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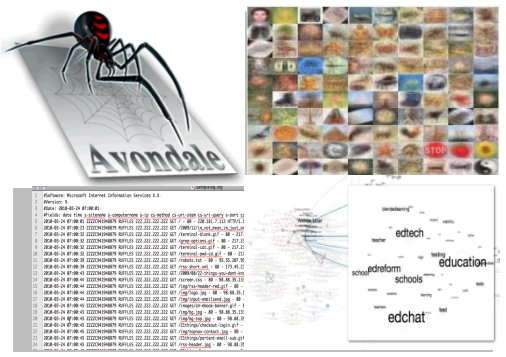

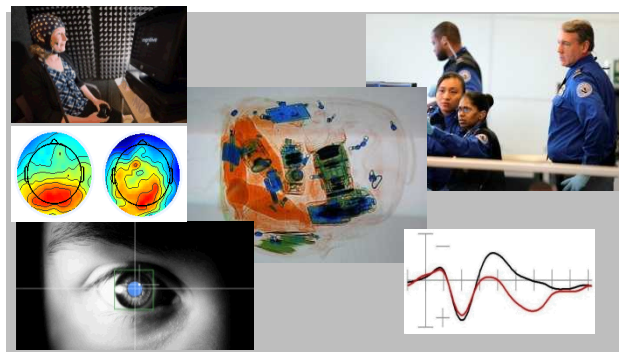

Methods for Determining the Role of Fatigue and Cognitive Load on Behavior Detection Officers (BDOs) Performance in the Field

Presented by Rob Kittinger, PhD

Co-author James Bender, PhD

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Overview

- Transportation Security Administration (TSA)
  - Behavior Detection Officers (BDOs)
- Job Analysis (aka, Work Analysis)
  - Method
- Cognitive Task Analysis (CTA)
  - Method

TSA

- Established on November 19, 2001 in response to the 9/11 terrorist attacks
- Moved from DOT to DHS in 2003.
- 55,600 employees

BDOs

- The Behavior Detection program began in 2006
- There are 2,700 BDOs across 87 airports
- BDOs are trained to identify suspicious behaviors and/or activities at airports

Pistole, J. S. (2013). Statement of Administrator John S. Pistole Transportation Security Administration U.S. Department of Homeland Security Before the United States House of Representatives Committee on Homeland Security Subcommittee on Transportation Security, 1-5 (2013) (testimony of John S. Pistole). Retrieved from http://www.tsa.gov/sites/default/files/assets/pdf/11-14-13_testimony_jsp.pdf

Description of Job Analysis (aka work analysis)

- The foundation of the I-O Psychology and HRM fields
- Defined as
  - "…the process of studying jobs in order to gather, analyze, synthesize, and report information about job requirements and rewards" (Heneman et al., 2000)
  - "…the collection and analysis of any type of job related information" (McCormick, 1979)
  - "…a method of assessing what tasks are involved in a specific job and how workers perform these tasks" (Gael, 1983)
- Identifying the observable job tasks and supporting factors

Heneman, R. L., Tansky, J. W., & Camp, S. M. (2000). Human resource management practices in small and medium-sized enterprises: Unanswered questions and future research perspectives. *Entrepreneurship theory and practice*, *25*(1), 11-26.

McCormick, E. J. (1979). *Job analysis: Methods and applications*. Amacom.

Gael, S. (1983). Job analysis. *A guide to assessing work activities. San Francisco: Jossey Bass Publishers*.

Job Analysis Method

- Preparation
  - Document Review (i.e., SOPs, training materials, old job tasks lists)
  - Attended BDO Training
  - Identified and invited 18 Subject Matter Experts (SMEs)
    - Two co-located groups representing eight geographically diverse airports
- Job Analysis
  - Utilized Sandia's Custom Job Analysis Software
  - Verified Accuracy and Currency of 578 job tasks
    - Identified related KSAOs
    - Identified related Job Competencies
    - Rated tasks on: Difficulty, Importance, Frequency, Complexity and Duration

Description of CTA

- Defined as…
  - "…the extension of traditional task analysis techniques to yield information about the knowledge, thought processes and goal structures that underlie observable task performance" (Schraagen, 2000)
- Identifying the unobservable job tasks
  - Knowledge
  - Processes
  - Decision Making
  - Goal Structures
  - Planning
  - Problem Solving

Schraagen, J. M. C. (2000). CHAPTER IV Report on the NATO-ONR Workshop on Cognitive Task Analysis. *Cognitive Task Analysis*, 31.

CTA Method (Tentative)

- Preparation
  - Update Job Analysis
  - Structured Critical Incident Interviews*
  - Draft Hierarchical Task Analysis (task flow diagram) based on SOP using Visio and custom plugins
  - Invited back the same 18 SMEs
  - CTA Method External Panel Review
- Cognitive Task Analysis
  - SMEs edited the HTA task flow diagram to reflect their actual process
  - Went step-by-step through the HTA identifying and adding supporting cognitive tasks (i.e., planning, decision making, knowledge, etc.)
  - Extracted the cognitive tasks from Visio to Excel
  - SMEs used custom Sandia software to provide independent ratings on job tasks following the NASA-TLX (Task Load Index)

NASA-TLX (Hart & Staveland, 1988)

- SMEs rate cognitive job tasks (7-point Likert scale)
  - Mental Demand – how mentally demanding is the work?
  - Physical Demand – how physically demanding is the work?
  - Temporal Demand – how hurried or rushed was the pace of the task?
  - Performance – how successful were you in accomplishing what you were asked to do?
  - Effort – how hard did you have to work to accomplish your level of performance?
  - Frustration – how insecure, discouraged, irritated, stressed, and annoyed were you?

Additional Factors considered: Overall workload, task difficulty, stress level, fatigue, activity type (skill based, rule based, knowledge based)

Hart, S. G., & Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. *Advances in psychology*, *52*, 139-183.

Validity and Reliability

- Candidates for calculating Validity and Reliability
  - Generalizability Theory
  - Completeness of job information
  - Mean ratings
  - Interrater reliability
  - Interrater agreement

Morgeson, F. P., & Campion, M. A. (2000). Accuracy in job analysis: Toward an inference-based model. Journal of Organizational Behavior, 21(7), 819-827.

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Questions?

"Science for a Smarter Workplace"
-SIOP, describing I-O Psychology