Vestibular Reactions to Space Flight: Human Factors Issues

Spatial Disorientation Symposium

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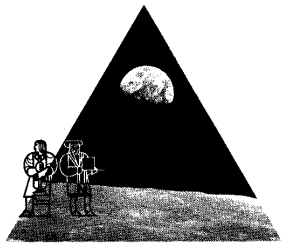


No “up” or “down”

VESTIBULAR HUMAN FACTORS: LAUNCH

- Oculogravic Illusions
- Vibration Induced VOR
- Display Legibility

Dual Visual Verticals

NEUROVESTIBULAR EFFECT: EARLY ON-ORBIT

- Inversion Illusion
- Space Motion Sickness (SMS)
- Proprioception
- Visual Dominance
- Reliance on Tactile and Internal References
- IVA Navigation

EVA - Earth

NEUROVESTIBULAR HUMAN FACTORS: EVA

- Disorientation
- Light/Dark Transitions
- Tactile Cues
- Underwater and VR Training

2001 Centrifuge

NEUROVESTIBULAR HUMAN FACTORS: ARTIFICIAL GRAVITY

- Gravity gradient
- Coriolis cross coupling
- Dual Adaptation

Sky Lab
Floating Astronaut

NEUROVESTIBULAR HUMAN FACTORS: RE-ENTRY

- Head movement/disorientation
- Excess-g effect
- Development of PIO?

Astronaut Posture Test

NEUROVESTIBULAR HUMAN FACTORS: POST-FLIGHT

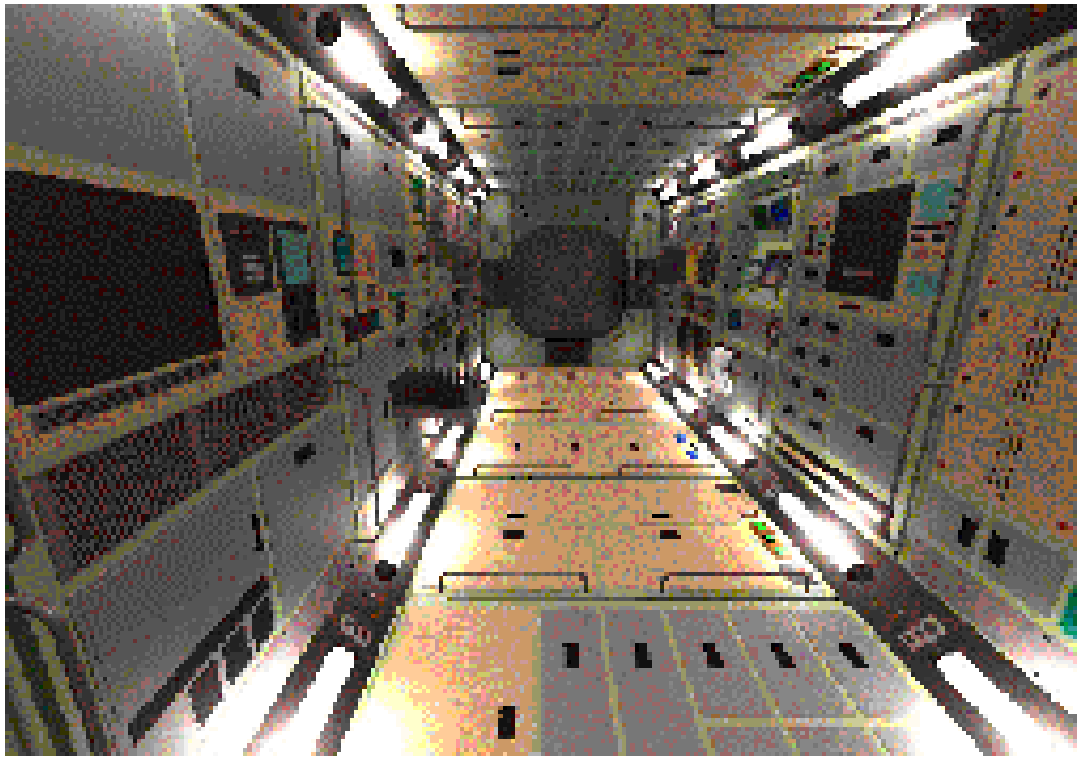
- Posture and Locomotion
- Earth Sickness
- Dual Adaptation

Holloman Centrifuge

PERCEPTION & COGNITION

HF Research Requiring New Facilities

- Artificial Gravity - Space and Ground

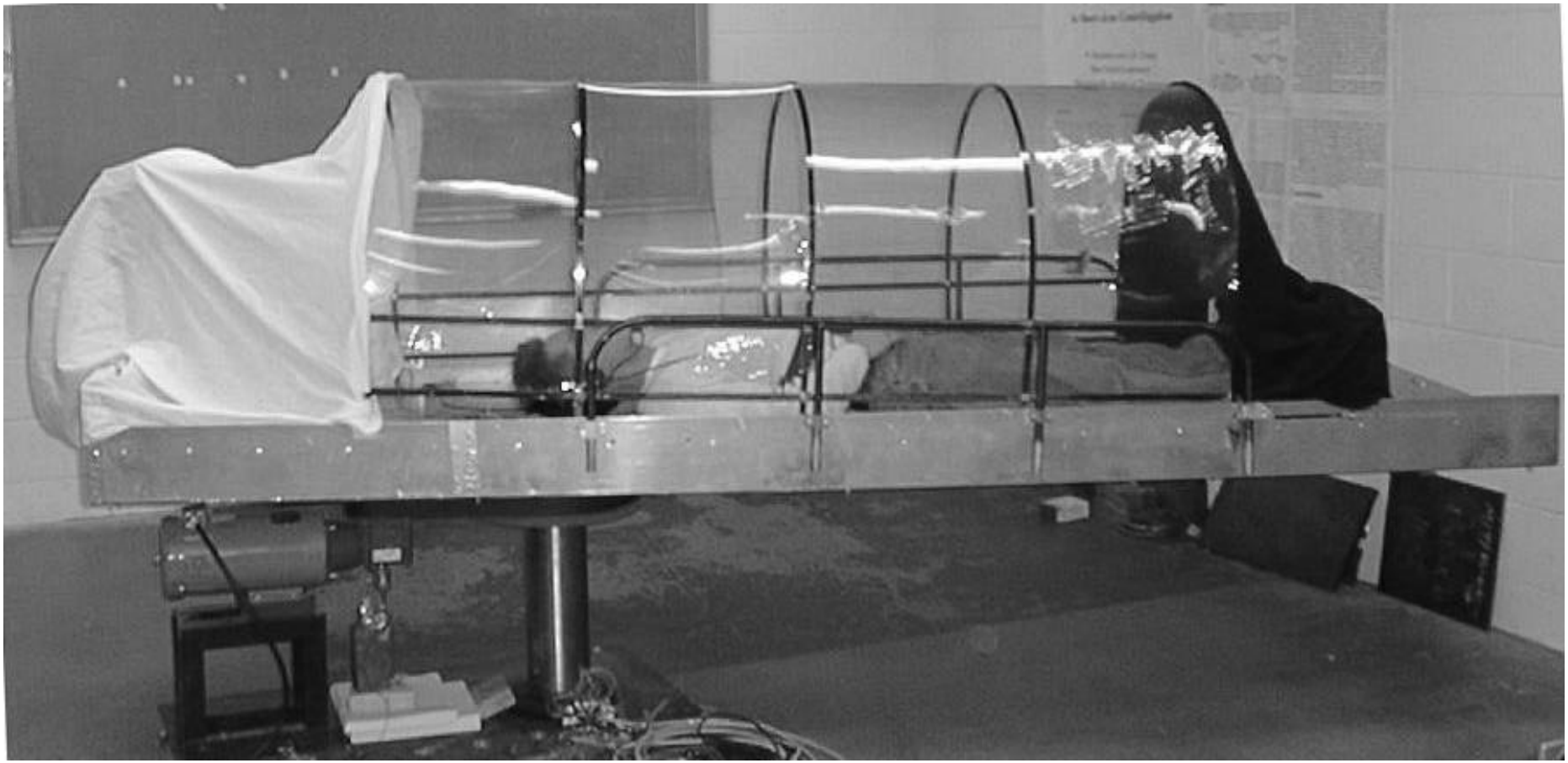


Ceiling or floor?

PERCEPTION & COGNITION
HF - Research Using ISS

- Head & Eye Movement Coordination
- Visual - Vestibular Interaction
- Dual Adaptation

MIT Short-Radius Centrifuge



PERCEPTION & COGNITION
Priorities for ISS Operation

- Visual coding for orientation and navigation
- EVA orientation countermeasure
- SMS & Earth Sickness Treatment
- Pre-Flight Adaptation