Fiscal Year:	FY 2004	**Task Last Updated:**	FY 02/24/2010
PI Name:	Moore, Steven T. Ph.D.		
Project Title:	Head-eye Coordination during Simulated Orbiter Landings		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Physiology		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Sensorimotor**:Risk of Altered Sensorimotor/Vestibular Function Impacting Critical Mission Tasks (Revised as of IRP Rev M)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Organization Name:	Mount Sinai School of Medicine		
PI Address 1:	Human Aerospace Laboratory		
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PI Web Page:			
City:	New York	**State:**	NY
Zip Code:	10029	**Congressional District:**	14
Comments:	NOTE: PI moved to Central Queensland University, Australia, July 2016.		
Project Type:	GROUND	**Solicitation / Funding Source:**	2003 Biomedical Research & Countermeasures 03-OBPR-04
Start Date:	05/15/2004	**End Date:**	06/01/2009
No. of Post Docs:	1	**No. of PhD Degrees:**	
No. of PhD Candidates:	0	**No. of Master' Degrees:**	
No. of Master's Candidates:	0	**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	MacDougall, Hamish (Mt Sinai School of Medicine) Clark, Jonathon (NASA Johnson Space Center) Wuyts, Floris (University of Antwerp) Lesceu, Xavier (Airbus) Speyer, Jean-Jacques (Airbus)		
Grant/Contract No.:	NNJ04HF51G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Up to 90% of crewmembers experience spatial disorientation during reentry and landing of the Orbiter, with prevalence proportional to the length of the mission. The possibility of extending shuttle missions is currently under investigation, and it is likely that the incidence and severity of spatial disorientation during reentry will increase with flight duration. This is a critical issue, as Orbiter landing data shows a decrement in performance following microgravity exposure compared to simulated landings in the Vertical Motion Simulator (VMS) at NASA Ames and the NASA Shuttle Training Aircraft. Despite the potential impact on landing operations, the basis of microgravity-related spatial disorientation is poorly understood. The aim of this proposal is to obtain basic data on the characteristics of head and eye movements during simulated Orbiter landings. This information will be used to determine landing tasks that may induce spatial disorientation. In addition, we will model spatial disorientation due to microgravity exposure using a ground-based analogue of post-flight sensorimotor deficits developed during the course of this project. The system uses Galvanic vestibular stimulation (GVS) to modulate vestibualr input to the brain with a pseudorandom current waveform. Preliminary results suggest that per-GVS exposure generate symptoms of spatial disorientation comparable to space flight. Simulated landings in the VMS will be performed both post-centrifugation and with GVS, to test the hypothesis that spatial disorientation diminishes head-eye coordination and landing performance. This may serve as a model for the deterioration in pilot performance during reentry, and provide a training regimen to allow commanders and pilots to experience spatial disorientation in a simulator. To develop a model of spatial disorientation (SD) due to microgravity exposure that can be used to familiarize shuttle pilots with SD symptoms during simulated landings, as well as a training tool to improve landing performance after space flight. This project addresses several questions from the Bioastronautics roadmap concerning disorientation and vertigo during g-level transitions, such as experienced during landing. Development of a ground-based model will help improve shuttle landing performance in the in the short term and will significantly improve mission safety, as several SD incidents impacting Orbiter safety during landing have been documented. In the long term, the SD model developed by this project will have application to future long-duration missions to ensure pilots can monitor automatic landings, and can take manual control of the space craft in off-nominal situations. The SD model may also be used to train astronauts for emergency egress and EVA on a planetary body after g-level transitions.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Development of a training regime incorporating a model of SD is of potential use in commercial and military aviation, where significant losses of aircraft and life occur each year due to SD-related mishaps.
Task Progress:	New project for FY2004. [Ed. note: FY2004 record added to Task Book in 02/2010 for statistical purposes]
Bibliography Type:	Description: (Last Updated: 09/07/2020)