VOLUME 2

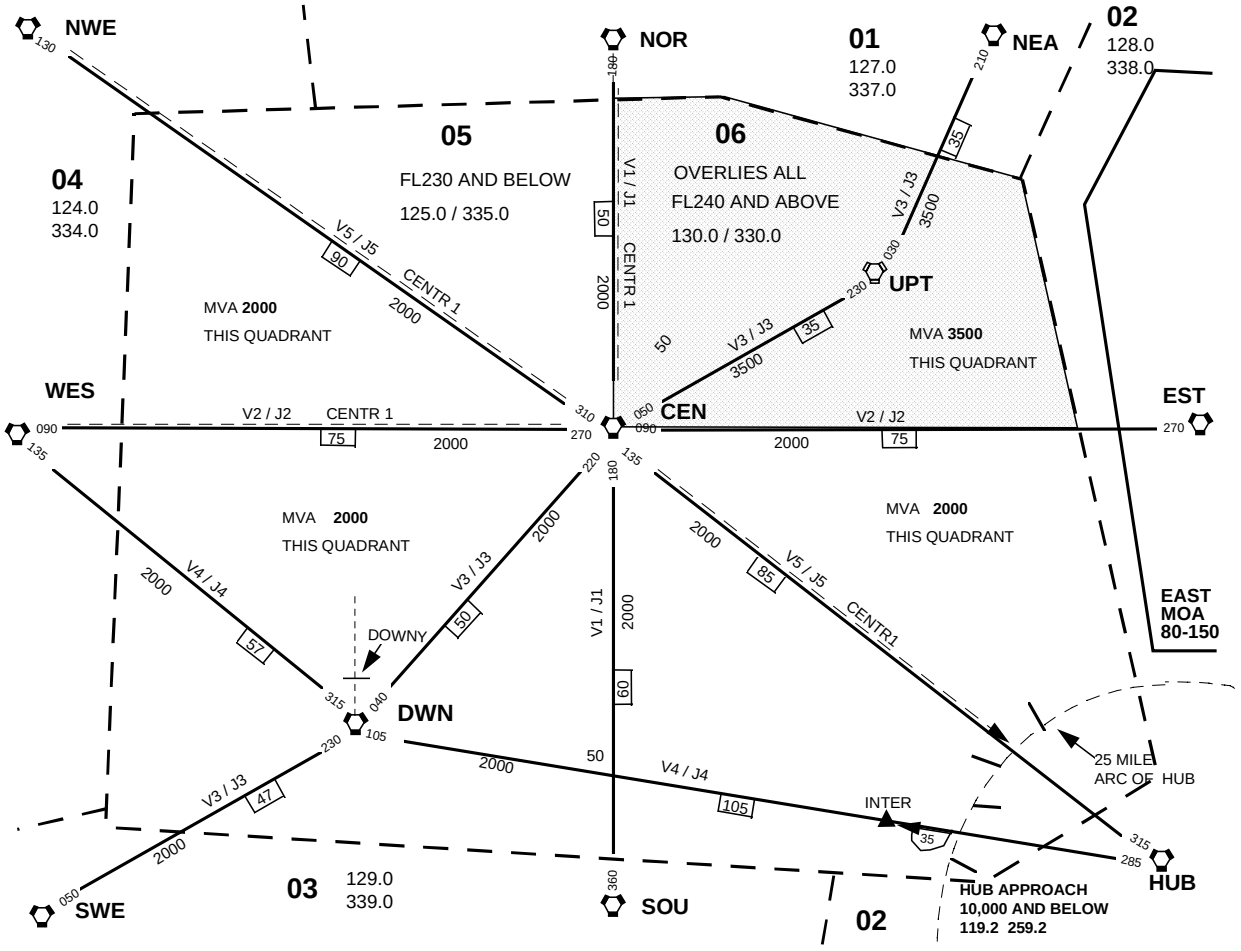


Figure 4.1. Map of CBPM Airspace

1. True north and magnetic north are the same.

2. There is an airport co-located with each displayed Navaid *except* CEN. There are three primary airports:

Uptown: UPT	Downtown: DWN	Hubsville: HUB
FSS only.	VFR tower.	Hubsville approach owns 10,000 and below.
IFR approach is VOR for RWY 27.	IFR approach is ILS to RWY 18. IAF is DOWNY.	STAR: north, northwest, & west. Jet arrivals via CENTR1cross at 11,000 @ 250 knots, propellors cross at 10,000; HUB's control on contact. Departures via V4/J4 climb to 10,000; your control on contact.
Missed approach altitude is 3500.	Missed approach altitiude is 2000.	

3. "DPT" indicates a departure from outside depicted airspace; "DESTN" indicates an arrival at an airport outside depicted airspace.

4. Tick marks on CENTR1 arrival are 10 miles apart, and airways start 5 miles from the Navaids.

5. Each full data block has a one minute velocity vector and three histories.

Figure 4.2. Airspace Summary: Sector 05 in Hub Center

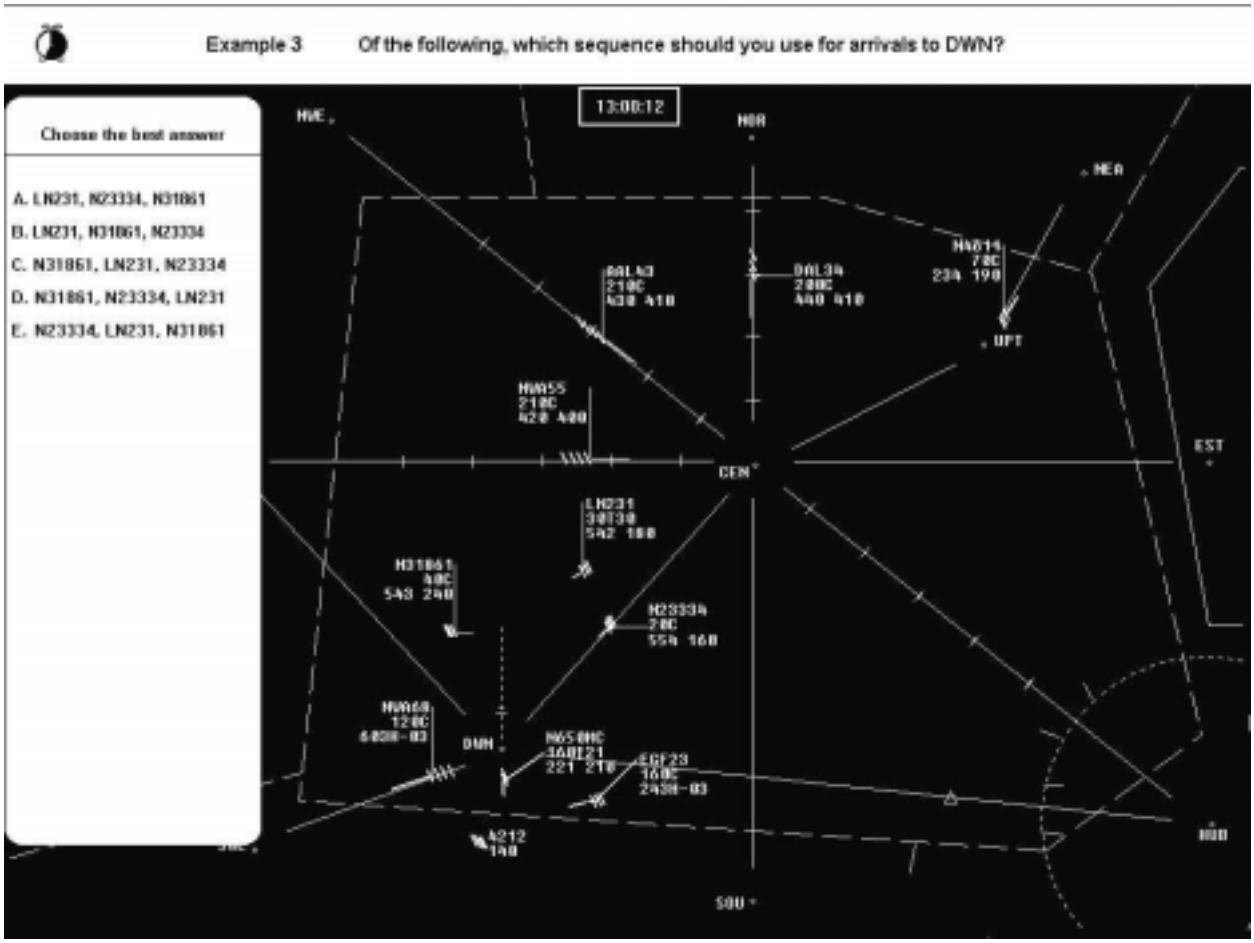


Figure 4.3. Example CBPM Item

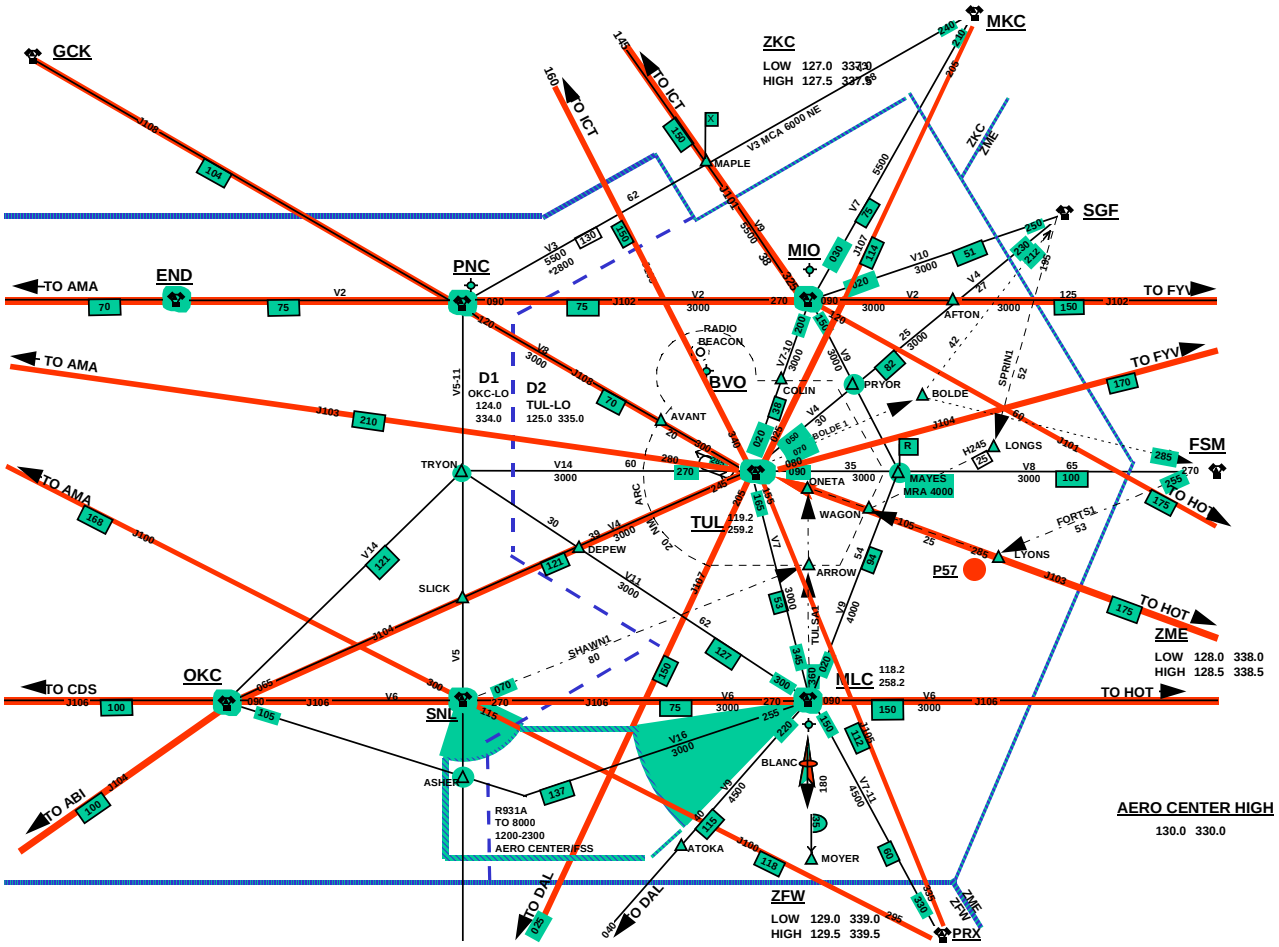


Figure 4.4. Aero Center Airspace

Volunteers Needed to Take Air Traffic Controller Tests

Interested in air traffic controller jobs? We need volunteers to take some computer administered tests that are being evaluated for use in selecting future controllers. Volunteering provides a preview of potential tests for future controllers and in no way affects future employment as a controller. Requires 8 hours, including breaks, and a meal which is provided. Tests administered in June/July 1997. Minimum qualifications for taking tests are: US citizenship, ages between 17 and 30, AND at least 3 years of general work experience. Please call toll-free 1-888-322-2827

Figure 5.2.1. Sample Classified Newspaper Advertisement for Soliciting Civilian Pseudo-Applicants

Interested In a 1-Day Research Experience Involving
Pre-Employment Testing for Air Traffic Controllers?

Air traffic controllers provide for the safe, orderly, and expeditious passage of airplanes from location to location along established airways. In doing so, air traffic controllers use sophisticated, hi-tech radar and communications systems to coordinate with pilots and other air traffic controllers. A consortium, under contract to the Federal Aviation Administration of the United States Department of Transportation, is currently evaluating new tests that are being considered for possible use in the coming years to select entry-level, or new, air traffic controllers. Therefore, those interested in this job field are being asked to volunteer some time to take the computer-administered tests.

Minimum Qualifications?	United States citizenship, AND age between 17 and 30 (proof is required at time of testing), AND 3 years work experience in any job or job type. College may be substituted for work at the rate of 1 year of college for 9 months work experience.
When?	Testing will occur in June/July 1997. Please call toll-free 1-888-322-2827 for more detailed information.
Where?	Air Route Traffic Control Center, (street address), (city), (state), (zip code).
Time & Date?	Please call toll-free 1-888-322-2827 to schedule a time and date for testing.
How Long Will It Take?	Approximately 8 hours
What Do I Bring?	Valid form of photo identification, such as a driver's license or passport

Figure 5.2.2. Sample Flyer Advertisement for Soliciting Civilian Pseudo-Applicants.

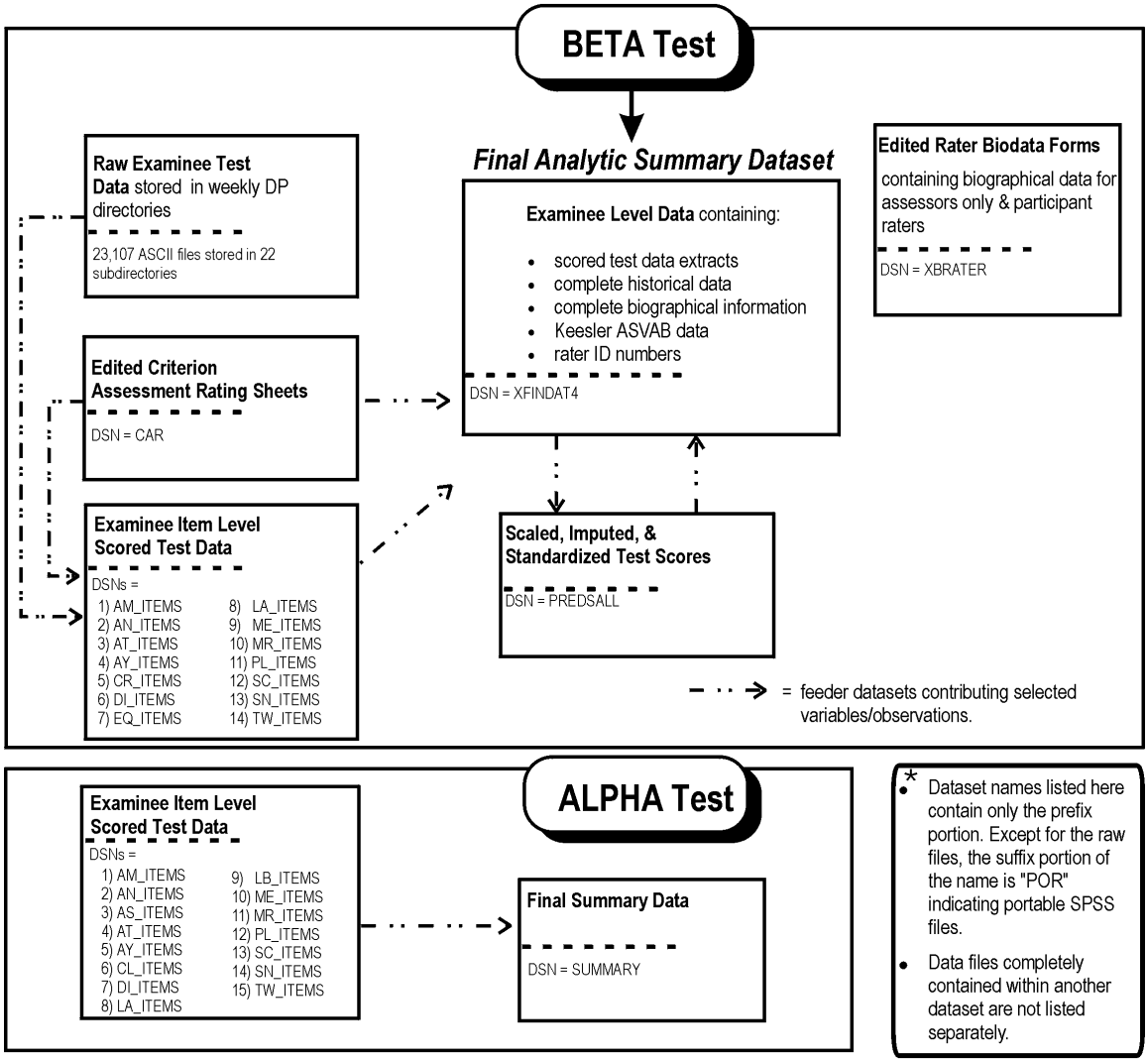


Figure 5.3.1. AT-SAT Data Base (*)

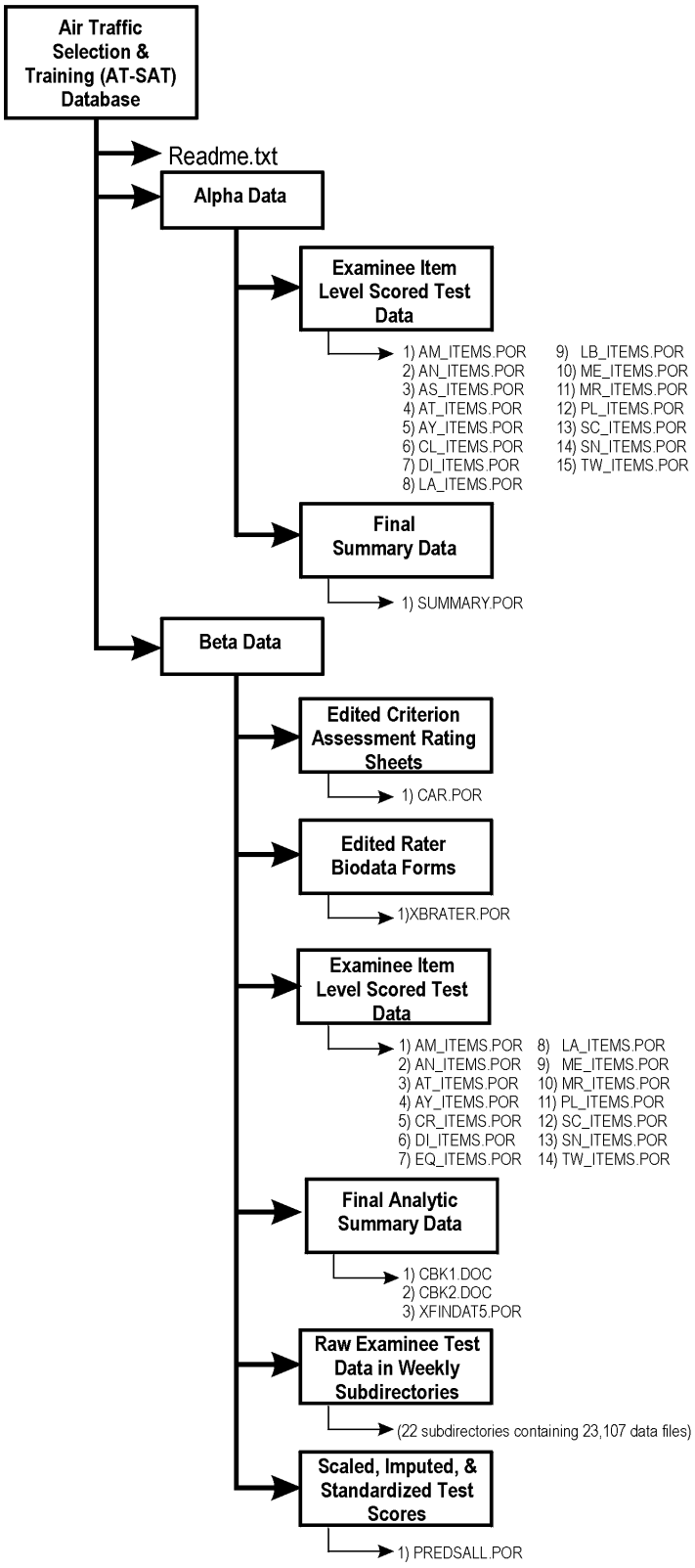
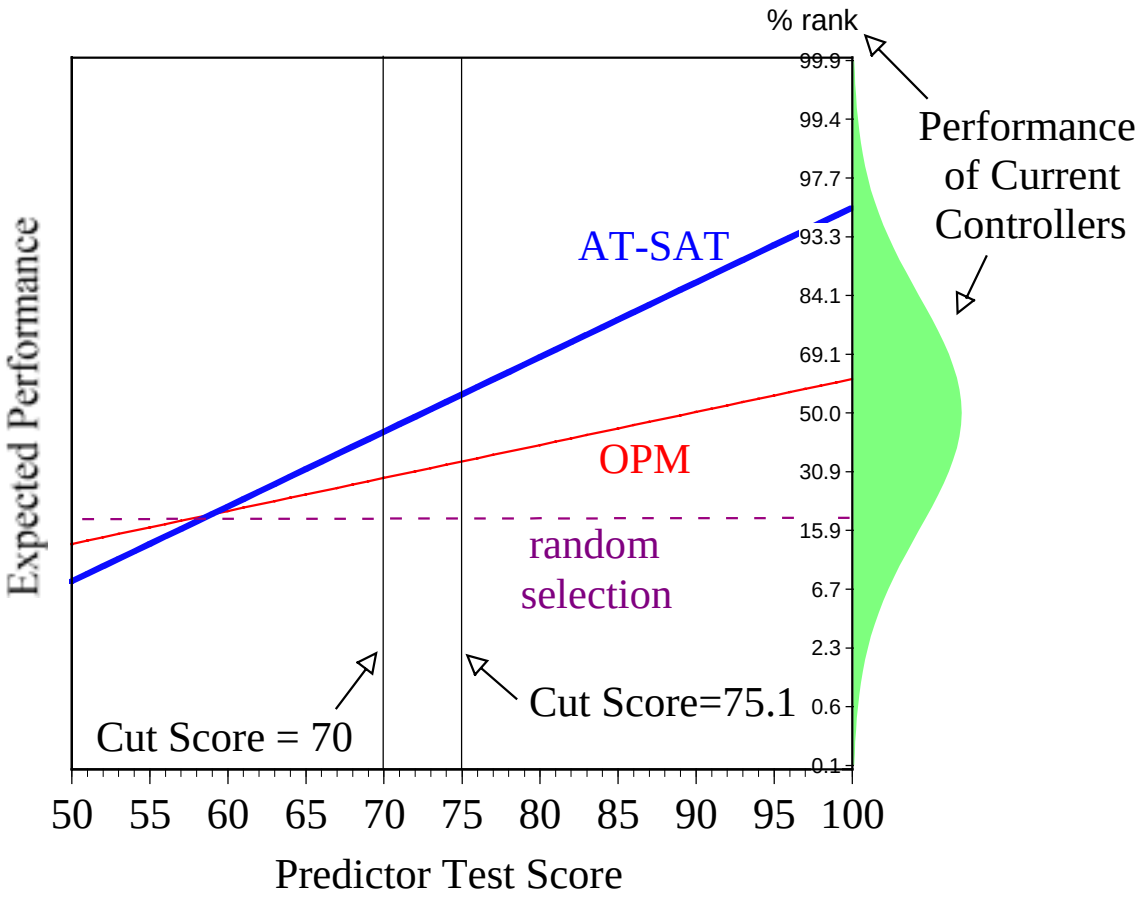


Figure 5.3.2. CD-ROM Directory Structure of AT-SAT Data Base.



- Validity is the slope of the line showing the increase in average performance associated with an increase in test scores.
- AT-SAT has a much higher validity than the old OPM test.
- Above the cut scores, AT-SAT's line is higher than OPM. This means that the selected workforce will perform better when AT-SAT is used to screen applicants.

Figure 5.5.1. Expected Performance: OPM vs. AT-SAT

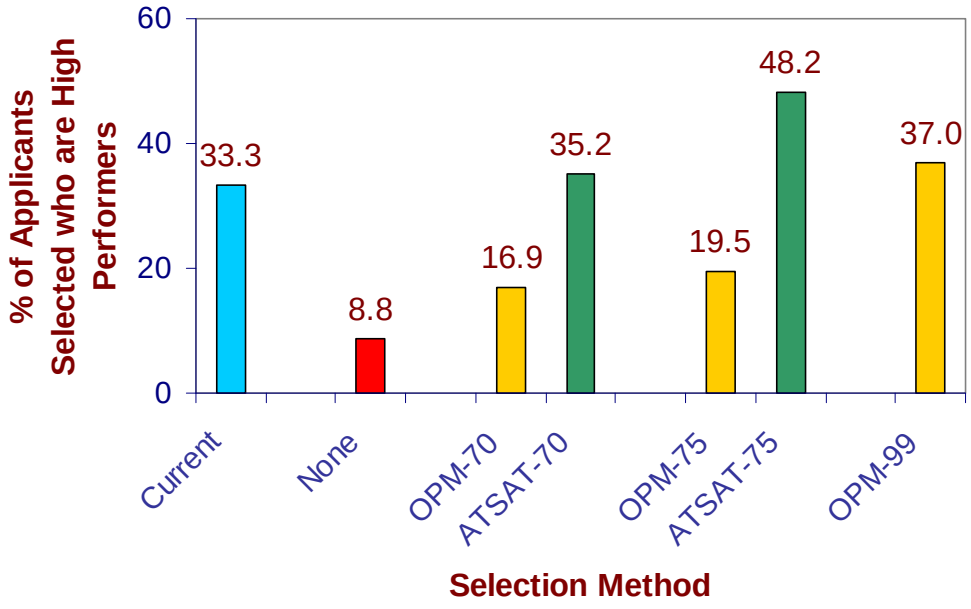


Figure 5.5.2. Percentage of Selected Applicants whose Expected Performance is in the Top Third of Current Controllers: OPM vs. AT-SAT

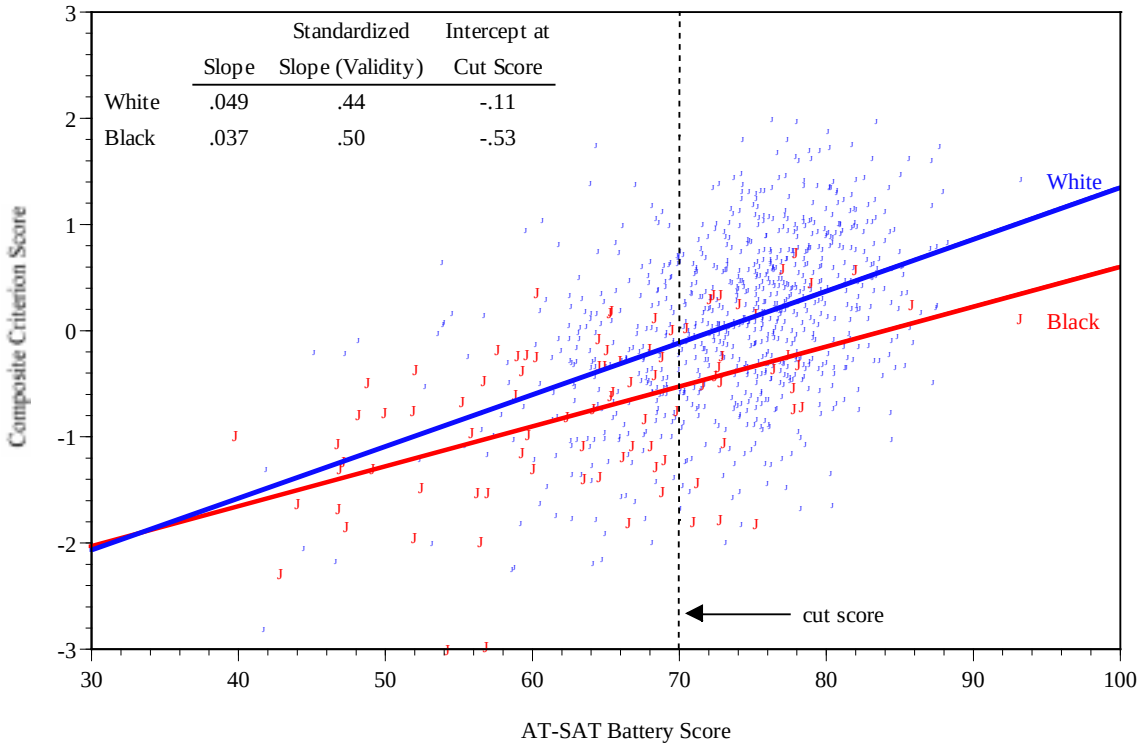


Figure 5.6.1. Fairness Regression for Blacks Using AT-SAT Battery Score and Composite Criterion

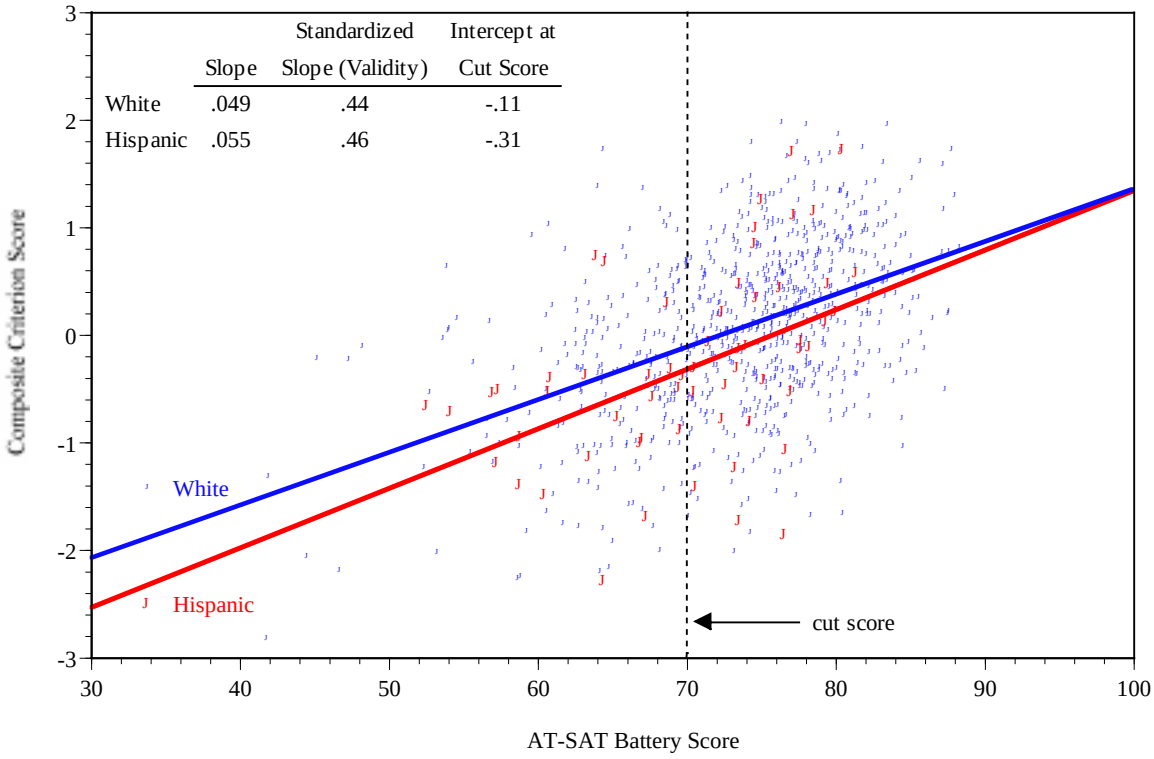


Figure 5.6.2. Fairness Regression for Hispanics Using AT-SAT Battery Score and Composite Criterion

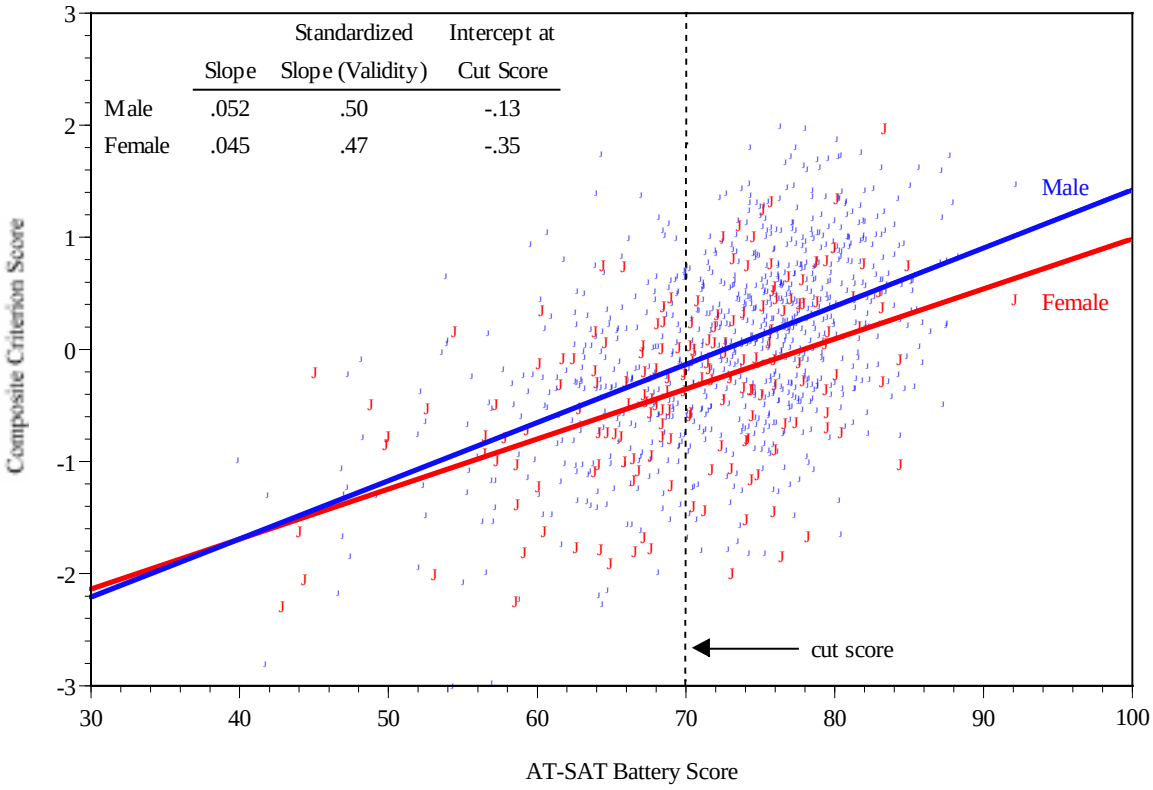
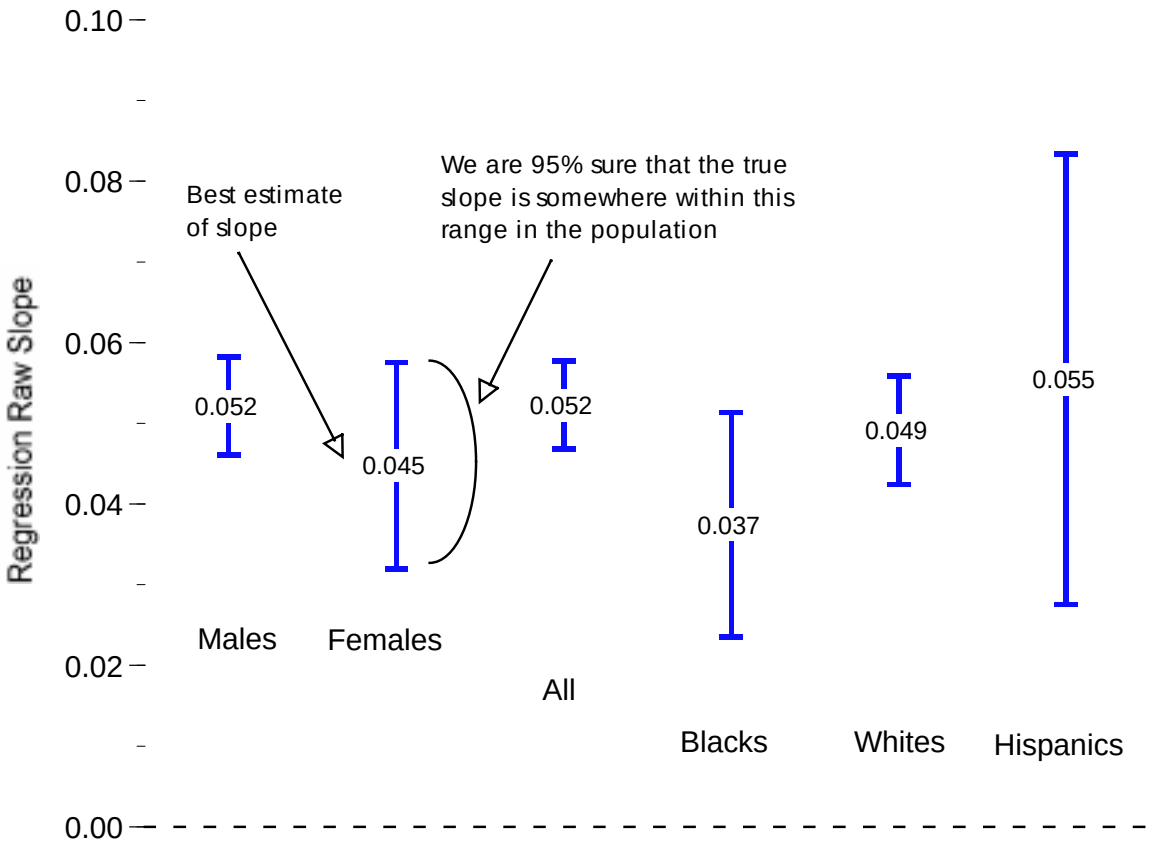
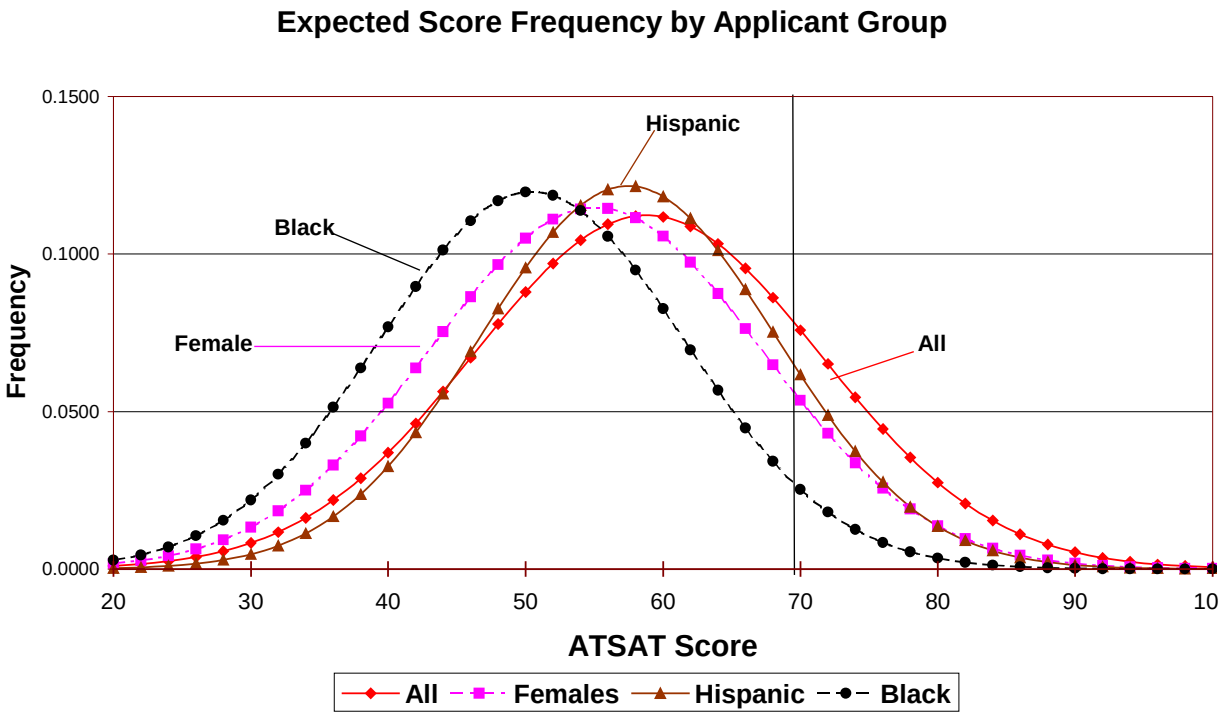


Figure 5.6.3. Fairness Regression for Females Using AT-SAT Battery Score and Composite Criterion



Notes. Controller sample used. The dependent variable is the composite criterion. The independent variable is the composite predictor (scaled such that the cut-score is 70 and the maximum possible score is 100). Each slope value represents the predicted increase in the criterion score for a unit increase in the predictor score. For the criterion, M = -.05, SD = .83 for the entire controller sample. For the predictor, M = 72.4, SD = 7.9 for the entire controller sample.

Figure 5.6.4. Confidence Intervals for the Slopes in the Fairness Regressions



=> Best estimates show mean differences, but also a great deal of overlap

Figure 5.6.5. Expected Score Frequency by Applicant Group

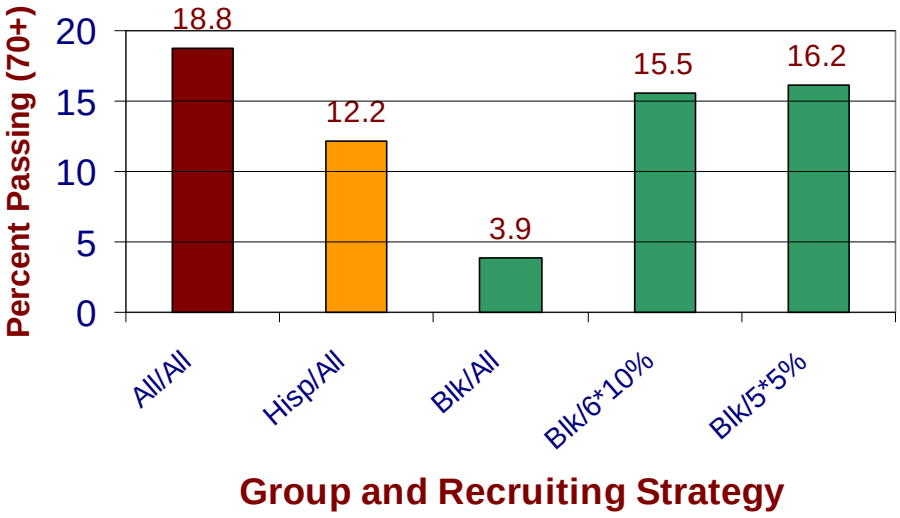


Figure 5.6.6. Percent Passing by Recruitment Strategy

Table 4.1. CBPM Development and Scaling Participants: Biographical Information

	CBPM Scenario/ Item Authors	Initial Scaling Participants	Final Scaling Participants
Total number of participants	3	9	12
Gender (frequency):			
Male	3	8	11
Female	0	1	1
Race (frequency):			
Black/African American	0	1	1
Native American/American Indian	0	2	1
Hispanic	0	2	1
White/Caucasian	3	4	8
Other	0	0	1
Job title (frequency):			
FAA Academy Instructor	3	4	3
Supervisor	0	4	5
Controller	0	1	4
Mean age[a]	33.67 (2.08)	41.33 (6.22)	40.58 (7.66)
Mean time as an FPL	5.25 (1.37)	10.94 (4.20)	8.79 (5.09)
Mean time as a supervisor - Years	.08 (.14)	2.30 (4.09)	3.51 (6.34)
Mean time as an instructor - Years	6.47 (1.91)	5.00 (3.58)	6.62 (5.52)

[a]Standard deviations appear in parentheses

Table 4.2. CBPM Scaling Workshops: Interrater Reliability Results[a]

	Number of Items			
	Initial Scaling Group 1[b]	**Initial Scaling Group 2[c]**	**Final Scaling Participants[d]**	**Scoring Key for 84 Item[d] CBPM**
Reliability < .10	9	7		
Between .10 and .19	1	4		
Between .20 and .29	3	1		
Between .30 and .39	4	2		
Between .40 and .49	4	8	5	1
Between .50 and .59	1	3	1	
Between .60 and .69	8	7	1	
Between .70 and .79	10	12	7	1
Between.80 and .89	18	26	22	13
Reliability > .90	41	29	58	46
Total Number of Items	99	99	94	61[e]

[a]Reliabilities are k-rater intraclass correlation coefficients; these coefficients reflect the reliability of the mean ratings.
[b]N = 4
[c] N = 5
[d] N = 12
[e]61 items required the panel to rate the effectiveness of each response option; 23 items were either knowledge or "confliction prediction" items that had a correct answer.

Table 4.3. Performance Categories for Behavior Summary Scales

A. Coordinating

Coordinating with other controllers to minimize traffic problems; coordinating clearances, changes in aircraft destinations, altitudes, etc. as appropriate; initiating and receiving handoffs and pointouts in an effective manner; presenting the rationale for instructions to pilots or other controllers as necessary.

B. Communicating and Informing

Using clear, concise, accurate language to get message across unambiguously; talking only when necessary and appropriate; employing proper phraseology to ensure accurate communications; notifying pilots/controllers/other personnel of information that might affect them as appropriate; issuing advisories and alerts to appropriate parties; providing complete and accurate position relief briefings; providing accurate and legible flight strip information; listening carefully to requests and instructions (e.g., from pilots, other controllers) and ensuring that they are understood; attending to readbacks and ensuring that they are accurate.

C. Maintaining Attention and Vigilance

Scanning properly for air traffic events, situations, potential problems, etc.; keeping track of equipment/weather status; identifying unusual events, improper positioning of aircraft, equipment malfunctions, etc.; recognizing when aircraft have potential for loss of separation; verifying visually that control instructions are followed; recognizing potential problems in adjacent sectors; remaining vigilant during slow periods.

D. Managing Multiple Tasks

Keeping track of a large number of aircraft/events at a time; conducting two or more tasks simultaneously (e.g., issuing instructions while scanning the screen; monitoring pilot communications while writing on strips); remembering and keeping track of aircraft and their positions; remembering what you were doing after an interruption; returning to what you were doing after an interruption and following through; providing pilots with additional services as time allows.

E. Prioritizing

Taking early or prompt action on air traffic problems rather than waiting or getting behind; knowing what to do first and which are the most important situations to work on; recognizing that some problems or situations are less important and can wait; preplanning before busy periods; organizing the board and using flight strips effectively to keep priorities straight for handling air traffic situations; quickly and decisively determining appropriate priorities.

F. Technical Knowledge

Knowing the equipment and its capabilities and using it effectively; knowing aircraft capabilities/limitations (speed, wake requirements, size, minimums) and using that knowledge; keeping up-to-date on letters of agreement, changes in procedures, regulations, etc.; keeping up-to-date on seldom used procedures or skills.

(Continued)

Table 4.3 Performance Categories for Behavior Summary Scales (Continued)

G. Maintaining Safe and Efficient Air Traffic Flow

Reacting to and resolving potential conflictions effectively and efficiently; using proper air traffic separation techniques effectively to ensure safety; sequencing aircraft effectively for arrival or departure; sequencing aircraft to ensure efficient/timely traffic flow; controlling traffic in a manner that ensures efficient traffic flow; controlling traffic in a manner that minimizes traffic problems (e.g., conflictions, traffic flow problems) for other controllers and pilots.

H. Reacting to Stress

Remaining calm and cool under stressful situations; handling stressful air traffic conditions in a professional manner.

I. Teamwork

Working smoothly with supervisors and other controllers in the facility; pitching in and helping other controllers as necessary; accepting and reacting constructively to appropriate criticism from supervisors or peers; avoiding arguments and interpersonal conflicts with other controllers, supervisors, or pilots.

J. Adaptability/Flexibility

Reacting effectively to difficult equipment problems, changes in weather, traffic situations, etc., or to unexpected actions on the part of other controllers or pilots; using contingency or "fall-back" strategies effectively when unforeseen/unanticipated air traffic problems emerge or if first plan doesn't work; asking for help when it's needed; developing/executing innovative solutions to air traffic problems; dealing effectively with situations for which there may not be clearly prescribed procedures, situations that require novel thinking; adapting to equipment updates, new kinds of procedures, etc.

Table 4.4. Pilot Test Results: Computer-Based Performance Measure (CBPM) Distribution of Scores

Percentage of Maximum Score	Number of Controllers
69% or lower	1
70 - 74%	1
75 - 79%	9
80 - 84%	36
85 - 89%	28
90% or higher	2

Note. N = 77; Mean Score (i.e., percentage) = 84.4; Standard Deviation = 4.0; Coefficient Alpha Reliability = .53.

Table 4.5. Pilot Test Results: Means and Standard Deviations for Ratings on Each Dimension

Rating Dimension	Supervisors[a]		Peers[b]		Supervisors & Peers[c]	
	Mean	SD	Mean	SD	Mean	SD
1. Maintaining Safe & Efficient Air Traffic Flow	5.27	1.11	5.40	1.09	5.32	1.01
2. Maintaining Attention & Vigilance	4.89	1.10	5.25	.95	5.04	.97
3. Prioritizing	5.25	1.06	5.29	.99	5.28	.93
4. Communicating & Informing	5.11	1.18	5.35	1.00	5.25	1.03
5. Coordinating	5.23	1.06	5.72	.72	5.46	.86
6. Managing Multiple Tasks	5.23	.98	5.17	1.14	5.21	.91
7. Reacting to Stress	4.85	1.33	5.18	1.21	4.92	1.24
8. Adaptability & Flexibility	4.99	1.21	5.33	.95	5.12	1.07
9. Technical Knowledge	5.42	1.14	5.42	1.11	5.42	.99
10. Teamwork	5.21	1.32	5.52	1.06	5.33	1.10
11. Overall Effectiveness	5.33	.98	5.47	.88	5.38	.88

[a]N = 64
[b]N = 49
[c]N = 72

Table 4.6. Pilot Test Results: Interrater Reliabilities for Ratings [a]

Rating Dimension	Supervisor Reliabilities[b]	Peer Reliabilities[c]	Combined Supervisor/Peer Reliabilities[d]
1. Maintaining Safe & Efficient Air Traffic Flow	.51	.55	.57
2. Maintaining Attention & Vigilance	.60	.37	.54
3. Prioritizing	.63	.49	.55
4. Communicating & Informing	.51	.00	.49
5. Coordinating	.50	.00	.37
6. Managing Multiple Tasks	.31	.43	.41
7. Reacting to Stress	.47	.28	.61
8. Adaptability & Flexibility	.65	.43	.58
9. Technical Knowledge	.48	.51	.53
10. Teamwork	.45	.59	.47
11. Overall Effectiveness	.57	.57	.62

[a] Reliabilities are k-rater intraclass correlation coefficients; these coefficients reflect the reliability of the mean ratings.
[b]N = 64, k = 1.24
[c]N = 49, k = 1.30
[d]N = 72, k = 1.84

Table 4.7. HFPM Pilot Test Results - Correlations Between Ratings for Rater Pairs (Collapsed Across Ratee) Both Across All Scenarios and Within Each Scenario

Dimension	All Scenarios (N = 38)	Scenario 1 (N = 6)	Scenario 2 (N = 7)	Scenario 3 (N = 5)	Scenario 4 (N = 6)	Scenario 5 (N = 5)	Scenario 6 (N = 4)	Scenario 7 (N = 4)
Behavioral Checklist	.75*	.72*	.84*	.94*	.77*	.83*	.13	.81*
Maintaining Separation	.81*	.97*	.59	.85*	.96*	.91*	.77	.67
Maintaining Efficient Air Traffic Flow	.61*	.91*	.43	.80*	.39	.91*	.82	-.38
Maintaining Attention & Situation Awareness	.56*	.84*	-.11	.83*	.46	.91*	.10	.18
Communicating Clearly, Accurately, & Efficiently	.36*	.75*	.18	.16	.79*	.60*	.13	.65
Facilitating Information Flow	.34*	.73*	.18	.36	.13	.00	.82	.37
Coordinating	.27*	.75*	.14	.89*	.16	.56	.14	.71
Managing Multiple Tasks	.51*	.29	.33	.84*	.77	.58	.30	.62
Managing Sector Workload	.60*	.61	.31	.94*	.97*	.51	.85	.00
Overall Performance	.57*	.74*	.22	.97*	.92*	.74	.64	-.29

*Correlation is significant at the $p < .10$ level

Table 4.8. Rater-Ratee Assignments

Number of Supervisor Raters / Ratee	N	Number of Peer Raters / Ratee	N	Total Number of Raters / Ratee	N
0	33	0	74	1	40
1	92	1	87	2	79
2	1064	2	1044	3	93
3	34	3	21	4	974
4	4	4	1	5	39
				6	2

Mean number of supervisor raters per ratee = 1.90
Mean number of peer raters per ratee = 1.82
Mean total number of raters per ratee = 3.73

Table 4.9. Computer-Based Performance Measure (CBPM): Distribution of Scores in Validation Sample

Percentage of Maximum Score	Number of Controllers
69% or lower	5
70 - 74%	35
75 - 79%	214
80 - 84%	490
85 - 89%	280
90% or higher	22

Note. N = 1046; Mean Score (i.e., percentage) = 82.68; Standard Deviation = 4.17; Coefficient Alpha Reliability = .63.

Table 4.10. Number and Percentage of Supervisor Ratings at Each Scale Point in the Validation Sample

Rating Scale Point (1 = Lowest) (7 = Highest)	Number of Ratings[a]	Percentage of Ratings
1	130	.51
2	646	2.51
3	2336	9.08
4	5605	21.79
5	7569	29.43
6	6727	26.16
7	2683	10.43
Missing	22	.09

[a]Total number of supervisor ratings across all 10 dimensions and the overall performance dimension.

Table 4.11. Number and Percentage of Peer Ratings at Each Scale Point in the Validation Sample

Rating Scale Point (1 = Lowest) (7 = Highest)	Number of Ratings[a]	Percentage of Ratings
1	54	.22
2	391	1.58
3	1587	6.44
4	4407	17.87
5	7452	30.22
6	7505	30.43
7	3263	13.23
Missing	3	.01

[a]Total number of peer ratings across all 10 dimensions and the overall performance dimension.

Table 4.12. Interrater Reliabilities for Peer, Supervisor and Combined Ratings [a]

Rating Dimension	Supervisor Reliabilities[b]	Peer Reliabilities[c]	Combined Supervisor/Peer Reliabilities[d]
1. Maintaining Safe & Efficient Air Traffic Flow	.60	.57	.69
2. Maintaining Attention & Vigilance	.51	.49	.63
3. Prioritizing	.50	.46	.60
4. Communicating & Informing	.45	.43	.57
5. Coordinating	.43	.32	.50
6. Managing Multiple Tasks	.55	.47	.62
7. Reacting to Stress	.54	.53	.65
8. Adaptability & Flexibility	.55	.48	.61
9. Technical Knowledge	.48	.44	.60
10. Teamwork	.52	.48	.63
11. Overall Effectiveness	.60	.56	.69

[a] Reliabilities are k-rater intraclass correlation coefficients; these coefficients reflect the reliability of the mean ratings.
[b]N = 1194, k = 1.88
[c]N = 1153, k = 1.87
[d]N = 1227, k = 3.39

Table 4.13. Means and Standard Deviations for Mean Ratings on Each Dimension

Rating Dimension	Supervisors[a]		Peers[b]		Supervisors & Peers[c]	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
1. Maintaining Safe & Efficient Air Traffic Flow	5.07	1.05	5.31	.97	5.18	.89
2. Maintaining Attention & Vigilance	4.93	1.02	5.15	.94	5.03	.86
3. Prioritizing	5.03	.97	5.20	.91	5.11	.81
4. Communicating & Informing	4.89	1.02	5.12	1.00	5.00	.86
5. Coordinating	5.18	.93	5.46	.83	5.30	.74
6. Managing Multiple Tasks	4.98	1.05	5.12	.98	5.05	.87
7. Reacting to Stress	4.72	1.19	5.03	1.16	4.88	1.03
8. Adaptability & Flexibility	4.81	1.10	5.12	.99	4.96	.89
9. Technical Knowledge	5.10	.97	5.22	.94	5.15	.83
10. Teamwork	5.00	1.17	5.22	1.11	5.09	.99
11. Overall Effectiveness	5.02	.95	5.32	.85	5.16	.80

[a]N = 1194
[b]N = 1153
[c]N = 1227

Table 4.14. Correlations Between Rating Dimensions for Peers and Supervisors

Dimension	Supervisor Assessors											Peer Assessors										
	S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**	**S 10**	**S 11**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P 10**	**P 11**
S1. Maintaining Safe & Efficient Air Traffic Flow	--																					
S2. Maintaining Attention & Vigilance	.71	--																				
S3. Prioritizing	.79	.67	--																			
S4. Communicating & Informing	.67	.68	.68	--																		
S5. Coordinating	.72	.69	.72	.70	--																	
S6. Managing Multiple Tasks	.82	.63	.77	.64	.68	--																
S7. Reacting to Stress	.69	.55	.67	.59	.60	.73	--															
S8. Adaptability & Flexibility	.75	.56	.74	.63	.67	.78	.79	--														
S9. Technical Knowledge	.63	.62	.63	.61	.62	.60	.51	.57	--													
S10. Teamwork	.56	.57	.56	.60	.60	.53	.61	.64	.50	--												
S11. Overall Effectiveness	.84	.74	.80	.74	.76	.81	.77	.80	.68	.72	--											
P1. Maintaining Safe & Efficient Air Traffic Flow	**.50**	.36	.43	.37	.36	.46	.43	.42	.33	.29	.49	--										
P2. Maintaining Attention & Vigilance	.42	**.45**	.38	.40	.38	.35	.33	.29	.37	.30	.45	.62	--									
P3. Prioritizing	.45	.36	**.41**	.35	.36	.39	.37	.36	.33	.25	.44	.73	.63	--								
P4. Communicating & Informing	.34	.35	.33	**.39**	.34	.28	.28	.28	.29	.30	.38	.53	.56	.51	--							
P5. Coordinating	.39	.36	.37	.35	**.33**	.34	.30	.29	.30	.30	.40	.60	.60	.58	.56	--						
P6. Managing Multiple Tasks	.42	.27	.36	.29	.30	**.41**	.38	.37	.26	.22	.40	.73	.56	.67	.44	.56	--					
P7. Reacting to Stress	.35	.24	.33	.27	.22	.36	**.46**	.39	.21	.26	.37	.58	.40	.53	.45	.41	.60	--				
P8. Adaptability & Flexibility	.43	.28	.38	.30	.32	.41	.41	**.40**	.27	.26	.42	.72	.54	.67	.49	.53	.70	.66	--			
P9. Technical Knowledge	.33	.37	.31	.33	.31	.26	.25	.23	**.40**	.22	.33	.47	.53	.47	.44	.45	.41	.32	.41	--		
P10. Teamwork	.28	.28	.26	.30	.29	.24	.33	.28	.22	**.44**	.37	.44	.43	.43	.49	.46	.36	.45	.49	.37	--	
P11. Overall Effectiveness	.51	.41	.45	.42	.40	.47	.45	.44	.38	.35	**.51**	.84	.68	.74	.60	.65	.75	.64	.77	.54	.58	--

Note. Bold correlations reflect the supervisor-peer convergent validity indices in this multitrait-multimethod matrix. Sample size is 1120.

Table 4.15. Factor Analysis Results for Performance Ratings

Rating Dimension	Loadings		
	Factor 1	**Factor 2**	**Factor 3**
1. Maintaining Safe & Efficient Air Traffic Flow	**.73**	.54	.16
2. Maintaining Attention & Vigilance	.33	**.79**	.26
3. Prioritizing	**.68**	.59	.16
4. Communicating & Informing	.30	**.65**	.50
5. Coordinating	.40	**.70**	.33
6. Managing Multiple Tasks	**.82**	.44	.09
7. Reacting to Stress	**.79**	.14	.43
8. Adaptability & Flexibility	**.82**	.30	.33
9. Technical Knowledge	.25	**.80**	.13
10.Teamwork	.27	.30	**.87**
Eigenvalue	6.75	.81	.65
% Variance	67.5	8.1	6.5

Note. Sample size was 1227. Principal components analysis with varimax rotation was used. Factor names: 1. Technical Performance - Activities directly related to separating aircraft; 2. Technical Effort- Activities in support of controlling aircraft; 3. Teamwork

Table 4.16. Descriptive Statistics of High Fidelity Performance Measure Criterion Variables

	N	**Mean**	**SD**
OTS Dimensions:			
1. Maintaining Separation	107	3.98	1.05
2. Maintaining Efficient Air Traffic Flow	107	4.22	.99
3. Maintaining Attention and Situation Awareness	107	3.66	1.02
4. Communicating Clearly, Accurately, and Efficiently	107	4.61	.96
5. Coordinating	107	4.17	.97
6. Performing Multiple Tasks	107	4.40	1.00
7. Managing Sector Workload	107	4.39	1.03
Behavioral & Event Checklist:			
8. Operational Errors	107	.05	.04
9. Operational Deviations	107	.11	.07
10. Failed to Accept Handoff	107	.31	.46
11. LOA/Directive Violations	107	2.42	1.26
12. Readback/Hearback Errors	107	.46	.44
13. Failed to Accomodate Pilot Request	107	.45	.33
14. Made Late Frequency Change	107	.44	.43
15. Unnecessary Delays	107	2.68	1.56
16. Incorrect Information in Computer	107	1.04	.66

Table 4.17. Interrater Reliabilities[a] for OTS Ratings (N=24)

Dimension	Median	Range
1. Maintaining Separation	.95	.83 to .98
2. Maintaining Efficient Air Traffic Flow	.89	.71 to .94
3. Maintaining Attention and Situation Awareness	.83	.79 to .87
4. Communicating	.91	.88 to .93
5. Coordinating	.91	.86 to .96
6. Managing Multiple Tasks	.88	.82 to .93
7. Managing Sector Workload	.91	.85 to .95
8. Overall	.95	.88 to .97

[a]Reliabilities are 2-rater intraclass correlation coefficients; these coefficients reflect the reliability of the mean ratings.

Table 4.18. Principal Components Analysis of the High Fidelity Criterion Space

Criterion Measures	Component 1	Component 2
Core Technical Proficiency		
OTS: Maintaining Separation	.95	.05
OTS: Coordinating	.87	-.12
BEC: Operational Errors	-.85	-.36
OTS: Maintaining Attention/Awareness	.83	-.20
OTS: Performing Multiple Tasks	.81	-.27
OTS: Managing Sector Workload	.80	-.29
OTS: Communicating	.79	-.27
OTS: Maintaining Efficient Air Traffic Flow	.78	-.30
BEC: LOA/Directive Violations	-.76	-.07
BEC: Operational Deviations	-.59	.05
Poor Sector Management		
BEC: Incorrect Information in Computer	.10	.72
BEC: Readback/Hearback Errors	-.01	.63
BEC: Make Late Frequency Changes	-.13	.60
BEC: Fail to Accommodate Pilot Requests	-.27	.54
BEC: Unnecessary Delays	-.45	.53
BEC: Fail to Accept Handoffs	-.37	.45
Percent Variance Accounted For	59	9

Table 4.19. Intercorrelations Between Proposed Criterion Scores

	Performance Ratings	CBPM		HFPM	
	Overall Performance	**Total Score**	**Final Score**	**Core Technical Proficiency**	**Poor Sector Management**
Performance Ratings:					
Overall Performance	-				
CBPM:					
Total Score (84 items)	.22**	-			
Final Score (38 items)	.24**	.90**	-		
HFPM:					
Core Technical Proficiency	.40**	.54**	.61**	--	
Poor Sector Management	-.28**	-.43**	-.42**	-.72**	--

Sample sizes for correlations involving the HFPM range from 106 to 107; sample sizes for remaining correlations range from 1043 to 1227.

*p<.05, one tailed
**p<.01, one tailed

Table 4.20. Job Analysis-Item Linkage Task Results for CBPM and HFPM

Sub-Activities from Job Analysis	Number of CBPM Items	HFPM Scenario/Item Numbers
1. Checking and evaluating separation or traffic movement to ensure separation is maintained	30	all scenarios
2. Performing aircraft conflict resolution	18	all scenarios
3. Establishing and maintaining positive aircraft or vehicle identification	25	all scenarios
4. Establishing arrival sequences	5	all scenarios
5. Issuing clearances	24	all scenarios
6. Responding to special conditions, unusual airspace or aircraft operation	15	scenarios 1, 2, 3, 5, 7
7. Prioritizing sector/position tasks	32	all scenarios
8. Responding to pointouts based on current or anticipated traffic situations	1	scenarios 2, 4, 6, 7
9. Initiating pointouts	3	scenarios 1, 2, 3, 7
10. Assuming position responsibility	0	all scenarios
11. Scanning to maintain awareness of surrounding airspace	13	all scenarios
12. Managing personal workload	30	all scenarios
13. Briefing relieving controllers	8	scenarios 1, 2, 3, 5, 6, 7
14. Establishing/maintaining/terminating radio communications	27	all scenarios
15. Recognizing and responding to deviations from ATC instructions/clearances	3	scenarios 4, 5, 6
16. Performing procedures for non-radar environment	4	scenarios 1, 2, 3, 4, 6, 7
17. Managing departure flows	1	scenarios 2 - 7
18. Responding to computer failures	0	scenario 5
19. Orienting lost aircraft	0	none
20. Establishing/re-establishing/terminating radar identification	11	scenarios 1 - 7
21. Reviewing route of flight	33	scenarios 1 - 7
22. Issuing arrival and landing information or instructions	14	scenarios 1 - 7
23. Issuing departure information or instructions	4	all scenarios
24. Responding to communications failures	4	scenarios 2, 3, 4
25. Executing backup procedures for radar display failures	0	scenario 5
26. Managing departure traffic	11	all scenarios
27. Processing flight plans or flight plan amendments	25	scenarios 1 - 7
28. Executing backup procedures for facility communications failures	2	scenarios 2, 4

Sub-Activities from Job Analysis	Number of CBPM Items	HFPM Scenario/Item Numbers
29. Planning clearances	30	all scenarios
30. Initiating search and rescue procedures	1	scenarios 2, 5
31. Updating flight progress strips	29	all scenarios
32. Conducting search and rescues procedures	1	none
33. Initiating transfer of control or radar identification	10	scenarios 1 - 7
34. Receiving transfer of control or radar identification	8	scenarios 1 - 7
35. Performing minimum safe altitude processing	10	all scenarios
36. Analyzing initial requests for clearances	12	all scenarios
37. Responding to traffic management constraints or flow control conflicts	3	scenarios 2, 4, 7
38. Disseminating weather information to pilots/other controllers	8	all scenarios
39. Responding to imposed airspace restrictions	5	scenarios 1, 7
40. Responding to significant weather information	4	scenarios 2 - 4

Note. Sub-activities are ranked according to their mean criticality for en route controllers.
Overall number of CBPM items tapping into sub-activities: Mean: 11.60; Standard Dev.: 10.94
Overall number of subactivities per CBPM item: Mean: 12.21; Standard Dev.: 5.46
Overall number of subactivities appearing in each HFPM scenario: Mean: 24.62; Standard Dev.: 2.38
Overall number of HFPM scenarios that a subactivity appeared in (out of 7): Mean: 4.31; Standard Dev.: 2.67

Table 5.2.1. 1990-1992 Profile Analysis of Actual FAA ATCS Applicants[1]

Gender		Race/Ethnicity		Educational Level		Test Year	
Male	80.8%	Native Am.	0.5%	≤ High school	17.4%	1990	32.7%
Female	19.1%	Asian	1.2%	Some college	51.0%	1991	51.9%
Missing	0.1%	Black	3.6%	Associate degree	0.6%	1992[2]	14.0%
		Hispanic	2.8%	Bachelor degree	25.9%	Missing	1.4%
		White	40.6%	Graduate work	3.2%		
		Missing	51.3%	Advanced degree	1.6%		
				Missing	0.4%		

[1] Data provided by CAMI via OPM records.
[2] 1992 data available for only 5,046 cases compared to 18,682 cases for 1991 and 11,791 cases for 1990.

Table 5.2.2 Bureau of Census Data for Race/Ethnicity

Race/Ethnicity	Percentage
White	75.8%
Black	11.8%
Hispanic	8.8%
Asian/Pacific Islander	2.8%
Native American	0.8%
Other	0.1%
TOTAL	100.0%

Table 5.2.3 Background Characteristics by Testing Samples

Testing Sample	Gender	Race/Ethnicity
Air Traffic Controller (n=919)	83% Male 17% Female	2.0% Native American 0.6% Asian/Pacific Islander 4.8% African American 4.4% Hispanic 87.7% Non-minority 0.7% Other 0.0 % Mixed
Civilian PA (n=262)	66% Male 34% Female	7.5% Native American 2.0% Asian/Pacific Islander 10.2% African American 11.0% Hispanic 66.1% Non-minority 2.8% Other 0.4 % Mixed
Military PA (n=256)	70% Male 30% Female	2.7% Native American 4.3% Asian/Pacific Islander 13.9% African American 8.5% Hispanic 67.0% Non-minority 2.3% Other 0.4 % Mixed

NOTE: There were 166 missing cases for the gender analysis of which 164 were ATCSs; 170 missing cases for the race/ethnicity analysis of which 165 were ATCSs.

Table 5.4.1: Ethnicity and Gender Of all Participants

ETHNICITY	GENDER		TOTAL
	Male	Female	
Native American / Alaskan	37	12	49
Asian / Pacific Islander	14	9	23
African-American	120	39	159
Hispanic	84	28	112
Caucasian	990	244	1,234
Multi-Racial	2	1	3
Other	14	7	1
TOTAL	**1,261**	**340**	**1,601**

Table 5.4.2. Educational Background of All Participants

Education Level	Number of Participants
High School or GED	227
Attended Trade School(s)	14
Completed Trade School	41
Attended College, less than 2 years	370
Attended College, 2 years or more	376
Completed College, with a 2-year degree	109
Completed College, with a 4-year degree	394
Attended Graduate School	70
TOTAL *	**1,601**

Table 5.4.3: Data Collection Locations for All Participants

Facility	No. of Participants	Facility	No. of Participants
Albuquerque	166	Miami	120
Boston	87	Minneapolis	82
Denver	148	Atlanta	100
Fort Worth	114	Chicago	44
Houston	142	Cleveland	39
Jacksonville	104	New York	6
Kansas City	109	Oakland	5
Los Angeles	91	Washington, D.C.	22
Memphis	111	Keesler AFB	262

Table 5.4.4: Ethnicity and Gender of Air Traffic Controllers

	1997 Sample			1998 Sample			Total Sample		
	Gender			Gender			Gender		
Ethnicity	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Native American / Alaskan	15	4	19	4	0	4	19	4	23
Asian / Pacific Islander	4	2	6	1	0	1	5	2	7
African-American	35	9	44	45	9	54	80	18	98
Hispanic	31	8	39	17	4	21	48	12	60
Caucasian	705	131	836	46	8	54	751	139	890
Multi-Racial	0	0	0	1	0	1	1	0	1
Other	6	0	6	1	1	2	7	1	8
TOTAL	**796**	**154**	**950**	**115**	**22**	**137**	**911**	**176**	**1,087**

Table 5.4.5. Air Traffic Controller Sample Educational Background

Education Level	Number of Participants
High School or GED	98
Attended Trade School(s)	7
Completed Trade School	24
Attended College, less than 2 years	224
Attended College, 2 years or more	271
Completed College, with a 2-year degree	79
Completed College, with a 4-year degree	324
Attended Graduate School	60
TOTAL	**1,087**

Table 5.4.6: Air Traffic Controller Sample from Participating Locations

Facility	No. of Participants	Facility	No. of Participants
Albuquerque	109	Miami	91
Boston	75	Minneapolis	76
Denver	118	Atlanta	77
Fort Worth	93	Chicago	38
Houston	116	Cleveland	35
Jacksonville	99	New York	6
Kansas City	84	Oakland	5
Los Angeles	82	Washington, D.C.	22
Memphis	92		

Table 5.4.7. Air Traffic Controller Sample Time in Current Position

Position	No. of Participants	Average Time	Minimum	Maximum
Journeyman Controller	964	8.86 years	1 month	31 years
Developmental Controller	11	2.61 years	3 months	6.67 years
Staff	47	2.25 years	1 month	16.67 years
Supervisor	43	2.25 years	1 month	20.50 years
Other	25	4.71 years	2 months	23 years
TOTAL	1,090	8.29 years	1 month	31 years

Table 5.4.8. Air Traffic Controller Sample Job Experience at any Facility

Position	Years	Months
Developmental Controller	2.78	3.53
FPL Controller	7.31	3.75
Staff	.63	.92
Supervisor	.35	.73

Table 5.4.9. Ethnicity and Gender of Pseudo-Applicant Sample

	Ethnicity	Gender		Total
Military*		Male	Female	
	Native American/Alaskan	7	0	7
	Asian/Pacific Islander	6	5	11
	African-American	28	8	36
	Hispanic	17	5	22
	Caucasian	120	56	176
	Multi-Racial	1	0	1
	Other	3	3	6
Total		**182**	**77**	**259**
Civilian*				
	Native American/Alaskan	11	8	19
	Asian/Pacific Islander	3	2	5
	African-American	12	13	25
	Hispanic	19	11	30
	Caucasian	119	49	168
	Multi-Racial	0	1	1
	Other	4	3	7
Total		**168**	**87**	**255**

* 3 individuals in the Military PA and 2 individuals in the Civilian PA did not indicate their race; two individuals in the Civilian PA did not indicate gender. These individuals were not included in this matrix.

Table 5.4.10. CUE-Plus Scale Item Means and Frequencies

ITEM	Mean	S.D.	1	2	3	4	5
1. I frequently read computer magazines or other sources of information that describe new computer technology	2.29	1.28	568	420	248	218	112
2. I know how to recover deleted or "lost data" on a computer or PC	2.49	1.36	514	371	210	339	132
3. I know what a LAN is	2.48	1.53	633	311	82	313	223
4. I know what an operating system is	3.32	1.40	266	214	169	569	341
5. I know how to write computer programs	2.00	1.20	740	400	180	175	71
6. I know how to install software on a personal computer	3.43	1.49	303	164	114	519	463
7. I know what e-mail is	4.47	0.70	20	11	32	651	853
8. I know what a database is	3.96	1.06	74	99	174	684	533
9. I am computer literate	3.34	1.21	155	226	391	519	277
10. I regularly use a PC for word processing	3.29	1.45	281	235	203	449	398
11. I often use a mainframe computer system	2.36	1.26	504	442	282	227	110
12. I am good at using computers	3.13	1.18	177	267	490	435	193
13. I frequently play action games or simulations (such as "Jet Fighter") on the computer	2.58	1.34	429	431	240	300	163
14. I regularly use a PC for spreadsheets	2.34	1.26	509	467	226	261	100
15. I frequently use e-mail to exchange messages or information	3.04	1.53	397	253	171	375	365
16. I am proficient at using a mouse with my computer	3.95	1.22	137	79	148	554	645
17. I frequently "surf" the Internet to find information or services	2.95	1.52	424	248	205	353	331

[a] 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree; 5 = Strongly Agree.

Table 5.4.11. CUE-Plus Means and Standard Deviations by Sample

	Controllers		Military PA		Civilian PA	
ITEM	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. I frequently read computer magazines or other sources of information that describe new computer technology	2.24	1.32	2.07	1.16	2.71	1.13
2. I know how to recover deleted or "lost data" on a computer or PC	2.38	1.38	2.45	1.30	2.98	1.19
3. I know what a LAN is	2.54	1.56	2.10	1.42	2.63	1.45
4. I know what an operating system is	3.41	1.39	2.74	1.42	3.53	1.25
5. I know how to write computer programs	1.95	1.22	2.00	1.17	2.24	1.11
6. I know how to install software on a personal computer	3.50	1.48	2.92	1.54	3.64	1.35
7. I know what e-mail is	4.46	0.68	4.38	0.78	4.62	0.65
8. I know what a database is	3.95	1.04	3.73	1.23	4.24	0.92
9. I am computer literate	3.24	1.22	3.30	1.21	3.80	1.04
10. I regularly use a PC for word processing	3.19	1.46	3.05	1.41	3.93	1.24
11. I often use a mainframe computer system	2.27	1.26	2.24	1.15	2.87	1.26
12. I am good at using computers	3.01	1.18	3.11	1.18	3.63	1.00
13. I frequently play action games or simulations (such as "Jet Fighter") on the computer	2.44	1.32	2.80	1.43	2.92	1.27
14. I regularly use a PC for spreadsheets	2.20	1.21	2.29	1.24	3.00	1.30
15. I frequently use e-mail to exchange messages or information	2.97	1.55	2.73	1.47	3.62	1.40
16. I am proficient at using a mouse with my computer	3.85	1.27	3.99	1.19	4.35	0.97
17. I frequently "surf" the Internet to find information or services	2.87	1.54	2.93	1.50	3.29	1.40

Table 5.4.12. Inter-Correlations of CUE-Plus Items

	Read Magazines	Recover Data	What a LAN is	Operating Systems	Know Program	Install Software	Know E-mail Is	What is Database	Computer Literate	Word Processing
Read Magazines	1.00									
Recover Data	.643*	1.00								
Know LAN is	.525*	.515*	1.00							
Operating Systems	.561*	.586*	.622*	1.00						
Write Program	.488*	.535*	.421*	.483*	1.00					
Install Software	.542*	.614*	.504*	.725*	.445*	1.00				
What E-mail is	.324*	.369*	.284*	.431*	.222*	.446*	1.00			
What Database	.418*	.492*	.444*	.622*	.391*	.588*	.604*	1.00		
Computer Literate	.598*	.691*	.558*	.694*	.536*	.711*	.501*	.691*	1.00	
Word Processing	.508*	.595*	.511*	.604*	.409*	.663*	.423*	.571*	.717*	1.00
Use Mainframe	.326*	.326*	.247*	.278*	.289*	.284*	.228*	.313*	.364*	.402*
Good at Computers	.611*	.696*	.571*	.660*	.539*	.674*	.458*	.609*	.829*	.693*
Play Games	.457*	.432*	.277*	.370*	.327*	.451*	.275*	.318*	.462*	.373*
Spreadsheets	.481*	.560*	.452*	.492*	.437*	.524*	.301*	.439*	.604*	.609*
Use E-mail	.520*	.561*	.488*	.529*	.378*	.598*	.464*	.472*	.632*	.655*
Use Mouse	.449*	.523*	.428*	.544*	.341*	.642*	.532*	.525*	.663*	.636*
Surf the ‘Net	.561*	.562*	.442*	.512*	.371*	.590*	.437*	.456*	.605*	.567*

Table 5.4.12. Inter-Correlations of CUE-Plus Items (continued)

	Use Mainframe	Good at Computers	Play Games	Spread-sheets	Use E-mail	Use Mouse	Surf the 'Net	CUE Original	CUE-Plus
Use Mainframe	1.00								
Good at Computers	.417*	1.00							
Play Games	.229*	.489*	1.00						
Spreadsheets	.345*	.608*	.424*	1.00					
Use E-mail	.321*	.618*	.408*	.557*	1.00				
Use Mouse	.301*	.650*	.428*	.480*	.583*	1.00			
Surf the 'Net	.271*	.600*	.458*	.487*	.799*	.566*	1.00		

* $\underline{p} < .05$

Table 5.4.13: Item-Total Statistics for CUE-Plus: All Respondents

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
I read computer magazines	49.17	230.66	.70	.94
I know how to recover data	48.98	226.74	.75	.94
I know what a LAN is	48.98	228.07	.63	.94
I know what an operating system is	48.14	225.82	.75	.94
I know how to write computer programs	49.46	236.98	.57	.94
I know how to install software	48.04	222.56	.78	.94
I know what e-mail is	47.00	247.27	.53	.94
I know what a database is	47.51	236.32	.67	.94
I am computer literate	48.13	226.66	.86	.94
I regularly use a PC for word processing	48.19	223.75	.78	.94
I often use a mainframe computer	49.11	241.70	.41	.95
I am good at using computers	48.34	227.98	.85	.94
I frequently play action games	48.90	236.04	.53	.94
I regularly use a PC for spreadsheets	49.12	231.89	.68	.94
I frequently use e-mail to exchange messages or information	48.43	222.96	.75	.94
I am proficient at using a mouse with my computer	47.52	231.38	.71	.94
I frequently “surf” the Internet	48.52	224.30	.72	.94

Table 5.4.14: Varimax and Oblique Rotated Factor Patterns (CUE-Plus)

	Varimax Rotation		Oblique Rotation		
ITEM	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**	**Single Factor Specified**
Computer magazines	.749	.253	.837	.100	.730
Recover data	.744	.348	.820	.003	.789
What a LAN is	.633	.301	.697	.008	.675
What an operating system is	.593	.528	.623	.267	.794
How to write computer programs	.742	.008	.850	.281	.610
How to install software	.564	.600	.582	.357	.819
What e-mail is	.003	.851	.007	.884	.584
What a database is	.316	.739	.277	.626	.724
Computer literate	.648	.611	.677	.328	.890
Use a PC for word processing	.570	.583	.590	.336	.813
Use a mainframe computer	.441	.187	.489	.002	.455
Good at using computers	.696	.533	.742	.222	.875
Frequently play action games	.526	.266	.577	.002	.571
Use a PC for spreadsheets	.668	.319	.735	.010	.713
Use e-mail to exchange messages or information	.515	.595	.526	.376	.780
Proficient at using a mouse with my computer	.385	.713	.361	.564	.759
I frequently “surf” the Internet	.512	.563	.525	.344	.756

Table 5.4.15: Eigenvalues and Variance (CUE-Plus)

	Eigenvalue (from Varimax)	**% of Variance (from Varimax)**	**Cumulative % (from Varimax)**
Factor 1	9.17	53.9	53.9
Factor 2	1.07	6.3	60.2

Table 5.4.16. CUE-Plus Means, S.D. and d-Score for Gender

	Males			Females			
	n	Mean	S.D.	n	Mean	S.D.	d
All Respondents	1226	52.26	16.26	340	47.85	15.02	.21
Controllers	879	51.74	16.27	176	43.50	16.25	.42
Military PA	179	49.20	16.52	77	47.27	16.12	.08
Civilian PA	168	58.23	14.48	87	57.17	11.94	.04

Table 5.4.17. Means, S.D. and d-Score for Ethnicity

	Comparison Group			Caucasian			
	n	**Mean**	**S.D.**	**n**	**Mean**	**S.D.**	**d**
African American / Caucasian							
All Respondents	159	49.88	14.95	1197	51.66	16.14	.10
Controllers	98	49.16	14.92	858	50.71	16.30	.08
Military PA	36	44.03	13.35	172	50.12	16.39	.31
Civilian PA	25	61.12	11.30	167	58.11	13.43	-.20
Hispanic / Caucasian							
All Respondents	113	50.50	16.05	1197	51.66	16.14	.07
Controllers	61	49.20	17.14	858	50.71	16.30	.08
Military PA	22	46.41	13.99	172	50.12	16.39	.20
Civilian PA	30	56.17	14.00	167	58.11	13.43	.12
Minority / Caucasian							
All Respondents	365	50.04	15.68	1197	51.66	16.14	.07
Controllers	196	48.84	15.71	858	50.71	16.30	.09
Military PA	82	45.39	14.95	172	50.12	16.39	.18
Civilian PA	87	57.14	13.97	167	58.11	13.43	.04

Table 5.4.18. Correlations between CUE-Plus and Predictor Battery: Controllers

	Predictor Scores										
CUE-Plus Items	Ap Math: Number Correct	Angles: Number Correct	Air Traffic: Effncy	Air Traffic: % Accuracy	ATS: Safety	Analogy: Info Process	Analogy: Latency	Analogy: Reason	Analogy: Window Views	Dials: Number Correct	Scan: Total Score
I read computer magazines	.030	.042	.237**	.069*	.233**	.054	.130**	.029	-.003	.045	.048
I know how to recover data	.045	.043	.254**	.058	.257**	.084**	.150**	.038	.050	.012	.070*
I know what a LAN is	.096**	.093**	.220*	.035	.212**	.043	.107**	.125**	.025	.052	.096**
I know what an operating system is	.149**	.135**	.268**	-.012	.251**	.041	.090**	.144**	.072*	.079**	.072*
I know how to write computer programs	.099**	.079*	.229**	.010	.232**	.037	.082**	.143**	.104**	.066*	.120**
I know how to install software	.178**	.152**	.312**	.022	.302**	.106**	.154**	.165**	.117**	.077*	.075*
I know what e-mail is	.060	.108**	.249**	.012	.213**	.122**	.142**	.092**	.092**	.014	.092**
I know what a database is	.129**	.075*	.229**	-.022	.206**	.024	.077**	.100**	.028	.028	.115**
I am computer literate	.128**	.111**	.303**	.052	.300**	.069*	.137**	.149**	.069*	.059	.124**
I regularly use a PC for word processing	.103**	.119**	.252**	.045	.236**	.071*	.123**	.116**	.086*	.014	.073*
I often use a mainframe computer	-.010	.042	.043	-.038	.023	-.017	-.010	-.008	-.026	-.014	-.008
I am good at using computers	.123**	.117**	.291**	.057	.281**	.091**	.162**	.131**	.061*	.087**	.115**
I frequently play action games	.047	.083**	.293**	.049	.278**	.075*	.160**	.048	-.015	.037	.074*
I regularly use a PC for spreadsheets	.078*	.068*	.193**	.050	.201**	.071*	.090**	.043	.023	.047	.046
I frequently use e-mail to exchange messages or information	.039	.058	.291**	.043	.285**	.168**	.222**	.050	.073*	.009	.076*
I am proficient at using a mouse with my computer	.083**	.093**	.333**	.048	.320**	.143**	.194**	.122**	.100**	.061*	.087**
I frequently “surf” the Internet	.057	.079*	.316**	.031	.315**	.170**	.236**	.060	.074	.037	.057
CUE-Plus Total	.116**	.124**	.346**	.035	.333**	.108**	.183**	.126**	.074**	.061*	.107**

* $p < .o5$ ** $p < .01$

Table 5.4.19. Correlations between CUE-Plus and Predictor Battery: Controllers

	Predictor Scores										
CUE-Plus Items	Letter Factory: Aware	Letter Factory: Planning	Memory Number Correct	Recall: Number Correct	Planes: Project	Planes: Visual/ Spatial	Planes: Time Sharing	Sounds: Total Correct	TW:Time Est Accy	TW: Perc Accuracy	TW: Perc Speed
I read computer magazines	-.012	.167**	-.046	-.051	-.007	.009	-.062*	.032	.028	-.009	.106**
I know how to recover data	.000	.198**	-.040	-.028	.038	.032	-.037	.055	.058	.008	.137**
I know what a LAN is	.025	.200**	.043	.060	.056	.072*	.006	.031	.016	.018	.101**
I know what an operating system is	.056	.224**	.027	.067*	.064*	.065*	.013	.074*	.086**	.054	.120**
I know how to write computer programs	.107**	.197**	.030	.035	.045	.063*	.037	.108**	.080*	.059	.132**
I know how to install software	.095**	.301**	.054	.095**	.051	.087**	.024	.104**	.121**	.097**	.126**
I know what e-mail is	.024	.239**	.042	.067*	.023	.056	.010	.091**	.063*	.093**	.100**
I know what a database is	.035	.166**	.039	.071*	.051	.089**	.036	.063*	.065*	.078*	.062*
I am computer literate	.045	.272**	.048	.086**	.049	.079*	.013	.094**	.048	.073*	.135**
I regularly use a PC for word processing	.039	.257**	.020	.061	.024	.097**	.008	.039	.015	.059	.089**
I often use a mainframe computer	-.058	.024	-.027	-.011	-.018	.056	.019	.029	-.068*	-.003	-.037
I am good at using computers	.060	.288**	.034	.052	.064*	.080**	.022	.098**	.084**	.076*	.127**
I frequently play action games	.077*	.266**	-.004	.021	.015	.081**	.035	.082**	.130**	.086**	.141**
I regularly use a PC for spreadsheets	-.001	.155**	-.029	-.016	-.013	.054	-.018	.007	-.005	.026	.111**
I frequently use e-mail to exchange messages or information	.012	.258**	.002	.030	.011	.076*	-.020	.083**	.042	.054	.113**
I am proficient at using a mouse with my computer	.090**	.320**	.066*	.089**	.050	.075*	.044	.121**	.060	.071*	.135**
I frequently “surf” the Internet	.001	.254**	.006	.031	.025	.073*	-.028	.095**	.080**	.073*	.121**
CUE-Plus Total	.050	.306**	.017	.048	.042	.091**	.008	.096**	.070*	.072*	.147**

* p < .o5 ** p < .01

Table 5.4.20. Correlations between CUE-Plus and Predictor Battery: Pseudo Applicants

	Predictor Scores										
CUE-Plus Items	Ap Math: Number Correct	Angles: Number Correct	Air Traffic: Effncy	Air Traffic: % Accuracy	ATS: Safety	Analogy: Info Process	Analogy: Latency	Analogy: Reason	Analogy: Window Views	Dials: Number Correct	Scan: Total Score
I read computer magazines	.134**	.060	.100*	.125**	.058	-.130**	-.087	.082	-.008	.079	.047
I know how to recover data	.086	.039	.130**	.125**	.087	-.103*	-.035	.071	-.001	.069	.031
I know what a LAN is	.206**	.083	.258**	.179**	.185**	-.102*	-.068	.198**	.088*	.076	.053
I know what an operating system is	.245**	.184**	.272**	.227**	.116*	-.187**	-.103*	.275**	.056	.158**	.160**
I know how to write computer programs	.113**	.117**	.134**	.122**	.015	-.066	-.018	.119**	.049	.093*	.037
I know how to install software	.202**	.183**	.275**	.162**	.135**	-.094*	-.007	.239**	.096*	.140**	.082
I know what e-mail is	.146**	.050	.123**	.127**	.065	-.039	.028	.142**	.091*	.106*	.107*
I know what a database is	.188**	.102*	.209**	.195**	.083	-.144**	-.092*	.197**	.056	.103*	.132**
I am computer literate	.194**	.124**	.198**	.196**	.145**	-.125**	-.003	.245**	.088*	.104*	.130**
I regularly use a PC for word processing	.183**	.136**	.181**	.179**	.109*	-.119**	-.013	.245**	.091*	.089*	.138**
I often use a mainframe computer	.059	.036	.057	.085	-.011	-.156**	-.098*	.109*	.019	.006	.012
I am good at using computers	.204**	.138**	.290**	.183**	.177**	-.122**	.004	.263**	.078	.143**	.137**
I frequently play action games	.083	.039	.225**	.112*	.103*	.063	.092*	-.004	.033	.097*	.004
I regularly use a PC for spreadsheets	.156**	.093*	.209**	.118**	.148**	-.074	-.031	.144**	.105*	.112**	.044
I frequently use e-mail to exchange messages or information	.126**	.092*	.188**	.188**	.138**	-.077	-.047	.183**	.127**	.125**	.087
I am proficient at using a mouse with my computer	.209**	.154**	.249**	.201**	.161**	-.098**	.038	.253**	.098*	.152**	.171**
I frequently “surf” the Internet	.109*	.106*	.189**	.129**	.173**	-.010	.051	.128**	.077	.131**	.060
CUE-Plus Total	.216**	.147**	.273**	.217**	.160**	-.129**	-.032	.243**	.094*	.150**	.117**

* p < .o5 ** p < .01

Table 5.4.21. Correlations between CUE-Plus and Predictor Battery: Pseudo Applicants

	Predictor Scores										
CUE-Plus Items	Letter Factory: Aware	Letter Factory: Planning	Memory Number Correct	Recall: Number Correct	Planes: Project	Planes: Visual/ Spatial	Planes: Time Sharing	Sounds: Total Correct	TW: Time Est Accuracy	TW: Percept Accuracy	TW: Percept Speed
I read computer magazines	.117**	.102*	.076	.132**	.110*	.028	.006	.094*	.097*	.153**	.013
I know how to recover data	.111*	.175**	.022	.062	.119**	.087	-.009	.086	.119**	.158**	.024
I know what a LAN is	.187**	.204**	.064	.099*	.172**	.156**	.091*	.125**	.130**	.152**	.043
I know what an operating system is	.221**	.286**	.179**	.210**	.219**	.173**	.098*	.170**	.180**	.259**	.049
I know how to write computer programs	.114*	.149**	.004	.067	.114*	.024	.047	.097*	.092	.078	.054
I know how to install software	.216**	.261**	.122**	.159**	.168	.135**	.076	.106*	.164**	.261**	.072
I know what e-mail is	.176**	.222**	.092*	.164**	.111*	.146**	.083	.101*	.102*	.223**	.021
I know what a database is	.191**	.243**	.110*	.141**	.185*	.190**	.096*	.146**	.163**	.267**	.045
I am computer literate	.255**	.307**	.170**	.200**	.206**	.160**	.110*	.173**	.215**	.240**	.069
I regularly use a PC for word processing	.241**	.303**	.133**	.168**	.160**	.169**	.107*	.124**	.195**	.272**	.037
I often use a mainframe computer	,128**	.126**	.086	.109*	.088*	.121**	.071	.046	.094*	.153**	.049
I am good at using computers	.271**	.312**	.177**	.224**	.235**	.182**	.090*	.188**	.185**	.253**	.135**
I frequently play action games	.093*	.136**	-.010	.013	.064	-.032	.049	.072	.046	.035	.076
I regularly use a PC for spreadsheets	.196**	.244**	.077	.104*	.140**	.149**	.067	.143**	.160**	.193**	.027
I frequently use e-mail to exchange messages or information	.183**	.275**	.099*	.145**	.129**	.123**	.084	.187**	.162**	.181**	.046
I am proficient at using a mouse with my computer	.228**	.291**	.145**	.190**	.178**	.092**	.129**	.124**	.159**	.232**	.150**
I frequently “surf” the Internet	.138**	.198**	.073	.109*	.097*	.053	.031	.155**	.154**	.127**	.073
CUE-Plus Total	.249**	.313**	.134**	.184**	.203**	.158*	.099*	.173**	.200**	.265**	.083

* $p < .o5$ ** $p < .01$

Table 5.4.22. Determinants of Applied Math Test: No. of Items Correct

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	*Beta*	*t*	*b*	*Beta*	*t*	*b*	*Beta*	*t*
Intercept	7.12		4.13	6.48		3.16	6.77		3.11
Age	.26	.19	4.28	.24	.17	3.39	.30	.21	4.13
Gender	-3.47	-.27	-6.63	-3.71	-.28	-6.09	-3.55	-.27	-5.70
Race	2.24	.18	4.32	3.50	.20	4.48	1.66	.09	1.98
Education	.31	.11	2.32	.41	.14	2.58	.37	.12	2.33
CUE-Plus	.06	.15	3.50	.05	.13	2.81	.05	.13	2.79
Adj. R Square			.20			.21			.19

Table 5.4.23. Determinants of Angles Test: No. of Items Correct

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*T*	*b*	***Beta***	*t*	*b*	***Beta***	*t*
Intercept	22.04		20.32	20.33		15.53	21.16		17.15
Age			n.s.			n.s.			n.s.
Gender	-2.31	-.21	- 4.80	-2.41	-.21	-4.40	-1.96	-.18	-3.60
Race	1.51	.14	3.16	2.60	.18	3.70			n.s.
Education	.35	.14	3.08	.40	.16	3.16	.50	.20	4.05
CUE-Plus	.03	.09	2.02	.04	.12	2.32	.05	.15	3.04
Adj. R Square			.09			.12			.10

Table 5.4.24. Determinants of Air Traffic Scenarios: Efficiency

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*t*	*b*	***Beta***	*t*	*b*	***Beta***	*T*
Intercept	41.30		15.80	37.36		11.52	46.39		15.38
Age			n.s.			n.s.			n.s.
Gender	-7.01	-.25	-5.89	-7.08	-24	-5.16	-7.35	-.26	-5.30
Race	6.78	.24	5.80	11.37	.30	6.41			n.s.
Education			n.s.			n.s.			n.s.
CUE-Plus	.21	.25	5.97	.20	.23	4.90	.25	.29	5.94
Adj. R Square			.19			.20			.15

Table 5.4.25. Determinants of Air Traffic Scenarios: Safety

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*t*	*b*	***Beta***	*t*	*b*	***Beta***	*T*
Intercept	39.84		14.23	41.19		9.72	41.29		13.40
Age			n.s.			n.s.			n.s.
Gender			n.s.	-3.58	-.10	-1.99			n.s.
Race	3.11	.09	1.98	6.83	.15	2.94			n.s.
Education			n.s.			n.s.			n.s.
CUE-Plus	.16	.15	3.32	.15	.14	2.80	.19	.18	3.53
Adj. R Square			.03			.05			.03

Table 5.4.26. Determinants of Air Traffic Scenarios: Procedural Accuracy

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*B*	***Beta***	*T*	*b*	***Beta***	*t*	*b*	***Beta***	*t*
Intercept	20.65		3.57	19.01		2.80	20.32		3.14
Age	.61	.13	2.97	.53	.12	2.30	.77	.17	3.30
Gender			n.s.			n.s.			n.s.
Race	5.655	.13	2.90	8.46	.15	2.91			n.s.
Education			n.s.			n.s.			n.s.
CUE-Plus	.24	.18	4.07	.26	.19	3.79	.28	.22	4.26
Adj. R Square			.07			.07			.08

Table 5.4.27. Determinants of Analogy: Information Processing

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*t* [a]	*b*	***Beta***	*t* [a]	*b*	***Beta***	*t* [a]
Intercept	114.66		58.32	114.87		51.88	116.10		52.15
Age	-.43	-.23	-4.81	-.42	-.23	-4.16	-.50	-27	-4.91
Gender			n.s.			n.s.			n.s.
Race			n.s.			n.s.			n.s.
Education	-.64	-.16	-3.32	-.69	-.17	-3.12	-.52	-.13	-2.41
CUE-Plus			n.s.			n.s.			n.s.
Adj. R Square			.10			.11			.11

Table 5.4.28. Determinants of Analogy Test: Reasoning

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*t*	*b*	***Beta***	*t*	*b*	***Beta***	*t*
Intercept	11.94		10.06	10.84		6.99	6.18		2.54
Age			n.s.			n.s.	.26	.15	2.86
Gender			n.s.			n.s.			n.s.
Race	2.95	.19	4.57	4.27	.20	4.27	2.35	.11	2.27
Education	.91	.26	6.02	.94	.26	5.28	.82	.23	4.21
CUE-Plus	.08	.17	3.82	.07	.15	2.97	.09	.18	3.71
Adj. R Square			.16			.15			.16

Table 5.4.29. Determinants of Dials Test: No. of Items Correct

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*T*	*b*	***Beta***	*t*	*B*	***Beta***	*t*
Intercept	15.96		30.59	14.98		24.18	16.64		32.83
Age			n.s.			n.s.			n.s.
Gender	-1.0	-.19	-4.31	-.88	-.17	-3.42	-1.04	-.21	-4.15
Race	.84	.16	3.69	1.48	.22	4.46	.80	.12	2.37
Education	.11	.09	2.00	.13	.11	2.18	.18	.16	3.11
CUE-Plus	.02	.10	2.15	.02	.11	2.16			n.s.
Adj. R Square			.08			.10			.07

Table 5.4.30. Determinants of Letter Factory Test: Situational Awareness

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*T*	***Beta***	*t*	*b*	***Beta***	*t*	*b*	***Beta***	*t*
Intercept	20.77		14.17	19.18		10.21	21.74		10.82
Age			n.s.			n.s.			n.s.
Gender			n.s.			n.s.			n.s.
Race	4.04	.22		6.68	.26	5.49	2.86	.11	2.19
Education	.57	.14		.53	.12	2.42	.56	.13	2.56
CUE-Plus	.111	.19		.09	.16	3.42	.12	.20	3.88
Adj. R Square			.12			.12			.07

Table 5.4.31. Determinants of Letter Factory Test: Planning & Thinking Ahead

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*t*	*b*	***Beta***	*t*	*b*	***Beta***	*t*
Intercept	.09		7.79	.07		4.44	.12		8.61
Age			n.s.			n.s.			n.s.
Gender			n.s.			n.s.			n.s.
Race	.002	.19	4.42	.06	.28	5.85			n.s.
Education			n.s			n.s.			n.s.
CUE-Plus	.01	.30	6.99	.001	.27	5.82	.002	.33	6.71
Adj. R Square			.13			.16			.11

Table 5.4.32. Determinants of Scan Test: Total Score

	Race: Caucasians and Minorities			Race: Caucasians and African-Americans			Race: Caucasians and Hispanics		
Variable	*b*	***Beta***	*T*	*b*	***Beta***	*t*	*b*	***Beta***	*t*
Intercept	157.63		49.89	147.07		26.20	145.43		22.75
Age			n.s.			n.s.			n.s.
Gender			n.s.			n.s.			n.s.
Race			n.s.	11.28	.12	2.30			n.s.
Education	1.90	.70	2.73	1.89	.12	2.29	2.05	.13	2.53
CUE-Plus			n.s.			n.s.	.23	.11	2.12
Adj. R Square			.01			.02			.03

Table 5.5.1. Simple Validities: Correlations Between Predictor Scores and Criteria

		Criterion					
		Corrected Correlation			Uncorrected Correlation		
Test	**Scale**	**CBPM**	**Rat-ings**	**Comp-osite**	**CBPM**	**Rat-ings**	**Comp-osite**
Predictor Composite	**Scaled Score**	70	32	68	52	21	51
AM: Applied Math	**Number Correct**	59	28	58	41	18	41
AN: Angles	**Number Correct**	57	19	55	35	10	33
AT: Air Traffic Scenarios					32	15	32
	Efficiency	32	16	32	30	15	31
	Procedural Accuracy	19	09	18	14	06	13
	Safety	26	11	25	24	10	23
AY: Analogies					43	09	38
	Info. Proc. Latency	02	00	01	02	00	01
	Info. Proc. Windows	22	06	20	21	06	19
	Reasoning	42	10	38	40	09	36
DI: Dials	**Number Correct**	35	09	32	27	07	24
EQ: Experiences Questionnaire							
All scales					16	17	18
Final scales					09	16	14
Dropped scales					05	06	00
	Composure	11	15	15	09	13	13
	Concentration	09	09	11	07	07	09
	Behavioral Consistency	07	17	14	06	16	12
	Cooperation	-07	08	-02	-07	08	-02
	Decisiveness	05	11	09	04	09	07
	Execution	04	09	07	03	08	06
	Flexibility	03	07	05	03	06	05
	Tolerance for High Intensity	-02	02	-01	-02	02	-01
	Self Awareness	05	05	07	05	05	06
	Self Confidence	01	11	06	01	09	05
	Sustained Attention	07	06	08	06	05	07
	Taking Charge	-02	03	00	-02	03	00
	Interpersonal Tolerance	00	09	05	01	10	05
	Task Closure	01	09	05	01	07	04
LA: Letter Factory					36	11	33
	Situational Awareness	38	12	35	33	10	30
	Planning & Thinking Ahead	35	12	33	32	11	30
ME: Memory	Number Correct	24	05	21	22	05	19
MR: Memory Retest	Number Correct	27	09	25	25	08	23

		Criterion					
		Corrected Correlation			Uncorrected Correlation		
Test	**Scale**	**CBPM**	**Rat-ings**	**Comp-osite**	**CBPM**	**Rat-ings**	**Comp-osite**
PL: Planes					27	08	25
	Projection	31	08	28	20	05	18
	Visual/Spatial	29	07	26	15	04	14
	Timesharing	21	09	20	19	08	18
SC: Scan	**Number Correct**	26	08	24	21	06	19
SN: Sound	Digits Correct	14	05	13	16	05	14
TW: Time Wall					30	08	27
	Perceptual Accuracy	48	15	45	23	07	21
	Perceptual Speed	12	02	10	10	02	08
	Time Estimation Accuracy	26	09	25	22	07	21

Notes. Decimals omitted. N = 984–1056. Uncorrected correlations above .04 are significant at $p < .05$. Uncorrected correlations above .05 are significant at $p < .01$. *Corrected Correlations* are corrected for range restriction in the predictor; they are estimates of what the correlations would be in an applicant sample. The scores in the final battery are boldfaced. The multiple correlations are corrected for shrinkage (to correct for overfitting the regression equation to the sample).

Table 5.5.2. Incremental Validities: Increases in Validities when Adding a Scale or Test

		Criterion					
		All Other Tests Entered			All Other Final Battery Tests Entered		
Test	**Scale**	**CBPM**	**Rat-ings**	**Comp-osite**	**CBPM**	**Rat-ings**	**Comp-osite**
AM: Applied Math	**Number Correct**	122	125	155	126	133	163
AN: Angles	**Number Correct**	083	*005*	060	084	014	057
AT: Air Traffic Scenarios		101	088	116	109	082	118
	Efficiency	027	068	055	028	064	054
	Procedural Accuracy	066	034	067	077	034	076
	Safety	035	*014*	019	032	018	015
AY: Analogies		*103*	035	063	141	030	101
	Info. Proc. Latency	000	*013*	*007*	024	024	030
	Info. Proc. Windows	046	*001*	034	064	001	049
	Reasoning	093	*034*	053	118	022	079
DI: Dials	**Number Correct**	048	*020*	027	052	019	029
EQ: Experiences Questionnaire							
All scales		102	196	136			
Final scales		084	166	135	073	190	124
Dropped scales		066	071	067	061	069	061
	Composure	013	060	040	019	055	042
	Concentration	052	019	049	035	010	032
	Behavioral Consistency	026	088	064	019	123	077
	Cooperation	*047*	037	*017*	*061*	021	*035*
	Decisiveness	*001*	008	003	007	001	005
	Execution	031	027	037	018	008	018
	Flexibility	*019*	*054*	*042*	030	058	052
	Tolerance for High Intensity	*022*	*039*	*036*	*019*	*047*	*039*
	Self Awareness	019	*019*	005	022	016	009
	Self Confidence	010	051	033	004	032	013
	Sustained Attention	*023*	*059*	*048*	021	059	046
	Taking Charge	*024*	*047*	*042*	*034*	*040*	*046*
	Interpersonal Tolerance	*007*	018	004	031	036	006
	Task Closure	*026*	*002*	*021*	029	010	027
LA: Letter Factory		052	024	051	054	020	051
	Situational Awareness	025	002	021	030	011	028
	Planning & Thinking Ahead	035	022	038	031	013	030
Memory		052	041	057	054	039	058
	ME: Memory	*017*	*036*	*031*	031	001	024
	MR: Memory Retest	042	041	053	050	028	052
PL: Planes		051	032	042	051	028	040
	Projection	049	*007*	034	051	059	093
	Visual/Spatial	*017*	000	*013*	010	*004*	006
	Timesharing	015	030	027	016	029	027
SC: Scan	**Number Correct**	058	022	055	076	027	071

		Criterion					
		All Other Tests Entered			All Other Final Battery Tests Entered		
Test	**Scale**	**CBPM**	**Rat-ings**	**Comp-osite**	**CBPM**	**Rat-ings**	**Comp-osite**
SN: Sound	Digits Correct	*014*	000	*011*	*015*	007	*008*
TW: Time Wall		032	017	028	034	017	029
	Perceptual Accuracy	021	*007*	013	036	*008*	023
	Perceptual Speed	*016*	*018*	*021*	*031*	*012*	*029*
	Time Estimation Accuracy	*010*	*000*	*007*	009	004	009

Notes. Decimals omitted. N = 920 or 944. Values are italicized for situations in which the score had a negative regression coefficient. All correlations are uncorrected. The *scores* in the final battery are boldfaced. For $p < .05$ level of significance, the incremental validity for a single scale must be greater than about .06 (the critical value varies from .055 to .062, depending upon the column). For the first three columns, the incremental validity indicates how much the multiple R decreases when that scale is removed from the complete set of scales. For the last three columns: the incremental validity indicates how much the multiple R *increases* when that single score is added to the final AT-SAT battery. The multiple correlations are corrected for shrinkage (to correct for overfitting the regression equation to the sample).

Table 5.5.3. Comparison of Five Predictor Weighting Methods

	Predictor Weighting Method				
Statistic	**Regression**	**Unit**	**Validity**	**Optimal low d-score**	**Combined**
Validity	.521	.463	.501	.435	.506
Validity corrected for range restriction	.691	.604	.664	.631	.682
Validity corrected for range restriction and shrinkage	.666[1]	.604	.644[2]	.603	.663[3]
d-score for blacks vs. whites	-.85	-.92	-.88	-.55	-.81
Largest *t* for difference in standardized regression slopes between racial/gender groups	-0.44 females	-1.65 females	-0.59 females	0.02 females	-0.58 females

[1] This validity's one-tailed lower confidence limit = .607.

[2] The correction for shrinkage using the validity weighting method is likely overcorrecting to a moderate extent. Thus, the best estimate of this value is likely greater than .644 and less than .664.

[3] The correction for shrinkage using the validity weighting method is likely overcorrecting to some small extent. Thus, the best estimate of this value is likely greater than .663 and less than .682.

Notes. The regression and unit-weighting methods used all 35 scales. The other weighting methods included only the 26 scales from the tests retained for AT-SAT Version 1.01. Negative values of *t* indicate that the female slope was lower than the male slope.

Table 5.5.4. Validity Coefficients for the Predictor Composite

	Criterion				
	Composite	**CBPM**	**Ratings**	**High Fidelity - Core Technical**	**High Fidelity - Controlling Traffic Safely & Efficiently**
N	1029	1032	1053	106	106
r uncorrected	.51	.52	.21	.22	.18
r corrected for range restriction	.68	.70	.32	.33	.28
r corrected for range restriction and shrinkage	.66	.68	.22	n/a[1]	n/a[1]
Criterion reliability	see *Notes* below	see *Notes* below	.71	.95	.99
r corrected for range restriction and criterion unreliability					
Using best estimate of reliability	.76	.78	.38	.34[1]	.28[1]
Using upper bound estimate of reliability	.70	.74			
Using lower bound estimate of reliability	.79	.84			

[1] The Hi Fidelity scores were not used to determine the weights used in the predictor composite so it was not appropriate to correct for shrinkage due to capitalization on chance in the estimation of the predictor weights.

Notes. Interrater agreement reliability was used to correct the validities for the Ratings and HiFi criteria. Reliability for the CBPM was estimated by computing its internal consistency (coefficient alpha = .59), but this figure is probably an underestimate because the CBPM appears to be multidimensional (according to factor analyses). Thus, three different reliabilities were used to correct the CBPM's validity for unreliability: .8 (best guess), .9 (upper bound estimate), and .7 (lower bound estimate), respectively. The composite criterion reliability was estimated as the mean of the ratings and CBPM reliabilities.

Table 5.5.5. Effect of Cut Score on Predicted Controller Performance

		Applicant Screening Model	
		Pass All Applicants	Screen at Cut Score
Cut Score on Raw Predictor (Scaled Cut Score = 70)		none	0.51
Passing Pseudo-Applicant Demographics (Number in Group Passing / Total Number Passing)	***N***		
All	511	100 %	100 %
Male	348	68 %	80 %
Female	162	32 %	20 %
White	339	75 %	92 %
Black	60	13 %	2 %
Hispanic	51	11 %	6 %
Other/Missing Race	61		
Passing Rates of Pseudo-Applicants (Proportion of Each Group Passing)			
All			.22
Male			.26
Female			.14
White			.28
Black			.03
Hispanic			.12
Relative Passing Rates of Pseudo-Applicants			
Female (Relative to Males) = .14 / .26			.54
Black (Relative to Whites) = .03 / .28			.11
Hispanic (Relative to Whites) = .12 / .28			.43
Predicted Criterion Score (as Controller z-score)			
At the Cut Score			-0.22
Mean For Pseudo-Applicants Passing		-0.83	0.19
Predicted Criterion Score Expressed as the Percentile Rank on the Current Controller Distribution			
At the Cut Score			41 %
Mean For Pseudo-Applicants Passing		33 %	56 %
Proportion of Pseudo-Applicants			
Passing			.22
Passing Above Current Controllers' Mean Criterion		.23	.59
Descriptive Statistics for Predicted Criterion Scores among Pseudo-Applicants Passing			
Mean		-0.86	0.24
Standard Deviation (adjusted for estimated error of prediction)		1.17	0.88
Descriptive Statistics for Criterion Scores among Controllers Passing			
Mean		0.00	0.29
Standard Deviation		1.00	0.89

	Applicant Screening Model	
	Pass All Applicants	Screen at Cut Score

Notes. The criterion scores are *z*-scores on the current Controller distribution. The predictor scores are the weighted sum of the *z*-scores based on the Pseudo-Applicants' distribution. Passing rates shown are for the Pseudo-Applicant sample. Actual passing rates will likely differ somewhat because (a) the small sample size of some groups limits the accuracy of the estimated passing rates and (b) the degree of correspondence between the Pseudo-Applicants and future applicants is unknown.

Table 5.5.6. Expected Performance by Validity and Selectivity

Selection Cut Point	Screen	Percent Selected	# Tested per Hire	Percent High Performers
N/A	Current Workforce			33.3
0.0	None			8.8
70.0	OPM (r=.30)	18.8	5.3	16.9
70.0	ATSAT (r=.76)	18.8	5.3	35.2
75.1	OPM (r=.30)	10.0	10.0	19.5
75.1	ATSAT (r=.76)	10.0	10.0	48.2
99.0	OPM (r=.30)	0.1	1376.4	37.0

Note. *Percent High Performers* = the percentage of applicants selected whose expected job performance is in the top third of current controllers.

Table 5.6.1. Means for All Scales by Sample, Gender, and Race

Means for each Scale	Controllers						Pseudo-Applicants					
	All	Male	Female	White	Black	Hispanic	All	Male	Female	White	Black	Hispanic
Composite Criterion	-0.050	0.018	-0.371	0.061	-0.755	-0.299						
CBPM Criterion Ratings	189.49	190.39	185.23	191.67	174.86	184.53						
	5.08	5.14	4.83	5.12	4.95	5.01						
Composite Predictor	72.37	72.90	69.78	73.58	64.26	70.10	58.82	60.69	55.05	60.90	50.27	57.37
AM: Applied Math	21.69	22.17	19.34	22.22	18.21	20.03	14.41	15.61	11.91	15.26	11.35	13.60
AN: Angles	27.07	27.20	26.48	27.41	24.73	26.73	22.91	23.72	21.28	23.48	20.48	22.35
AT: Air Traffic Scenarios												
Efficiency	59.36	60.20	55.02	60.05	53.11	61.84	47.94	50.32	42.80	50.34	38.38	48.06
Procedural Accuracy	69.64	69.58	70.49	69.74	69.09	69.64	51.75	51.75	51.99	53.65	44.83	52.85
Safety	65.83	66.16	63.62	66.21	61.66	67.56	50.40	51.25	48.47	51.45	44.28	52.92
AY: Analogies												
Info. Processing: Latency	0.229	0.229	0.226	0.230	0.213	0.236	0.244	0.246	0.240	0.248	0.236	0.240
Info. Processing: Windows	15.66	15.58	16.25	16.08	12.71	15.22	14.33	14.32	14.40	15.17	11.90	11.77
Reasoning	27.94	27.77	28.73	28.81	21.87	26.35	22.14	22.21	22.09	23.29	18.40	20.73
DI: Dials	17.33	17.46	16.70	17.46	16.26	17.30	16.44	16.81	15.69	16.77	15.11	15.92
EQ: Experiences Questionnaire												
Composure	72.93	73.13	71.41	72.80	73.76	72.06	69.67	70.17	68.57	70.19	68.20	69.02
Concentration	74.39	74.32	74.19	74.52	73.50	72.84	72.92	72.97	72.89	73.45	71.36	70.75
Behavioral Consistency	74.75	74.66	75.12	74.81	76.21	72.93	73.68	73.61	74.08	73.68	73.49	73.47
Cooperation	73.67	73.34	75.40	73.51	76.20	73.67	79.15	77.94	81.82	79.16	77.95	79.63
Decisiveness	76.49	76.33	76.97	76.83	75.20	73.77	72.06	72.40	71.49	72.90	69.40	69.88
Execution	75.27	75.05	76.35	75.28	74.91	75.77	75.80	75.95	75.49	76.48	72.14	75.58
Flexibility	76.60	76.57	76.58	76.48	77.76	76.24	74.38	74.21	74.86	75.09	71.05	73.50
Tolerance for High Intensity	66.50	66.00	68.50	66.40	65.03	67.40	68.48	68.16	69.20	69.33	66.02	67.22
Self Awareness	74.14	73.91	75.30	74.27	73.85	73.90	74.59	74.09	75.64	75.04	73.69	71.81
Self Confidence	81.42	81.70	79.63	81.33	81.84	80.26	77.20	78.17	75.16	77.76	75.29	75.86
Sustained Attention	71.65	71.64	71.23	71.75	71.93	69.37	73.40	73.90	72.56	74.15	71.20	72.20
Taking Charge	75.80	75.59	76.30	75.85	74.36	75.02	76.79	76.52	77.30	77.83	71.41	75.24
Interpersonal Tolerance	74.96	74.69	76.48	74.52	79.97	75.03	78.43	77.75	80.10	78.79	78.15	77.36
Task Closure	74.20	73.54	77.23	74.29	74.22	71.64	74.33	73.75	75.79	74.60	71.93	74.05
LA: Letter Factory												
Situational Awareness	35.84	35.80	36.14	36.55	31.52	34.57	31.43	31.68	30.96	32.82	25.87	30.10
Planning & Thinking Ahead	0.232	0.231	0.233	0.239	0.179	0.219	0.199	0.199	0.200	0.210	0.142	0.199
ME: Memory	16.89	16.57	18.54	17.19	15.52	16.15	14.59	14.32	15.24	14.68	13.65	14.61
MR: Memory Retest	15.61	15.27	17.22	15.92	13.72	14.61	12.94	12.45	14.02	13.24	12.20	12.59
PL: Planes												
Projection	41.77	41.78	41.79	41.94	40.54	41.42	38.79	38.97	38.42	39.30	36.34	38.22
Visual/Spatial	44.72	44.54	45.59	44.93	43.94	43.08	41.07	40.49	42.39	41.58	38.82	40.39
Timesharing	103.66	103.59	103.94	104.21	101.26	100.52	98.92	99.14	98.46	99.41	98.28	97.37
SC: Scan	178.01	177.26	181.10	179.50	169.21	77.05	164.85	165.26	164.32	165.59	153.78	168.88
SN: Sound	89.70	90.17	87.68	89.25	90.99	93.20	81.32	82.89	78.17	83.61	74.93	80.43

Means for each Scale	Controllers						Pseudo-Applicants					
	All	Male	Female	White	Black	Hispanic	All	Male	Female	White	Black	Hispanic
TW: Time Wall												
Perceptual Accuracy	92.40	92.44	92.37	92.76	90.40	91.13	86.43	86.31	86.88	87.12	81.28	87.01
Perceptual Speed	51.24	51.05	52.25	51.63	49.11	51.54	51.31	51.71	50.64	52.06	48.19	49.44
Time Estimation Accuracy	54.88	55.93	49.79	55.61	49.39	53.45	46.34	47.41	44.15	47.93	40.09	44.40

Table 5.6.2 Standard Deviations for All Scales by Sample, Gender, and Race

Standard Deviations for each Scale	Controllers						Pseudo-Applicants					
	All	Male	Female	White	Black	Hispanic	All	Male	Female	White	Black	Hispanic
Composite Criterion	0.825	0.811	0.809	0.786	0.759	0.859						
CBPM Criterion	14.87	14.65	15.07	13.93	14.12	14.40						
Criterion Ratings	0.717	0.698	0.717	0.709	0.649	0.764						
Composite Predictor	7.91	7.72	8.39	7.04	10.12	7.23	12.59	12.28	12.08	12.76	11.00	10.78
AM: Applied Math	3.82	3.39	4.81	3.26	5.61	4.60	6.08	6.05	5.29	6.25	5.01	5.58
AN: Angles	2.85	2.78	3.08	2.43	4.56	2.48	5.34	4.94	5.65	5.22	5.95	5.34
AT: Air Traffic Scenarios												
Efficiency	12.61	12.53	11.52	12.18	14.08	11.20	13.34	13.65	10.87	13.27	10.92	12.49
Procedural Accuracy	15.17	14.83	16.52	14.99	16.35	15.67	20.93	20.58	21.59	20.34	22.59	21.40
Safety	15.09	15.13	14.75	14.84	15.97	15.08	16.23	16.45	15.69	15.95	16.08	17.45
AY: Analogies												
Info. Processing: Latency	0.0441	0.0454	0.0378	0.0432	0.0459	0.0519	0.0422	0.0426	0.0415	0.0399	0.0474	0.0482
Info. Processing: Windows	6.72	6.80	6.09	6.65	6.80	6.06	6.88	6.83	7.02	6.85	6.46	6.56
Reasoning	7.02	7.11	6.73	6.66	6.90	7.37	7.48	7.64	7.04	7.70	6.53	7.01
DI: Dials	1.90	1.75	2.46	1.83	1.95	2.09	2.51	2.27	2.79	2.31	3.08	2.69
EQ: Experiences Questionnaire												
Composure	10.65	10.67	10.16	10.70	10.25	10.51	12.62	12.49	12.89	12.58	13.24	12.27
Concentration	10.61	10.58	10.57	10.45	10.17	12.56	13.04	13.46	12.11	13.07	12.31	10.65
Behavioral Consistency	11.30	11.41	10.74	11.23	10.45	13.43	12.66	12.78	12.06	12.66	13.51	11.74
Cooperation	11.13	11.01	11.22	11.13	9.77	12.19	11.19	11.26	10.60	10.89	13.13	8.58
Decisiveness	10.85	10.77	11.32	10.64	10.97	12.17	13.37	13.28	13.49	13.30	13.90	12.13
Execution	9.84	9.91	9.60	9.79	10.13	9.75	11.43	11.37	11.64	11.08	12.15	10.55
Flexibility	10.45	10.30	10.97	10.45	9.96	10.07	11.84	11.68	12.17	11.83	12.91	10.13
Tolerance for High Intensity	10.80	10.83	10.14	10.86	9.85	10.97	11.77	11.85	11.63	11.43	13.20	9.47
Self Awareness	10.09	9.94	10.85	10.10	9.18	10.91	10.68	11.10	9.71	10.50	11.85	9.26
Self Confidence	10.97	10.79	11.72	10.90	11.41	11.82	13.08	12.89	13.30	12.86	13.76	11.34
Sustained Attention	11.39	11.62	10.22	11.33	11.69	11.30	13.34	13.21	13.36	13.02	15.39	11.34
Taking Charge	10.77	10.72	10.81	10.78	10.54	10.71	11.61	11.59	11.69	11.04	12.47	10.21
Interpersonal Tolerance	12.26	12.21	12.27	12.22	9.93	13.64	11.63	11.78	10.89	11.71	12.01	11.78
Task Closure	10.84	10.92	10.06	10.70	11.22	11.93	13.00	12.91	12.88	13.25	13.04	11.55
LA: Letter Factory												
Situational Awareness	7.48	7.58	6.89	7.15	7.91	7.72	8.94	8.91	9.00	9.08	6.84	8.47
Planning & Thinking Ahead	0.0720	0.0725	0.0684	0.0685	0.0765	0.0672	0.0804	0.0772	0.0857	0.0800	0.0695	0.0693
ME: Memory	5.17	5.17	4.73	4.98	5.43	5.96	5.71	5.77	5.50	5.68	6.29	5.77

Standard Deviations for each Scale	Controllers						Pseudo-Applicants					
	All	Male	Female	White	Black	Hispanic	All	Male	Female	White	Black	Hispanic
MR: Memory Retest	5.41	5.43	5.10	5.27	5.61	6.24	5.92	5.92	5.75	5.91	6.24	6.12
PL: Planes												
Projection	3.02	3.01	3.10	2.98	3.27	2.83	4.89	4.89	4.89	4.75	5.68	4.52
Visual/Spatial	3.19	3.24	2.84	2.98	3.62	4.65	6.19	6.54	5.09	6.00	6.60	6.38
Timesharing	9.72	9.88	9.19	9.54	10.21	11.25	10.86	11.10	10.37	10.99	10.37	10.84
SC: Scan	24.76	25.56	21.37	22.59	28.85	29.95	31.70	29.47	35.92	32.78	35.25	26.38
SN: Sound	21.98	21.81	21.40	21.95	22.22	19.85	20.18	20.35	19.15	19.51	20.35	20.07
TW: Time Wall												
Perceptual Accuracy	4.78	4.86	3.98	4.17	6.17	7.55	11.31	11.44	10.77	11.37	13.67	10.45
Perceptual Speed	6.44	6.53	5.82	5.94	7.71	7.13	8.12	8.24	7.63	8.10	10.05	6.08
Time Estimation Accuracy	9.86	9.74	8.80	9.29	11.64	10.32	11.80	12.08	10.94	11.66	10.91	13.09

Table 5.6.3 Sample Sizes for All Scales by Sample, Gender, and Race

*N*s for each Scale	Controllers						Pseudo-Applicants					
	All	Male	Female	White	Black	Hispanic	All	Male	Female	White	Black	Hispanic
Composite Criterion	1043	867	171	849	92	61	0	0	0	0	0	0
CBPM Criterion	1046	869	172	850	94	61	0	0	0	0	0	0
Criterion Ratings	1227	910	176	889	96	61	0	0	0	0	0	0
Composite Predictor	1058	866	175	851	95	60	511	348	162	339	60	51
AM: Applied Math	1060	868	175	853	95	60	519	353	165	344	62	52
AN: Angles	1059	867	175	852	95	60	518	353	164	343	62	52
AT: Air Traffic Scenarios												
Efficiency	1012	831	164	811	90	60	498	343	154	331	57	50
	1012	831	164	811	90	60	498	343	154	331	57	50
Procedural Accuracy												
Safety	1012	831	164	811	90	60	498	343	154	331	57	50
AY: Analogies												
Info. Processing: Latency	1059	867	175	852	95	60	512	348	163	339	60	52
Info. Processing: Windows	1059	867	175	852	95	60	512	348	163	339	60	52
Reasoning	1059	867	175	852	95	60	512	348	163	339	60	52
DI: Dials	1062	869	175	853	96	60	518	352	164	342	62	52
EQ: Experiences Questionnaire												
Composure	1050	860	174	848	91	60	508	345	162	339	58	51
Concentration	1048	859	173	847	90	60	507	345	161	338	58	51
Behavioral Consistency	1049	859	174	847	91	60	504	342	161	338	57	49
Cooperation	1047	858	173	847	90	60	504	343	160	338	57	49
Decisiveness	1050	860	174	848	91	60	507	344	162	339	58	51
Execution	1058	867	175	852	95	60	516	351	164	342	62	51
Flexibility	1048	859	173	847	90	60	504	342	161	338	58	49
Tolerance for High Intensity	1058	867	175	852	95	60	515	350	164	342	61	51

*N*s for each	Controllers						Pseudo-Applicants					
Scale	All	Male	Female	White	Black	Hispanic	All	Male	Female	White	Black	Hispanic
Self Awareness	1058	867	175	852	95	60	513	348	164	342	59	51
Self Confidence	1056	865	175	851	94	60	511	348	162	341	58	51
Sustained Attention	1058	867	175	852	95	60	513	348	164	342	59	51
Taking Charge	1049	859	174	847	91	60	508	345	162	339	58	51
Interpersonal Tolerance	1050	860	174	848	91	60	508	345	162	339	58	51
Task Closure	1047	857	174	846	91	60	499	340	158	336	56	49
LA: Letter Factory												
Situational Awareness	1059	866	175	851	95	60	516	350	164	344	60	51
Planning & Thinking Ahead	1059	866	175	851	95	60	516	350	164	344	60	51
ME: Memory	1057	865	175	850	95	60	517	352	164	343	62	51
MR: Memory Retest	1049	859	175	847	93	59	512	348	163	340	61	51
PL: Planes												
Projection	1053	863	175	849	94	60	512	349	162	339	61	51
Visual/Spatial	1053	863	175	849	94	60	512	349	162	339	61	51
Timesharing	1053	863	175	849	94	60	512	349	162	339	61	51
SC: Scan	1030	841	172	834	85	59	495	337	157	332	55	48
SN: Sound	1055	862	174	845	96	60	505	346	157	337	59	51
TW: Time Wall												
Perceptual Accuracy	1038	847	175	833	94	60	480	323	156	319	56	47
Perceptual Speed	1038	847	175	833	94	60	480	323	156	319	56	47
Time Estimation Accuracy	1039	848	175	833	95	60	484	325	158	321	57	48

Notes. The *N* for the composite predictor is greater than the *N*s for most of the predictors because missing predictor values were estimated when computing the composite predictor. Predictors in boldface were used in the final AT-SAT battery.

Table 5.6.4. Frequency Table for Chi-Square Test of Association for Predictor Composite

	Observed Frequencies		
Group	Fail	Pass	Total for Group
Males	248	100	348
Females	137	25	162
Total for Fail/Pass	385	125	510

	Expected Frequencies	
Group	Fail	Pass
Males	263	85
Females	122	40

$\chi^2 = 10.574$ $df = 1$ $p = .0011$

Table 5.6.5. Group Differences in Means and Passing Rates for the Pseudo-Applicants

	Passing Rate					Difference in Means (in Std. Dev. Units)		
Predictor	Male	Female	White	Black	Hispanic	Female	Black	Hispanic
Composite Predictor	.28	.15 *a***	.30	.03 *a****	.14 *a**	-.44 ***	-.74 ***	-.24
AM: Applied Math	.28	.07 *a****	.27	.05 *a****	.12 *a**	-.61 ***	-.63 ***	-.27
AN: Angles	.46	.27 *a****	.44	.23 *a***	.35 *a*	-.49 ***	-.57 ***	-.22
AT: Air Traffic Scenarios								
Efficiency	.41	.19 *a****	.40	.11 *a****	.40	-.55 ***	-.90 ***	-.17
Procedural Accuracy	.33	.37	.38	.26 *a*	.36	.01	-.43 **	-.04
Safety	.34	.24 *a**	.32	.21 *a*	.34	-.17	-.45 **	.09
AY: Analogies								
Info. Processing: Latency	.83	.82	.85	.75	.79	-.14	-.29 *	-.20
Info. Processing: Windows	.64	.61	.67	.52 *a**	.50 *a**	.01	-.48 ***	-.50 ***
Reasoning	.33	.34	.40	.15 *a****	.29 *a*	-.01	-.63 ***	-.34 *
DI: Dials	.76	.60 *a****	.75	.55 *a***	.65	-.49 ***	-.72 ***	-.37 *
EQ: Experiences Questionnaire								
Composure	.57	.51	.56	.50	.55	-.13	-.16	-.09
Concentration	.59	.63	.63	.53	.55	-.01	-.16	-.21
Behavioral Consistency	.61	.65	.63	.58	.65	.04	-.02	-.02
Cooperation	.82	.93	.85	.84	.96	.34	-.11	.04
Decisiveness	.54	.51	.57	.47	.45 *a*	-.07	-.26	-.23
Execution	.73	.69	.73	.58 *a**	.75	-.04	-.39 **	-.08
Flexibility	.61	.60	.63	.52	.57	.06	-.34 *	-.13

Predictor	Passing Rate					Difference in Means (in Std. Dev. Units)		
	Male	Female	White	Black	Hispanic	Female	Black	Hispanic
Tolerance for High Intensity	.79	.80	.82	.70 *	.82	.09	-.29 *	-.19
Self Awareness	.66	.76	.70	.73	.57	.14	-.13	-.31 *
Self Confidence	.58	.47 *	.56	.55	.45	-.23 *	-.19	-.15
Sustained Attention	.74	.71	.75	.68	.75	-.10	-.23	-.15
Taking Charge	.74	.77	.78	.59 *a***	.78	.07	-.58 ***	-.24
Interpersonal Tolerance	.76	.84	.80	.76	.76	.20	-.06	-.12
Task Closure	.61	.69	.65	.59	.61	.16	-.20	-.04
LA: Letter Factory								
Situational Awareness	.53	.51	.58	.17 *a****	.53	-.08	-.77 ***	-.30 *
Planning & Thinking Ahead	.49	.51	.55	.25 *a****	.43 *a*	.02	-.86 ***	-.15
ME: Memory	.56	.62	.58	.55	.65	.16	-.18	-.01
MR: Memory Retest	.50	.59	.55	.49	.51	.27	-.18	-.11
PL: Planes								
Projection	.57	.48	.58	.34 *a****	.45 *a*	-.11	-.62 ***	-.23
Visual/Spatial	.43	.51	.48	.30 *a***	.39	.29	-.46 **	-.20
Timesharing	.48	.49	.51	.39 *a*	.47	-.06	-.10	-.19
SC: Scan	.36	.47	.43	.20 *a***	.42	-.03	-.36 *	.10
SN: Sound	.54	.42 *a**	.53	.37 *a**	.51	-.23 *	-.44 **	-.16
TW: Time Wall								
Perceptual Accuracy	.46	.40	.49	.25 *a****	.43	.05	-.51 ***	-.01
Perceptual Speed	.67	.63	.69	.50 *a***	.53 *a**	-.13	-.48 **	-.32 *
Time Estimation Accuracy	.44	.27 *a****	.45	.14 *a****	.31 *a*	-.27 **	-.67 ***	-.30

For passing rates:
a The passing rate for this group is less than 80% of the passing rate for the reference group.

For *t*-test of the difference between the mean scores and for χ^2 test of the difference between passing rates for the minority group vs. the reference group:
* $p < .05$
** $p < .01$
*** $p < .001$

Notes. Ns range from 288–353 for males, 140–165 for females, 289–342 for whites, 45–62 for blacks, and 41–52 for Hispanics. Each value in the three columns on the right, labeled *Difference in Means*, represents the difference between the mean score for the minority group (i.e., Female, Black, Hispanic) and the mean score for the reference group (i.e., Male, White). This difference is expressed in standard deviation units based on the reference group. This is often referred to as a *d-score*. A negative value indicates that the minority group's mean is less than the reference group's mean. The scores used in the final battery are boldfaced. Significant differences in means are asterisked only where the difference favors the reference group.

Table 5.6.6. Fairness Analysis Results

Predictor	Standardized Slope of Regression Line (i.e., validity coefficient)					Regression Lines' Difference at Cut Score (in Std. Dev. Units)		
	Male	Fem	White	Black	Hisp	Fem	Black	Hisp
Predictor Composite	.50	.47	.44	.50	.46	-.34	-.59	-.28
AM: Applied Math	.38	.43	.34	.43	.38	-.25	-.74	-.27
AN: Angles	.31	.35	.27	.34	.25	-.46	-.82	-.41
AT: Air Traffic Scenarios								
Efficiency	.30	.24	.25	.46	.30	-.40	-.96	-.64
Procedural Accuracy	.14	.12	.14	.22	.01	-.51	-1.11	-.44
Safety	.25	.09	.21	.26	.25	-.43	-1.04	-.56
AY: Analogies								
Latency Info. Proc.	.00	.04	-.01	.05	-.17	-.55	-1.05	-.36
Windows Info. Proc.	.20	.20	.17	.23	-.04	-.58	-.97	-.35
Reasoning	.38	.34	.28	.36	.39	-.67	-.75	-.41
DI: Dials	.23	.20	.21	.16	.12	-.39	-.91	-.39
EQ: Experiences Questionnaire								
Composure	.13	.09	.14	.08	.08	-.50	-.97	-.44
Concentration	.11	-.01	.07	.09	.01	-.47	-.97	-.44
Behavioral Consistency	.13	.10	.14	.02	.14	-.53	-.95	-.45
Cooperation	.01	-.08	-.02	-.02	.17	-.47	-.96	-.57
Decisiveness	.10	-.03	.05	.15	.01	-.47	-.99	-.45
Execution	.07	.08	.07	.04	.00	-.55	-1.02	-.43
Flexibility	.05	.04	.06	-.01	.10	-.51	-.94	-.49
Tolerance for High Intensity	.02	-.02	-.01	-.01	.01	-.50	-1.04	-.49
Self Awareness	.10	-.07 *	.06	.05	.04	-.44	-1.03	-.46
Self Confidence	.06	-.04	.08	-.01	-.03	-.49	-.99	-.42
Sustained Attention	.08	.03	.06	.08	.07	-.50	-1.05	-.46
Taking Charge	.02	-.07	-.02	.07	-.07	-.47	-1.01	-.44
Interpersonal Tolerance	.08	-.02	.09	-.03	.13	-.48	-.91	-.50
Task Closure	.07	-.00	.03	.11	.13	-.49	-1.01	-.49
LA: Letter Factory								
Situational Awareness	.31	.30	.24	.18	.25	-.59	-.89	-.42
Planning & Thinking Ahead	.32	.20	.22	.37	.24	-.51	-.82	-.43
ME: Memory	.24	.16	.14	.31	.27	-.60	-1.06	-.50
MR: Memory Retest	.27	.23	.19	.37	.20	-.67	-1.03	-.42
PL: Planes								
Projection	.20	.13	.15	.13	.09	-.50	-.97	-.43
Visual/Spatial	.17	.12	.10	.16	.18	-.58	-1.00	-.40
Timesharing	.21	.07	.15	.22	.17	-.50	-1.00	-.42
SC: Scan	.22	.08	.18	.18	.00	-.59	-.91	-.45
SN: Sound	.16	.02	.15	.31	.15	-.46	-1.13	-.52
TW: Time Wall								
Perceptual Accuracy	.22	.14	.14	.35	.21	-.53	-.96	-.42
Perceptual Speed	.11	.04	.04	.13	-.15	-.52	-1.03	-.38
Time Estimation Accuracy	.20	.09	.20	.12	.10	-.41	-.94	-.41

	Standardized Slope of Regression Line (i.e., validity coefficient)					Regression Lines' Difference at Cut Score (in Std. Dev. Units)		
Predictor	Male	Fem	White	Black	Hisp	Fem	Black	Hisp

* $p < .05$

Notes. *N*s range from 823–859 for males, 159–170 for females, 803–844 for Whites, 80–90 for Blacks, and 60 for Hispanics. There were no significant differences in slopes or intercepts that favored the reference group. Each value in the three columns on the right, labeled *Regression Lines Difference at Cut Score (in Std. Dev. Units)*, represents how far the regression line for the minority group (i.e., Female, Black, Hispanic) is above the regression line for the reference group (i.e., Male, White) at the predictor's cut score. This distance is expressed in standard deviation units based on the regression line for the reference group (i.e., the standard error of estimate of the Male or White regression line). A negative value indicates that the reference group's regression line is above the minority group's reference line at the cut point. The scores in the final battery are boldfaced.

Table 5.6.7. Criterion *d*-Scores Analyses for Controllers

	Proportion of Controllers in Each Group Above 32nd Percentile in Total Sample					Difference in Means (in Std. Dev. Units)		
Predictor	Male	Female	White	Black	Hispanic	Female	Black	Hispanic
Predictor Composite	.70	.56 ***	.74	.31 [a]***	.57 [a]**	-.40 ***	-1.35 ***	-.50 ***
Composite Criterion (of Ratings and CBPM)	.71	.55 [a]***	.74	.36 [a]***	.50 [a]***	-.47 ***	-1.04 ***	-.47 ***

Number of Controllers in Each Group				
Male	Female	White	Black	Hispanic
857	170	842	90	60

The following significance tests were performed to compare the minority group vs. the reference group: (a) *t*-test of the difference between the mean scores and (b) χ^2 test of the difference between the passing rates.
* $p < .05$
** $p < .01$
*** $p < .001$

a The *passing rate* of this group (i.e., the proportion above the hypothetical cut score) is less than 80% of the passing rate of the reference group. (The hypothetical cut score is the score at the 32nd percentile of the combined controller sample.)

Notes. Participants missing either the composite criterion or predictor composite scores were excluded from the analysis. The following significance tests were performed to compare the minority group vs. the reference group: (a) *t*-test of the difference between the mean scores and (b) χ^2 test of the difference between the passing rates. Each value in the three columns on the right, labeled *Difference in Means*, represents the difference between the mean score for the minority group (i.e., Female, Black, Hispanic) and the mean score for the reference group (i.e., Male, White). This difference is expressed in standard deviation units based on the reference group. This is often referred to as a *d*-score. A negative value indicates that the focal group's mean is less than the reference group's mean. Significant differences in means are asterisked only where the difference favors the reference group.

Table 5.6.8. Power Analysis of Fairness Regressions

Statistic	Males	Females	Whites	Blacks	Hispanics
Slope	.052	.045	.049	.037	.055
Smallest detectable slope difference at 80% power, $p<.05$		.18		.020	.036
Intercept at Cut Score	–.13	–.35	–.11	–.53	–.31
Smallest detectable intercept difference at 80% power, $p<.05$		–.15		–.21	–.26

Notes. The criterion and predictor are each scaled to have a standard deviation of one and a mean of zero for the sample of all controllers. *Smallest detectable difference at 80% power* is the minimum difference in the slope or intercept between the minority group and its reference group in the population to find statistical significance in 80% of the samples.

Table 5.6.9. Potential Impact of Targeted Recruitment

	Recruiting Strategy:		AT-SAT		% At or	% At or
Group	Range	Relative Freq.	Mean	S.D.	Above 70	Above 75
All	All	1	58.8	12.6	18.8	8.9
Hispanics	All	1	57.5	10.8	12.2	5.1
Blacks	All	1	50.4	11.1	3.9	1.3
	Top 10%	6	56.9	13.2	15.5	5.1
	Top 5%	5	54.3	13.3	16.2	5.3

Notes. Range = the portion of the potential applicant population that are targeted for preferential recruitment efforts. *Relative Freq.* = the number of people recruited from the targeted range under targeted vs. untargeted recruitment.

Table 6.1. Correlations Between Archival and AT-SAT Criterion Measures (N=669)

	Dayl X	HrsIX	IPIX	DayXII	HrsXII	IPXII	TFPL	Rating	CBPM
Archival criterion measures									
Days in Phase IX (DayIX)		.69**	-.10*	.30**	.33**	.02	.46**	-.07	.02
OJT Hours Phase IX (HrsIX)			-.07	.33**	.52**	.06	.41**	-.12**	-.04
Indication of Performance Phase IX (IPIX)				-.09*	-.05	.44**	.07	-.15**	.03
Days in Phase XII (DayXII)					.61**	-.03	.37**	-.19**	-.11**
OJT Hours Phase XII (HrsXII)						-.05	.36**	-.20**	-.14**
Indication of Performance Phase XII (IPXII)							.13**	-.08*	.10*
Time to FPL (TFPL)								-.16**	-.03
AT-SAT criterion measures									
Rating Composite (Rating)									.22**
Final CBPM score (CBPM)									

* Significantly different from 0 at $p < .05$.

** Significantly different from 0 at $p < .01$.

Table 6.2. Correlations of Archival Selection Procedures with Archival and AT-SAT Criterion Measures (Correlations adjusted for restriction in range of the predictors are in parentheses following the restricted correlations. N=370)

	OPM Rating	Final Nonradar Score	Final Radar Score
Archival selection procedures			
OPM Rating		.18** (.36)	.11** (.18)
Final score in Nonradar Screen Program			.37** (.63)
Final score in Radar Training program			
Archival criterion measures			
Days in Phase IX (DayIX)	.03 (.06)	-.09 (-.19)	-.20** (-.32)
OJT Hours Phase IX (HrsIX)	.07 (.11)	-.12* (-.25)	-.18** (-.28)
Indication of Performance Phase IX (IPIX)	.09* (.14)	.10 (.20)	-.01 (-.01)
Days in Phase XII (DayXII)	-.02 (-.03)	-.09 (-.18)	-.21** (-.34)
OJT Hours Phase XII (HrsXII)	.03 (.05)	-.13* (-.25)	-.22** (-.34)
Indication of Performance Phase XII (IPXII)	.12* (.20)	.13* (.26)	.11* (.18)
Time to FPL (TFPL)	-.08 (-.12)	-.17** (-.34)	-.22** (-.35)
AT-SAT criterion measures			
Rating Composite (Rating)	.02 (.04)	.12* (.24)	.17** (.27)
Final CBPM score (CBPM)	.22** (.34)	.34** (.60)	.21** (.32)

* Significantly different from 0 at $p < .05$.

** Significantly different from 0 at $p < .01$.

Table 6.3. Correlations of Archival Selection Procedure Components with Archival and AT-SAT Criterion Measures (N=212)

	MCAT	ABSR	OKT	AvIA	AvTA	NCST	RavIA	RavTA	RCST
Archival selection test components									
Multiplex Controller Aptitude Test (MCAT)		.24**	.04	.29**	.20**	.17*	.25**	.22**	.02
Abstract Reasoning (ABSR)			-.12	.12	.16*	.19**	-.04	-.02	.08
Occupational Knowledge Test (OKT)				.20**	.12	.09	.04	.04	.05
Average Instructor Assessment (AvIA)					.79**	.23**	.37**	.36**	.18**
Average Technical Assessment (AvTA)						.23**	.27**	.32**	.25**
Nonradar Controller Skills Test (NCST)							.16*	.17*	.25**
Radar Instructor Assessment (RAvIA)								.83**	.05
Radar Technical Assessment (RAvTA)									.09
Radar Controller Skills Test (RCST)									
Archival criterion measures									
Days in Phase IX (DayIX)	-.01	.03	-.01	-.12	-.16**	-.08	-.19*	-.18*	-.16*
OJT Hours Phase IX (HrsIX)	.03	.05	-.03	-.09	-.17**	-.10	-.14*	-.16*	-.10
Indication of Performance Phase IX (IPIX)	.00	.07	-.01	.07	.00	.01	.12	.06	-.03
Days in Phase XII (DayXII)	.13	.06	.12	-.04	-.11	-.02	-.11	-.18*	-.21**
OJT Hours Phase XII (HrsXII)	.09	.12	-.01	-.02	-.09	-.07	-.12	-.21**	-.11
Indication of Performance Phase XII (IPXII)	.12	.14	.12	.05	.02	.10	.10	.16*	.14*

	MCAT	ABSR	OKT	AvIA	AvTA	NCST	RavIA	RavTA	RCST
Time to FPL (TFPL)	-.06	.06	-.02	-.17*	-.16*	-.05	-.15*	-.20**	-.01
AT-SAT criterion measures									
Rating Composite (Rating)	.01	-.06	.06	.17*	.09	.05	.13	.13	-.02
Final CBPM score (CBPM)	.21**	.13	.15*	.29**	.35**	.32**	.17*	.15*	.31**

* Significantly different from 0 at $p < .05$.

** Significantly different from 0 at $p < .01$.

Table 6.4. Correlations of Criterion Measures from High Fidelity Simulation with Archival Performance-Based Predictors and Criterion Measures.

	MSep	MFlow	A-SA	Comm	Coord	MTask	SectWk	Hifirate	OES7
High fidelity simulation ratings									
Maintain separation (MSep)		.83** 107	.86** 107	.80** 107	.82** 107	.83** 107	.84** 107	.89** 107	-.32** 103
Maintain efficient AT flow (MFlow)			.92** 107	.92** 107	.89** 107	.95** 107	.95** 107	.95** 107	-.20* 103
Attention, Situation Awareness (A-SA)				.90** 107	.88** 107	.92** 107	.93** 107	.95** 107	-.23* 103
Communications (Comm)					.88** 107	.94** 107	.94** 107	.94** 107	-.24* 103
Coordination (Coord)						.92** 107	.91** 107	.92** 107	-.20* 103
Multiple tasks (Mtask)							.97** 107	.97** 107	-.23* 103
Managing sector workload (SectWk)								.97** 107	-.24* 103
Overall rating (Hifirate)									-.25* 103
Number of operational errors in scenario 7 (OES7)									
AT-SAT criterion measures									
Rating Composite (Rating)	.34** 62	.40** 62	.34** 62	.37** 62	.42** 62	.41** 62	.42** 62	.38** 62	.09 59
Final CBPM score (CBPM)	.57** 62	.64** 62	.60** 62	.64** 62	.65** 62	.65** 62	.68** 62	.63** 62	-.05 59
Archival criterion measures									
OJT Hours Phase IX (HrsIX)	-.14 53	-.34* 53	-.26 53	-.27 53	-.27 53	-.33* 53	-.32* 53	-.30* 53	.03 52
Indication of Performance Phase IX (IPIX)	.08 56	-.02 56	.02 56	.03 56	-.01 56	-.02 56	.01 56	.00 56	.09 55
OJT Hours Phase XII (HrsXII)	-.24 51	-.35* 51	-.29* 51	-.30* 51	-.22 51	-.34* 51	-.29* 51	-.35* 51	.08 50
Ind. of Performance Phase XII (IPXII)	-.05 56	-.04 56	-.01 56	.01 56	-.09 56	-.11 56	-.04 56	-.05 56	-.03 55
Time to FPL (TFPL)	-.11 45	-.30* 45	-.26* 45	-.21 45	-.18 45	-.25 45	-.25 45	-.23 45	.23 44
Archival performance-based selection test components									
Nonradar Average Instructor Assessment (AvIA)	.38** 55	.37** 55	.43** 55	.36** 55	.40** 55	.36** 55	.35** 55	.41** 55	-.23 53
Nonradar Average Technical Assessment (AvTA)	.53** 55	.50** 55	.57** 55	.48** 55	.51** 55	.53** 55	.49** 55	.54** 55	-.21 53
Nonradar Controller Skills Test (NCST)	.21 55	.24 55	.24 55	.18 55	.27* 55	.24 55	.23* 55	.26 55	.09 53
Radar Average Instructor Assessment (RIA)	-.18 30	-.08 30	-.07 30	-.12 30	-.15 30	-.03 30	-.11 30	-.10 30	-.35 29
Radar Average Technical	.51**	.57**	.55**	.60**	.55**	.65**	.58**	.60**	-.12

	MSep	MFlow	A-SA	Comm	Coord	MTask	SectWk	Hifirate	OES7
Assessment (RTA)	30	30	30	30	30	30	30	30	29
Radar Controller Skills Test (RCST)	.71** 21	.60** 21	.67** 21	.61** 21	.66** 21	.62** 21	.69** 21	.67** 21	-.01 21

Table 6.5. Correlations Between OPM Selection Tests and AT-SAT Predictor Tests (N=561).

	MCAT	**Abstract Reasoning**	**OKT**
AT-SAT Predictor Tests			
Applied Math: N items correct	.15** (.21)	.18** (.21)	-.06
Angles: N items correct	.09* (.13)	.23** (.27)	.04
Dials: N items correct	.11** (.15)	.13** (.16)	-.03
Memory: N items correct	.10* (.14)	.12** (.14)	-.11*
Memory Recall: N items correct	.10* (.14)	.14** (.17)	-.12**
Digit Span: N items correct	.10* (.14)	.04 (.05)	-.05
Time Wall: Time Estimation Accuracy	.13** (.18)	.16** (.19)	-.08
Time Wall: Perceptual Accuracy	.09* (.13)	.13** (.16)	-.11**
Time Wall: Perceptual Speed	.07 (.10)	.07 (.08)	.00
AT Scenarios: Efficiency	.13** (.18)	.09* (.11)	-.07
AT Scenarios: Safety	.11** (.15)	.09* (.11)	-.07
AT Scenarios: Procedural Accuracy	.02 (.03)	-.02 (-.02)	.09*
Analogies: Reasoning	.12** (.17)	.33** (.39)	-.08
Analogies: Latency	.04 (.06)	.01 (.01)	.01
Analogies: Information Processing	.03 (.04)	-.04 (-.05)	-.02
Letter Factories: N letters correctly placed	.13** (.18)	.10* (.12)	-.07
Letter Factories: Planning, Thinking ahead	.15** (.21)	.17** (.20)	-.16**
Letter Factories: Situational Awareness	.17** (.24)	.25** (.30)	-.19**
Planes: Projection	.04 (.06)	.01 (.01)	-.08
Planes: Dynamic Visual/Spatial	.03 (.04)	.04 (.05)	-.09*
Planes: Timesharing	.10* (.14)	.07 (.08)	-.06
Scan: Total Score	.11** (.15)	.10* (.12)	-.04

* Significantly different from 0 at $p < .05$.
** Significantly different from 0 at $p < .01$.

Table 6.6. Correlations of AT-SAT Applied Math, Angles, and Dials tests with Archival Dial Reading, Directional Headings, Math Aptitude Tests, and High School Math Grades Biographical Item.

	Applied Math: N Items Correct	Angles: N Items Correct	Dials: N Items Correct
AT-SAT Predictor Tests			
Applied Math: N items correct		.51** 1043	.39** 1043
Angles: N items correct			.31** 1043
Dials: N items correct			
Archival tests			
Dial reading: N items correct	.52** 145	.37** 145	.22** 145
Dial reading: N items wrong	-.36** 139	-.28** 139	-.39** 139
Directional Headings: N correct Part 1	.12 171	-.02 171	-.05 171
Directional Headings: N correct Part 2	-.01 171	-.07 171	-.13 171
Directional Headings: N wrong Part 1	.13 99	.07 99	.04 99
Directional Headings: N wrong Part 2	.14 142	.18* 142	.16 142
Math Aptitude: Total score	.63** 240	.41** 240	.29** 240
Biographical item: Math grades in HS	-.34** 483	-.21** 482	-.13** 482

Table 6.7. Correlation of the Version of Air Traffic Scenarios Test Used in Pre-Training Screen Validation with the Version of Air Traffic Scenarios Test Used in AT-SAT Validation (N=61)

	AT-SAT Air Traffic Scenarios Test Score		
PTS Air Traffic Scenarios Test Score	Safety	Efficiency	Procedural Accuracy
Average Safety Score	-.42**	-.33**	-.06
Average Total Delay Time	-.06	-.45**	.05

* Statistically significant at $p < .05$.
**Statistically significant at $p < .01$.

Table 6.8. Oblique Principal Components Analysis of EQ Scales

EQ Scales	Communality	Factor	
		A	B
Composure	.657	.701	.179
Concentration	.706	.728	.183
Self Confidence	.742	.905	-.086
Sustained Attention	.604	.540	.340
Decisiveness	.766	.855	.036
Execution	.671	.820	-.019
Flexibility	.647	.639	.254
Taking Charge	.667	.902	-.191
Task Closure/ Thoroughness	.679	.736	.148
Tolerance for High Intensity	.594	.820	-.102
Interpersonal Tolerance	.765	-.085	.917
Consistency of Work Behaviors	.638	.110	.735
Working Cooperatively	.652	.056	.776
Self Awareness	.382	.337	.368
Variance Explained		56.02%	9.49%

Table 6.9. Description of 16PF Scales.

Low score		High score
Factor A: Reserved, detached, critical, aloof, stiff	vs.	Warmhearted, outgoing, easygoing, participating
Factor B: Poorer judgment, low mental capacity	vs.	Better judgment, high mental capacity
Factor C: Emotionally less stable, easily upset	vs.	Emotionally stable, calm
Factor E: Obedient, mild, submissive	vs.	Assertive, aggressive, dominance
Factor F: Serious, silent, slow	vs.	Happy-go-lucky, talkative, quick
Factor G: Undependable, frivolous	vs.	Conscientious, responsible
Factor H: Shy, careful, restrained	vs.	Adventurous, carefree, impulsive
Factor I: Tough-minded, acts on practical	vs.	Tender-minded, acts on sensitive intuition
Factor L: Trusting, conciliatory, accepting conditions	vs.	Suspecting, irritable, jealous
Factor M: Practical, conventional	vs.	Imaginative, unconventional
Factor N: Naivete, genuine	vs.	Shrewdness, polished
Factor O: Self-assured, secure, cheerful	vs.	Apprehensive, insecure, depressed.
Factor Q_1: Conservative, respecting traditional ideas	vs.	Experimenting, liberal
Factor Q_2: Socially group dependent	vs.	Self-sufficient
Factor Q_3: Careless of social rules, uncontrolled	vs.	Socially precise, controlled
Factor Q_4: Relaxed, composed	vs.	Tense, fretful

Table 6.10. Correlation of EQ and 16PF Scales

	EQ Comp	EQ Conc	EQ Consis	EQ Coop	EQ Decis	EQ Exec	EQ Flex	EQ Toler	EQ Slf Aware	EQ Slf Conf	EQ Attent	EQ Taking	EQ Inter	EQ Task
EQ Composure		.70**	.47**	.38*	.70**	.58**	.69**	.60**	.44**	.64**	.60**	.52**	.47**	.57**
EQ Concentration			.48**	.45**	.70**	.60**	.72**	.62**	.41**	.64**	.69**	.57**	.44**	.64**
EQ Consistency of Work Behaviors				.52**	.49**	.44**	.44**	.31**	.44**	.43**	.53**	.28**	.54**	.52**
EQ Working Cooperatively					.38**	.41**	.49**	.36**	.36**	.36**	.45**	.44**	.65**	.47**
EQ Decisiveness						.67**	.69**	.57**	.44**	.78**	.65**	.63**	.39**	.69**
EQ Execution							.54**	.59**	.47**	.66**	.57**	.67**	.34**	.67**
EQ Flexibility								.56**	.40**	.61**	.55**	.55**	.51**	.59**
EQ Tolerance for High Intensity									.34**	.56**	.49**	.59**	.30**	.57**
EQ Self Awareness										.45**	.46**	.37**	.36**	.44**
EQ Self Confidence											.55**	.68**	.31**	.68**
EQ Sustained Attention												.43**	.44**	.63**
EQ Taking Charge													.23**	.62**
EQ Interpersonal Tolerance														.40**
EQ Task Closure														
16 PF Scales:														
Factor A	-.01	.07	.06	.15**	.15**	.10*	.12**	.19**	-.01	.08	.01	.22**	.04	.09
Factor B	.04	.03	.01	.01	.11*	.00	.04	-.02	-.00	.00	.05	.06	-.03	.01
Factor C	.24**	.21**	.11*	.17**	.26**	.18**	.13**	.18**	.17**	.22**	.17**	.15**	.13**	.16**
Factor E	.16**	.09	-.20**	-.08	.21**	.16**	.13**	.14**	.01	.25**	.01	.27**	-.04	.08
Factor F	.00	.00	-.14**	.02	.04	.03	.05	.07	-.05	.08	-.14**	.13**	-.04	-.01
Factor G	.13**	.06	.22**	.20**	.14**	.15**	.13**	.15**	.15**	.16**	.14**	.14**	.13**	.15**
Factor H	.21**	.20**	.07	.21**	.32**	.26**	.20**	.27**	.09	.30**	.12**	.41**	.06	.23**
Factor I	-.10*	-.07	.08	.17**	-.02	-.04	-.02	-.02	.08	-.14**	.05	-.01	.05	.08
Factor L	-.13**	-.13**	-.16**	-.19**	-.16**	-.06	-.12*	-.10*	-.14**	-.04	-.20**	-.07	-.17**	-.11*
Factor M	.10*	.01	-.06	.01	.07	-.02	.08	-.02	.04	.03	.00	-.01	.13**	.01
Factor N	.03	.01	.17**	.08	.05	.07	.01	.05	.05	.01	.11*	-.04	.01	.07
Factor O	-.33**	-.25**	-.15**	-.12**	-.32**	-.23**	-.21**	-.22**	-.16**	-.25**	-.19**	-.21**	-.20**	-.20**
Factor Q_1	.15	.06	-.12*	-.05	.10*	.10*	.09	.09	.05	.12*	.05	.11*	.01	.05
Factor Q_2	.06	-.10*	-.21**	-.30**	-.11*	-.05	-.06	-.07	-.02	-.05	-.08	-.19**	-.10*	-.11*
Factor Q_3	.23**	.18**	.23**	.15**	.23**	.23**	.14**	.18**	.20**	.24**	.18**	.15**	.12*	.24**
Factor Q_4	-.34**	-.23**	-.22**	-.28**	-.29**	-.25**	-.20**	-.23**	-.25**	-.23**	-.27**	-.20**	-.25**	-.23**

Table 6.11. Results of Multiple linear Regression of OPM Rating, Final Score in Nonradar Screen Program, and AT-SAT Predictor Tests on AT-SAT Composite Criterion Measure (N=586)

Variable	R	R^2	R^2 change	Beta	*t*	Sig. level
Analogies: Reasoning	.314	.099	.099	.22	5.16	.001
Final score in Nonradar Screen program	.417	.174	.075	.25	6.73	.001
Applied Math: N correct	.431	.186	.012	.11	2.68	.008
Scan: Total Score	.444	.197	.011	.10	2.69	.007
EQ: Unlikely virtues	.455	.207	.010	-.10	-2.73	.007
AT Scenarios: Procedural Accuracy	.465	.216	.009	.10	2.56	.011