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.

- For large data groupings, such as the 16-label group, data-alignment is faster than left-alignment.
- In high fidelity displays, there was no difference in search times between left and data-aligned labels.

FY08 Studies – 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 where additional efforts could be made to overcome the hazardous situation.
- Caution (Class 3): This is the least serious of the four categories, since it is only used as a reminder.

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). Recommended alarm sounds will be modified per ISO recommendations to reduce the startling effect and accommodate sleeping crew.

Studies Planned for FY09

Follow-up on FY07 studies will focus on investigating the effects of background music and the use of different font sizes. The goal is to improve the intelligibility of crewmembers’ speech communication with ground control during launch or landing.

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 symbols while in a semi-supine position.
- Blocks of 60 self-paced trials, 40 with vibration, 20 without.
- Each trial at one vibration level: 0 g, 15 g, 30 g, 55 g, 68 g.

Results

- Errors increased with increased vibration
- There were more errors for smaller compared to larger font
- Vibration effects appeared at smaller vibration 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 (4-8Hz) will significantly compromise the processing of alphanumeric symbols in the currently anticipated Orion display viewing conditions.