The goal of the Information Presentation Directed Research Project (DRP) is to address design questions related to the presentation of information to the crew. The major areas of work, or subtasks, within this DRP are: 1) Displays, 2) Controls, 3) Electronic Procedures and Fault Management, and 4) Human Performance Modeling. This DRP is a collaborative effort between researchers at Johnson Space Center and Ames Research Center.

ABSTRACT
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DISPLAYS – Visual displays

FY08 Studies

Label Alignment
Three studies investigated the effects of label alignment in small and large data groupings: 4, 8, and 16 label/value pairs, as well as high fidelity displays. The task was to find a value that corresponded to a target label.

Label Orientation
The purpose of the study was to investigate the effects of label orientation.

Studies Planned for FY09

Follow-up on alignment studies from FY08, further investigating left-aligned versus data-aligned labels for performance differences. The experimental task will be varied, and eye tracking will be used to gather higher precision data.

DISPLAYS – Auditory displays

Three studies examined the suitability of candidate alarm sounds for four types of alarms: class 1 emergency (fire-smoke and depressurization), class 2 warning and class 3 caution. Crew participants were asked to rate the sounds on a 5-point suitability scale.

Emergency (Class 1): This is the most serious type of event. It is used in a life threatening condition that requires immediate action in order to protect the crew.

Warning (Class 2): This is less serious than emergency. It is used in a situation that requires immediate correction to avoid loss or a major impact to mission or potential loss of crew.

Caution (Class 3): This is a situation of a less time critical nature, but with a potential for further degradation if crew attention is not given.

Results indicate that the most suitable alarm sound types are based on currently-used alarms.

Crew results differed from the non-crew slightly (different caution alarm was selected).

Studies Planned for FY09

FY08 studies will build on FY08 experiments, attempting to validate previous results, compare results with speech alarms, and examine the impacts of hearing these sounds in a suit.

Speech Communication Under Vibration
This is a new area of work that will begin in FY08. The question of interest is: To what extent will the intelligibility of crewmembers’ speech communication with ground control during launch be degraded as a result of vibration? If speech communication intelligibility from crew to ground is degraded severely enough, there are important implications for developing displays for non-verbal means of communication during launch. The need is particularly severe during launch since solutions to off-nominal conditions may require descriptions of situations and acknowledgment of commands under high vibration conditions.

CONTROLS

FY08 Studies

Cursor Movement
The study examined three cursor movement modes: continuous, discrete, and gravity well, using trackball and a 4-way castle switch, with and without EVA gloves.

EVA OPERATIONS

Study on HMD use in lunar lighting

Gloved Dexterity and Tactility

Demonstration of spatially localized beacons

VIBRATION STUDIES

Orion-Ares exposure will be at levels that may exceed the 0.25 g limit imposed by earlier programs during ascent.

There is a serious risk that higher vibration will cause unacceptable degradation of human performance, due in part to decrements in visual function.

Present study began the process of quantifying this risk by examining how different vibration levels impact ability to make speeded yes/no responses to alphanumeric symbology in a semi-supine position.

5 blocks of 60 self-paced trials, 40 with vibration, 20 without.

Each block at one vibration level: 0 g, 15 g, 30 g, 5 g, or 7.5 g.

Letter processing task (8 participants)

Digit processing task (8 participants)

Results

Errors increased with increased vibration.

There were more errors for smaller compared to larger font.

Vibration effects appeared at smaller vibrations levels for 10 pt font than 14 pt font.

No significant differences between vibration effects on lexical decision and magnitude comparison tasks.

No effects of vibration on follow-up trials.

Response times showed very similar pattern to errors.

Conclusions

For both number and letter processing, performance is significantly worse at both 0.5 g and 0.7 g for 10 pt font and at 0.7 g for 14 pt font.

Vibration levels above 0.3 g (0- to 7 peak) will significantly compromise the processing of alphanumeric symbology in the currently anticipated Orion display viewing conditions.