Re-use of a Serial List Model for Aircraft Procedure Learning

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Goal: Use ACT-R To Make Quantitative Training Time and Performance Predictions for Aircraft Procedures

Method: Re-use Anderson et al. (1998) Serial List Learning Model with Procedures that are Described as a Serial List of Actions, Memorized, and Executed by Retrieving Each Item and Performing Action Described by Item
Novice Representation of Procedures

- Based on observations that current training practices can lead novices to treat training as list learning
- Resulting lists are very difficult to memorize and rapidly forgotten

1. FMS has Direct To Function
2. Press Legs Page Key
3. Get Waypoint Identifier
   a. In Clearance OR
   b. Retrieve From LTM OR
   c. *Scan Leg Page(s) OR
   d. Ask ATC OR
   e. Look up on Chart
4. Enter INTO Scratch Pad
5. Press LSK 1L
6. Press? ABEAM PTS> LSK
7. Verify Change on ND
   a. Modify range if necessary
   b. Formulate what you expect to see on ND
8. Press EXECUTE
Ebbinghaus (1888) Data Modeled with Anderson et al. (1998) Serial List Learning Model

- Model pushed to represent 24-item list as 8 groups of 3 items (new productions acting on a deeper hierarchy may be a better representation)
- Initial performance of each day suffers from “overnight” decay of activation
Expert Representation of Procedures

- Experts can use retrieval structures to guide learning (encoding) and retrieval
- This results in shorter lists to retrieve from memory

1. FMS Has Direct-To Function
2. REFORMULATE: Edit Leg Page
   Inserting Waypoint into 1L
3. ACCESS: Legs Page
4. FORMAT: Waypoint
5. INSERT: 1L
6. Press ABEAM WPTS> LSK?
7. VERIFY: On ND
8. Press Execute

Items in RED Do Not Have To Be Memorized
Expert Data Modeled with Serial List Learning Model plus Anderson et al. (1999) Time Slowing

- Time slowing needed to retrieve pre-proceduralized lists over the course of weeks
- BUT time slowing changes Ebbinghaus results!
- Is time slowed the same for nonsense vs meaningful lists?

![Graph showing performance over list length and time slowing]

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