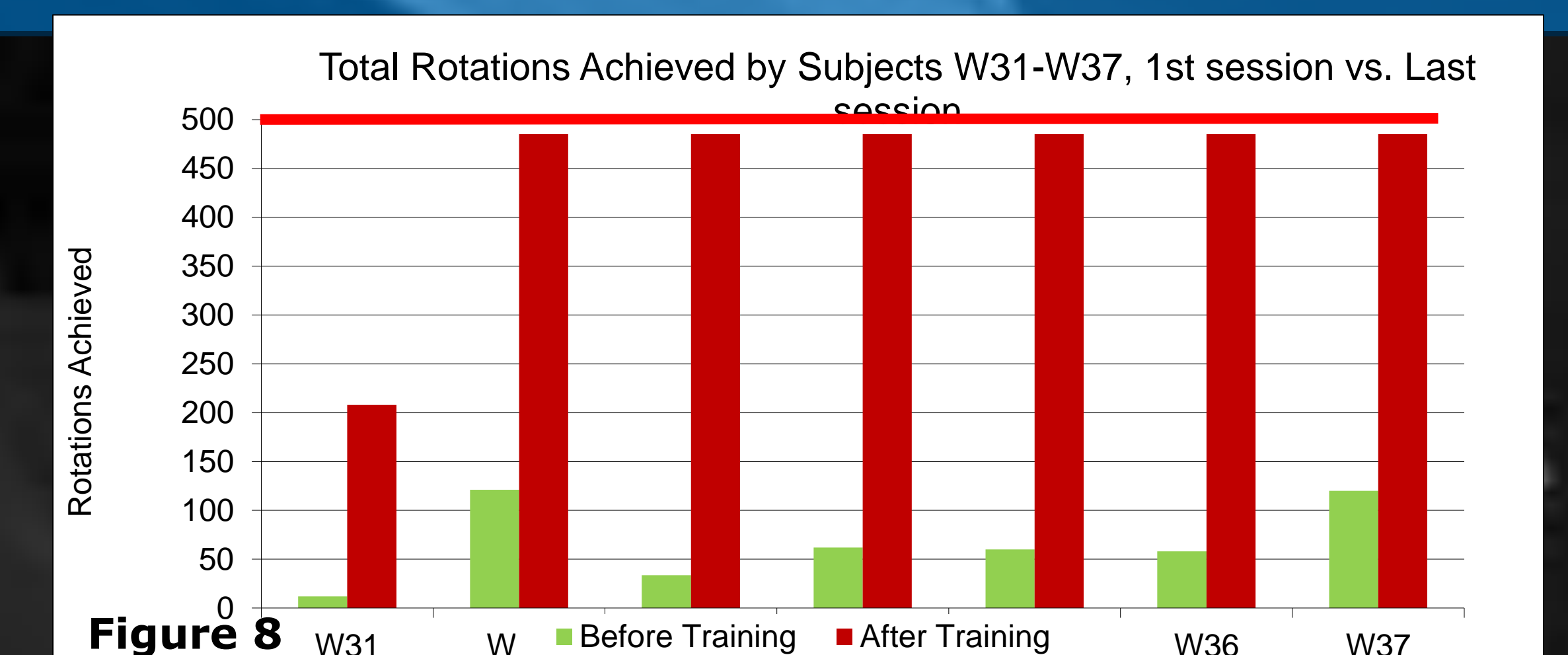


Figure 8

References

1. Cowings PS, Toscano WB. (2000) Autogenic Feedback Training Exercise is Superior to Promethazine for the Treatment of Motion Sickness. Journal of Clinical Pharmacology, 40(10): 11543-1165.
2. Cowings PS, Toscano WB, DeRoshia C, Taylor B, Hines A, Bright A, Dodds, A. (2007) Converging Indicators for Assessing Individual Differences in Adaptation to Extreme Environments. Aviation, Space, and Environmental Medicine, 78(5, Supp.): B195-215.