

Flight Attendant Work/Rest Patterns, Alertness, and Performance Assessment: A Field Study

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Federal Aviation
Administration



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Study Goals

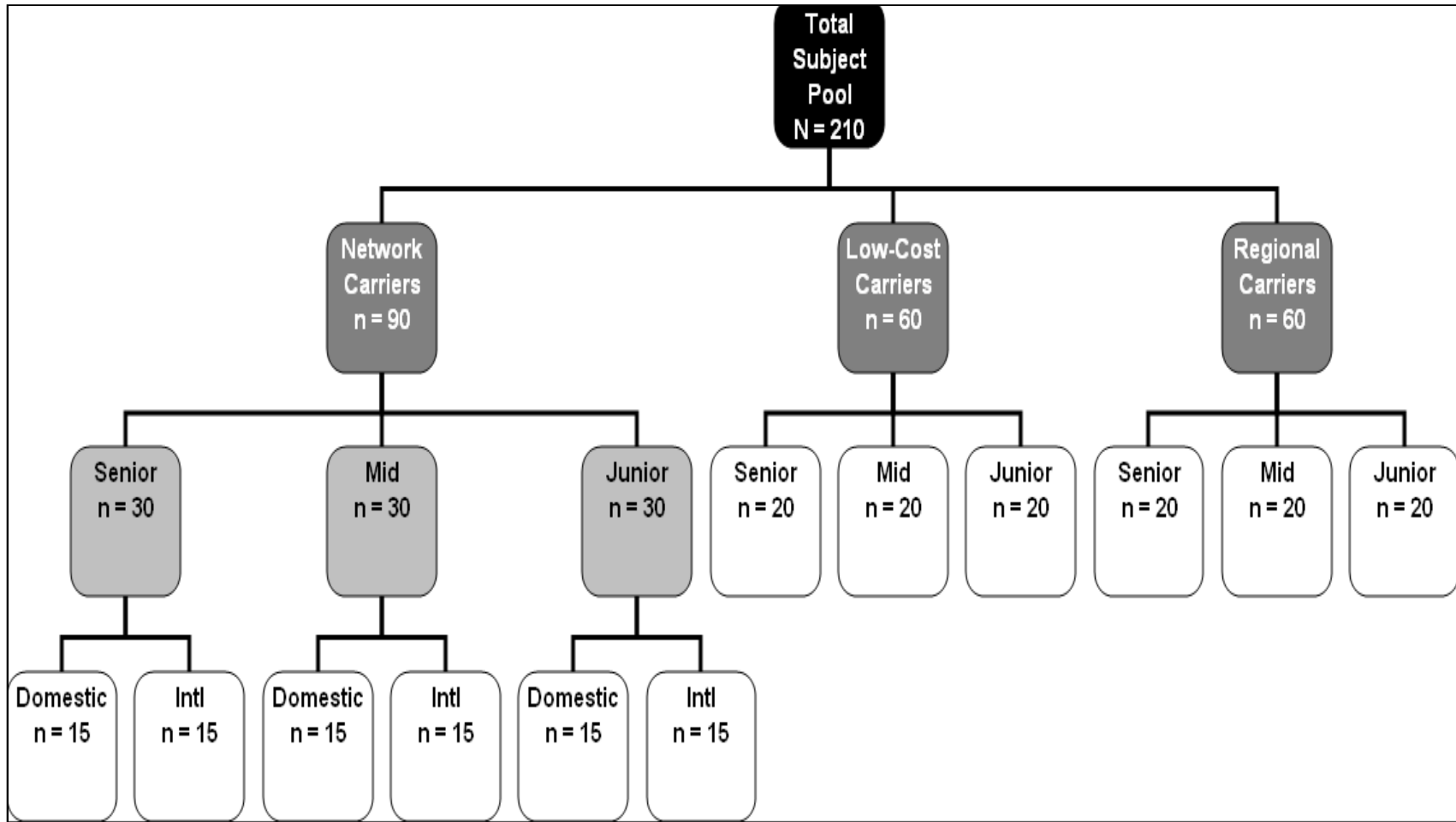
- How much activity, rest, and sleep do US-based flight attendants engage in during a typical 3-4 week period?
- Do these patterns affect attention, subjective sleepiness, and mood?
- Do these effects vary as a function of carrier type, seniority status, or domesticity?



Part II: Field Study

- Field study requires most complex data collection
 - Sole source of objective data on sleep/wake patterns, cognitive performance, mood changes, and workload patterns of flight attendants as they progress through a normal duty & off-duty monthly work cycle
- CAMI initiated cooperative research agreement with nonprofit research organization (IBR) with field research experience to conduct the project
- CAMI worked extensively with airlines and flight attendant unions in protocol development and volunteer recruitment strategies

Field Study Design



Recruitment & Selection

- Announcement letter released in cooperation with airlines and union reps
- Volunteers directed to online eligibility survey
- ***5,000 applicants***



Recruitment & Selection

- Reduced to ~3,000 eligible volunteers
- Random selection of N+10 per group
- Statistically compared to respective applicant pool for age and gender ratio
- Randomly assigned as Primary or Backup participant and notified via email



Scheduling

- Excel database, but based on individual communication and manual scheduling & tracking
- Coordinate launch, consent, shipping, training
- Improvisation in response to AWOL, vacations, dropouts, missed shipments, and other schedule changes



Data Collection: Background Questionnaire

- SurveyMonkey.com
 - Included demographics, NASA TLX weighting questions, Morningness-Eveningness questionnaire
 - SurveyMonkey affordable and easy to use
 - Automatic results, summaries, and graphs
 - Downloadable full results in Excel

Sleep & Activity Monitoring

- Pedometer (duty only)
- 24-hr/day Actigraphy



SleepBand (www.fatiguescience.com)

- Non-invasive
- Non-interactive
- Waterproof
- Experimenter controlled via IR-USB

Personal Digital Assistant (PDA)



- AT&T Tilt, Mobile Testing Suite (software developed by Peter Wubbels; www.archinoetics.com)
- Data downloaded via cell network following each testing session

PDA Daily Activity Log

Start 10:20

Run Mobile Testing Suite

Time Since Last Log Edit: **0d 00:01**

Current State: **At Work**

Local Time is...

Monday, Mar 02
10:20:41

Home Time: Monday, Mar 02, 10:20

Radio Off Device Lock

Schedule Log ok

Event Manager

New Save Cancel Del

Event Type
No Work, At Home

Location
ADL, 10.5

Start Time
06:55 03/03/09

Notes

Event Key

- Sleep
- Work Break
- Nap
- Commute
- At Work
- No Work: Home
- In-Flight
- No Work: Away

Tuesday Mar 03, 09 06:56

Objective Performance Measures

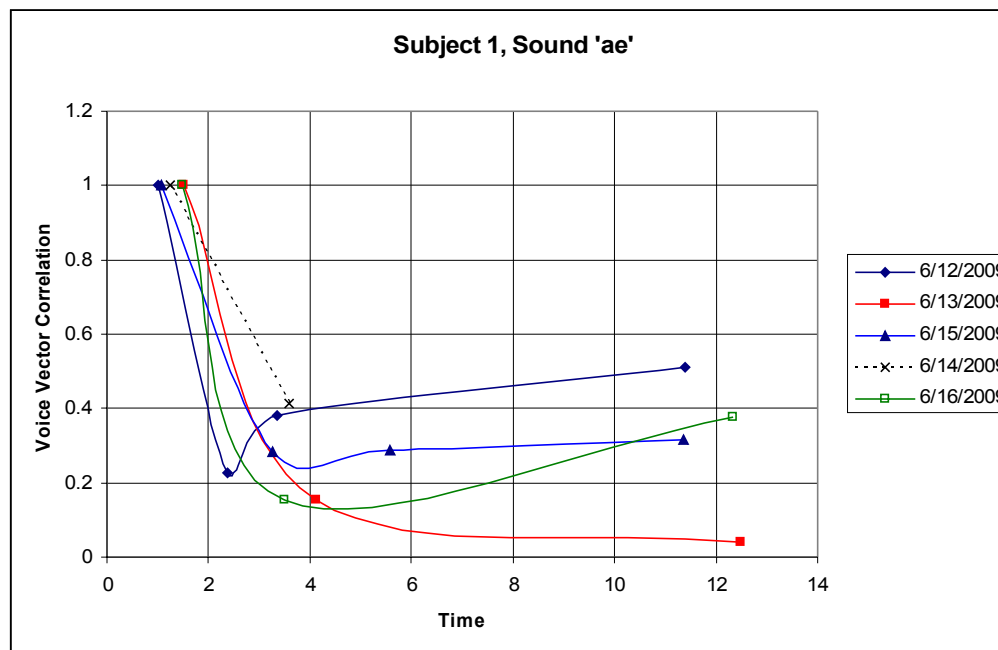


- PDA Touchscreen-Based 5-min Psychomotor Vigilance Test (PVT)
- Participants responded with a screen touch when numerals appear
- Display of response time (42 ms in example) provided for each response
- Time between stimuli varied from 3-10 sec

Objective Performance Measures

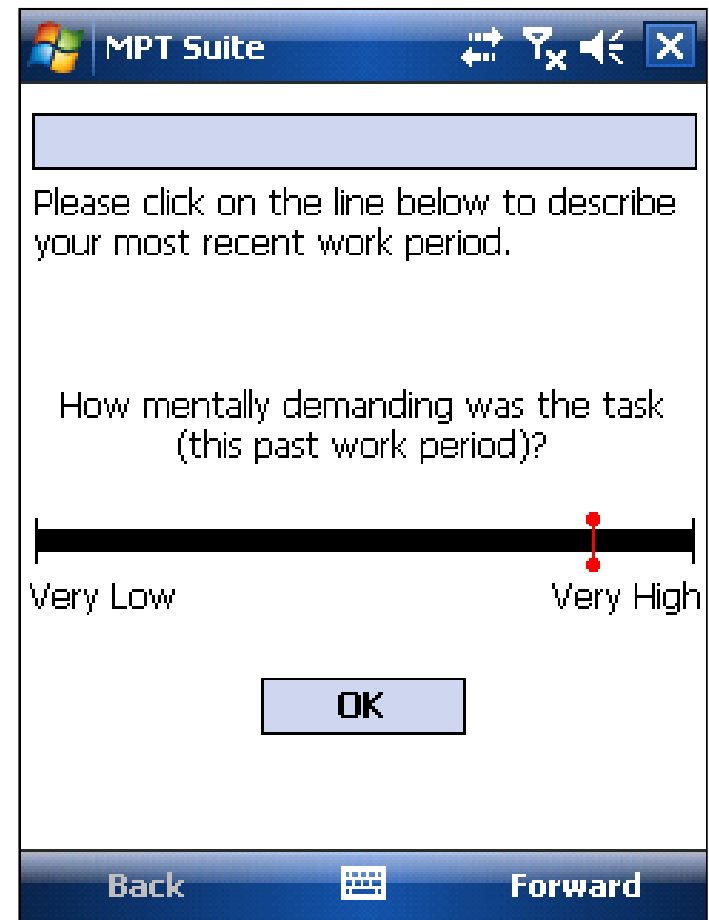
Voice Recordings

- 5 randomly ordered fatigue-sensitive phrases designed and analyzed by Dr. Hal Greeley of Response Applications, LLC (hpg@responseapplications.com)



Subjective Reports

- Visual Analogue Scale (VAS)
 - Subjective fatigue and mood
 - NASA TLX (post-work)
 - Sleep Quality (post-sleep)



The screenshot shows a window titled "MPT Suite" with a standard Windows-style title bar. The main content area contains a horizontal line for a Visual Analogue Scale (VAS). The text above the line reads: "Please click on the line below to describe your most recent work period." Below the line, the question is: "How mentally demanding was the task (this past work period)?". The line is labeled "Very Low" on the left and "Very High" on the right. A red vertical line with a dot at the top indicates the user's selection, which is positioned approximately 85% of the way from "Very Low" to "Very High". Below the scale is a blue "OK" button. At the bottom of the window, there are three buttons: "Back", a keyboard icon, and "Forward".

Subjective Effects

- Additional Tests
 - Drug Use Questionnaire (pre-sleep)
 - ✓ Select all that apply
 - Post-Duty Questionnaire
 - ✓ How often did ... happen?

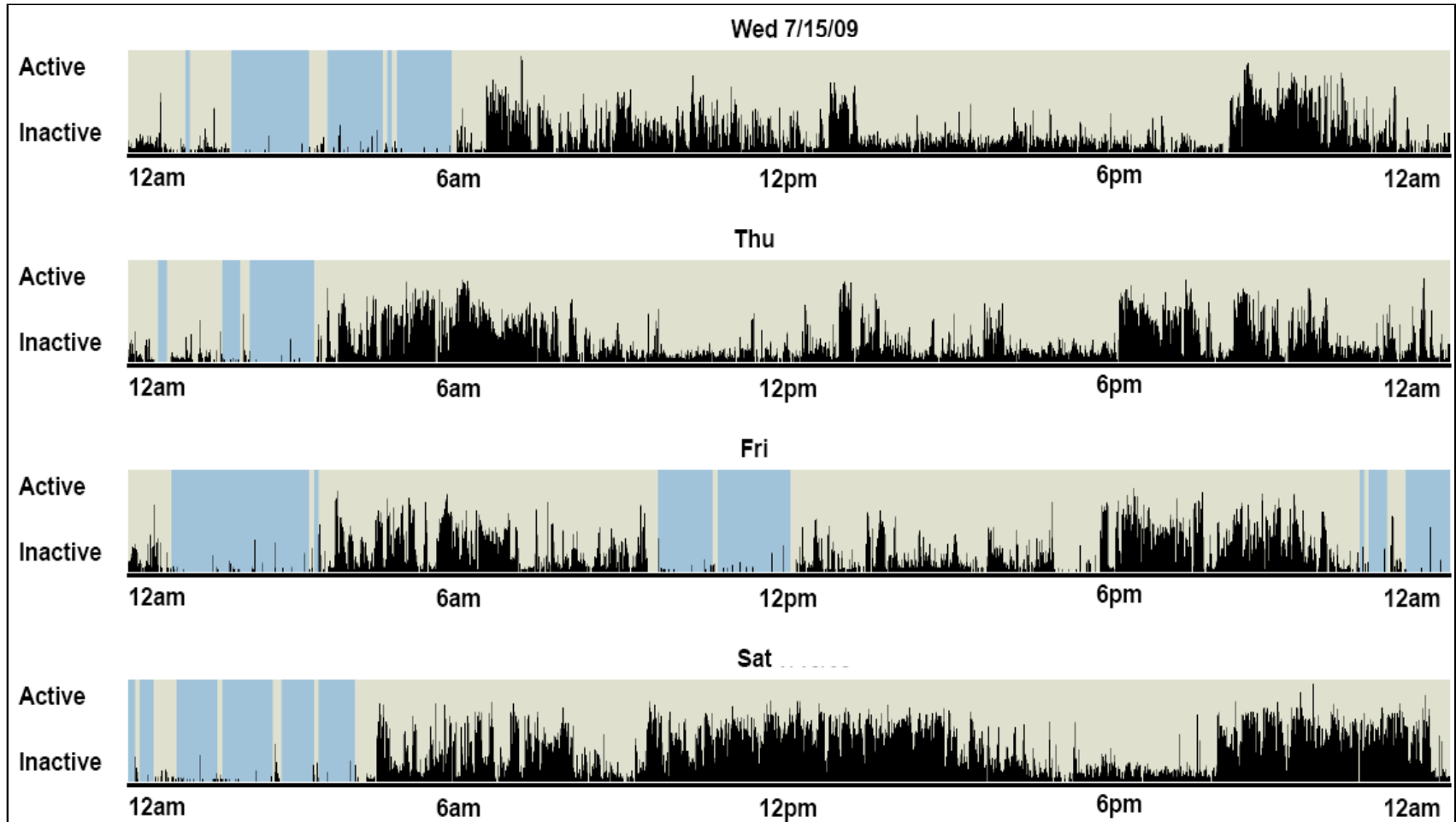
Data Management

- On-call availability for real-time assistance to participants in the field
- All PDA data uploaded to secure FTP site via cellular network after every test session
 - ✓ Check compliance of daily log and testing
- All actigraphy and PDA data stored on internal memory for final extraction and compilation upon equipment return
 - ✓ Final package for each subject uploaded to secure MediaFire account (www.mediafire.com)

Data Analysis

- All PDA data converted to Excel-compatible format
 - Traditional database techniques and conventional statistical analyses
- Raw Actigraphy data processed through proprietary algorithm to generate sleep and wake amounts, sleep efficiency, etc

Actigraphy Output Example Of 4 Days



Lessons Learned?

- Ample use of cost-effective online and off-the-shelf computer resources for recruitment, demography, and data management
- Actigraphy and PDA devices provide flexibility and convenience in operational settings



Current Status of Field Study

- Participant solicitation began Feb-Mar 09
 - 5,000 interested FAs contacted Web site
 - 3,600 completed Pre-Study Questionnaire
- So far, data collected from 156 Flight Attendants between 5/25/09 and 3/10/10
- Data collection continues through Spring 2010

Questions?

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