NCSU/Aptima – NASA NRA-07 Research

12/11/06

Team Members: Alexander, Bailey, Hsiang, Kaber, Kim, Stelzer

Guest: Cowley (Psychology)

Agenda:

Review of action items from November meeting and research progress

- SVS/EVS display examples (Alexander brief)
- EVS HUD display prototyping (Kim presentation)
- Review of EVS HUD features (grouping of features, active/inactive features under various conditions; Kim spreadsheet)
- Aptima task list (Bailey document)
- Search for historical NASA TRs for display info criticality analysis (Kaber)
  - Keller et al. (2003) – "Cognitive Task Analysis of Commercial Jet Aircraft Pilots during Instrument Approaches for Baseline and Synthetic Vision Displays"
  - Russell & Everett (2005) – "The Future Flight Deck"
- Review of semantic pairs of descriptor terms and reduction of list for 1st study (All)
  - Aptima analysis (Bailey)
  - Analytical evaluation (Hsiang)
    - Create database of concept relevant terminology
    - Identify loading of pairs on conceptual terminology
    - Compare degree to which loadings are common among pairs
    - Identify pairs of terms with greatest conceptual utility/breadth in meaning, but least overlap with other pairs.
    - Reveal terms useful for characterizing clutter and not confused with other terms.

New business

- Feedback from NASA on information elements of SVS/EVS prototypes for manipulation in 1st study
  - Minimal, if any, “declutter” controls on PFD.
  - Do not want to use existing ND modes (approach, map, plan) as a "clutter" variable.
  - Do not want to use existing HUD modes (raster, stroke) as a "clutter" variable.
  - Manipulate major groups of information in displays and not specific features.
  - Identification of info elements of each display for manipulation.
  - Present images of "full featured" and "decluttered" versions of the display to pilot groups in simple scenarios.
  - NASA will find pictures to represent each condition in exp.
- Current task list and 1st study preparations:
  - Comparison of nominal and SVS PFD and ND display modes.
  - Review on criticality of display features for phases of flight.
    - Identify critical traditional and SVS display features.
    - Critical groups of information would need to be persistent in images of display prototypes through the stages of a scenario.
  - Seek additional info from NASA on SVS/EVS displays.
  - Functional grouping of display features – SVS PFD, ND; SVS/EVS HUD.
  - Extension of analysis of semantic pairs of descriptor terms – need to resolve final list. (Identify reduced set of pairs with high degree of orthogonality among pairs.)
    - What pairs of descriptor terms are most useful for describing perceived clutter due to functional groups of features?
    - Need to consider specific issues raised by Aptima
  - Development of display prototypes for 1st experiment.
    - Can be done in house if fractional factorial design for experiment is acceptable.
  - Experimental design – Fractional factorial approach for assessing

each display type (PFD, ND, HUD)

Separate evaluation of each display – 5 factor design for HUD; 6 factor design for PFD; 7 factor for ND.

What high-order combinations of features are least likely to be used by pilots? (Need basis for aliasing.)

(NASA is willing to generate display images for testing (need experimental design and condition specs. from NCSU).)

Consider Resolution III design – 8 runs for mapping all conditions (1/4 replicate).

Development of subjective survey forms.

Must know conditions and semantic pairs in advance.

Issues Addressed:

We secured images of SVS displays.

NASA provided feedback on information elements of SVS/EVS prototypes for manipulation in 1st study - Focus on SVS instrumentation for commercial aircraft.

NASA provided documentation as basis for determining criticality of SVS display features in phases of flight.

Need to review documents to determine information elements needed from ND, PFD and HUD in landing or under weather.

Current Issues:

What is possibility of access to dynamic working software simulation of SVS prototypes?