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Investigating Training Performance in the Special Forces Qualifications Course

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Investigating Training Performance in the Special Forces Qualifications Course (SFQC)

Presented at:

18th Annual Conference of the Society of Industrial and
Organizational Psychology in Orlando, FL



Eric A. Surface
April 12, 2003

Overview

- ◆ Background & Context
- ◆ Research Questions
- ◆ Methodology
- ◆ Findings & Discussion
- ◆ Future Directions



Goals

- ◆ Phase II of Project A Team deals with training performance
- ◆ **Goals:**
 - To model and understand training performance in SFQC.
 - To utilize a multidimensional model at the latent level.
 - To provide the basis for linking training data with SFAS and field performance data.
 - To create a SFQC database of scores and ratings for additional research.



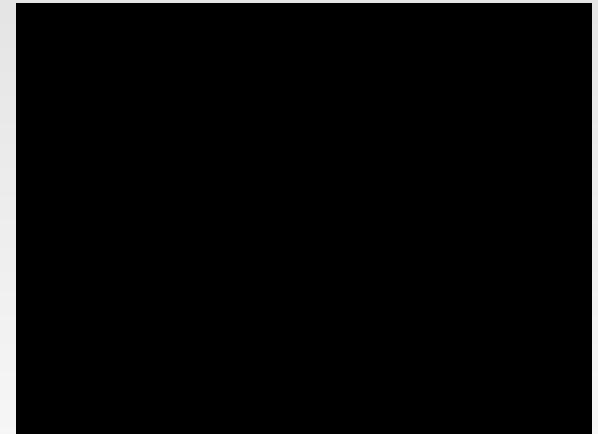
SF Context

- ◆ “Quiet Professionals”
- ◆ Strategic, multi-purpose force capable of rapid response to various contingencies
- ◆ Consequences of failure can be high.
- ◆ Ensuring each SF soldier has the necessary skills to performance his duties effectively is of paramount importance.



Current SF Pipeline

- ◆ Phase 1: SFAS
- ◆ Phase 2: SFQC Individual Training
- ◆ Phase 3: SFQC MOS Training
- ◆ Phase 4: SFQC Collective Training
- ◆ Phase 5: Language Training
- ◆ Phase 6: SERE



SFQC Context

- ◆ 4 iterations a year.
- ◆ SFQC typically takes 18-24 months
- ◆ Three Phases:
 - Phase I (now Phase II): Individual Training
 - Land navigation, small unit tactics (SUT), & live fire training
 - Phase II (now Phase III): MOS Training
 - 5 MOS courses (18A, 18B, 18C, 18D, 18E)
 - Phase III (now Phase IV): Team Training
 - SF mission training, isolation, & Robin Sage



Conceptual Background

- ◆ Training Evaluation
 - Sackett and Mullen (1993)
 - Level of Proficiency Evaluation
 - Kraiger, Ford, & Salas (1993)
 - Cognitive, Skill-based, & Affective
 - Model has not been operationalized at the latent level
 - Herold, Davis, Fedor, & Parsons (2002)
 - Training performance across multiple phases
- ◆ BE, KNOW, DO (Army FM 100)



Research Questions

- ◆ Validating a multidimensional criterion model was the first step in training research plan.
- ◆ Research Questions:
 - *Does the three-factor model describe training performance at the course level?*
 - *Does the three-factor model describe training performance at the phase level?*
 - *Are similar training performance constructs related across time and phase?*



Methodology

- ◆ Archival Data Collection from Training Folders
- ◆ Participants
 - 1441 Graduates of SFQC from 4-96 to 1-2000
 - 1996 ($n = 12$), 1997 ($n = 323$), 1998 ($n = 502$), 1999 ($n = 520$), and 2000 ($n = 84$)
 - 18A ($n = 294$), 18B ($n = 359$), 18C ($n = 321$), 18D ($n = 202$), and 18E ($n = 265$)
 - Course-level ($n = 822$) and Phase-level ($n = 558$)



Methodology

- ◆ Data Collection & Cleaning
- ◆ Constructs Operationalized by Question
- ◆ Analytic Philosophy
 - Confirmatory Strategy (CFA & SEM)
 - Independence Clusters Philosophy
 - Tried to eliminate confirmation bias
- ◆ SAS PROC CALIS for CFA and SEM

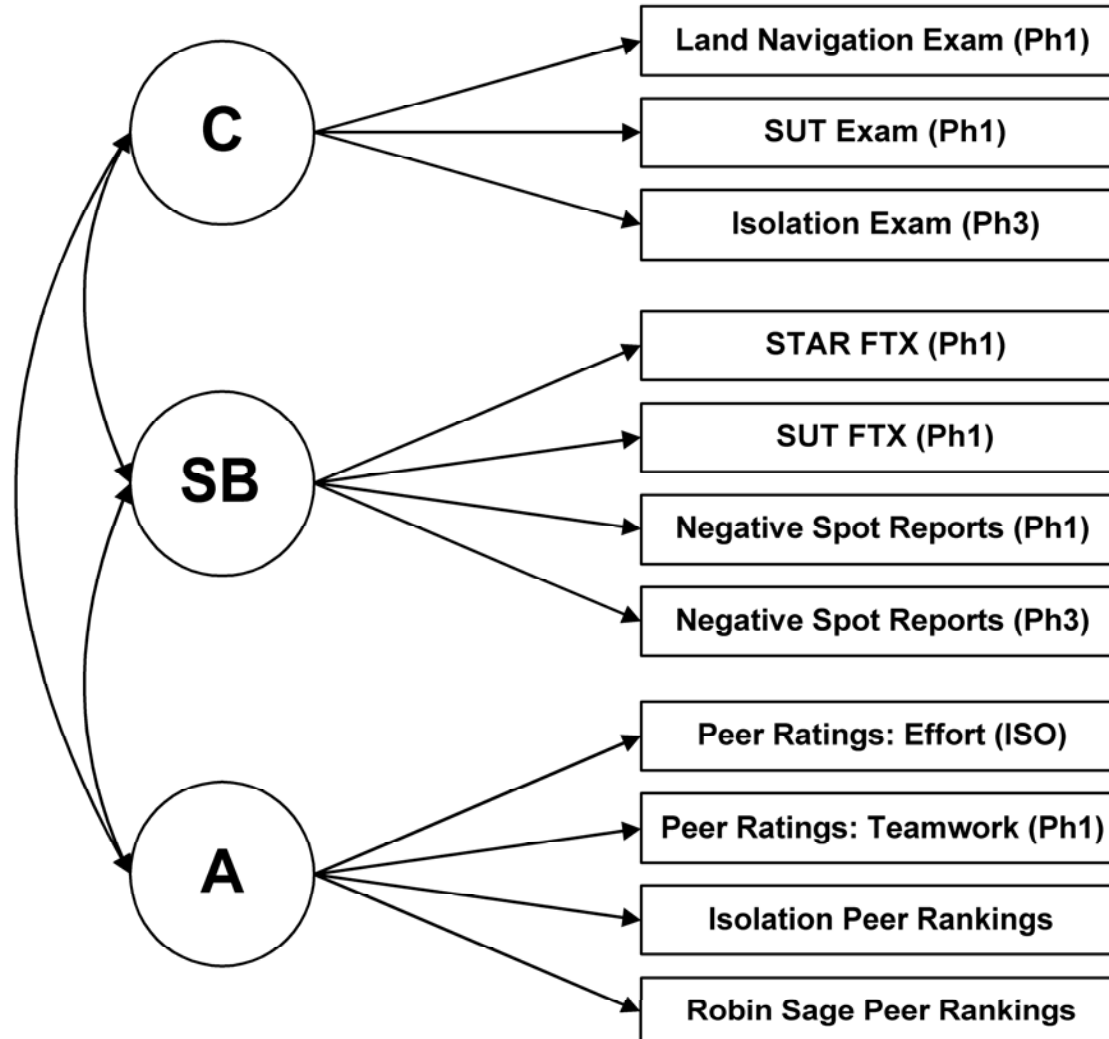


Manifest Indicators by Model

Latent Variables	Manifest Indicators by Model		
	Course-Level	Phase-Level	
		Phase One	Phase Three
Cognitive Criteria	Land Navigation Exam (Ph1) SUT Exam (Ph1) Isolation Exam (ISO)	Land Navigation Exam (Ph1) SUT Exam (Ph1)	Isolation Exam (ISO) Comprehensive Exam (Ph3)
Skill-based Criteria	Negative Spot Reports (Ph1) Negative Spot Reports (Ph3) STAR FTX (Ph1) SUT FTX (Ph1)	STAR FTX (Ph1) SUT FTX (Ph1) Negative Spot Reports (Ph1)	Peer Ratings: Tactical (RS) Peer Ratings: Leadership (RS) Negative Spot Reports (Ph3)
Affective Criteria	Peer Ratings: Effort (ISO) Peer Ratings: Team (Ph1) Peer Rankings (ISO) Peer Rankings (RS)	Peer Ratings: Effort (Ph1) Peer Ratings: Team (Ph1) Peer Ratings: Social (Ph1)	Peer Ratings: Effort (RS) Peer Ratings: Team (RS) Peer Ratings: Social (RS)



Initial CFA Model: Course-Level



Fit Statistics: Course-Level

Model	<i>N</i>	χ^2	<i>df</i>	$\Delta \chi^2$	GFI	CFI	NNFI	SRMSR	RMSEA	
Sample 1		410								
Null		175.24	44		.93	.83	.79	.11	.09 (.07-.10)	
Initial		95.35	41	79.89***	.96	.93	.91	.05	.06 (.04-.07)	
Final		79.03	32	16.32	.96	.94	.91	.05	.06 (.04-.08)	
Sample 2		412								
Null		193.05	44		.92	.81	.76	.12	.09 (.08-.10)	
Initial		102.14	41	90.91***	.96	.92	.90	.05	.06 (.05-.08)	
Final		86.95	32	15.19	.96	.93	.90	.05	.07 (.05-.08)	



Correlations between Latent Variables for the Course-Level Data

Latent Variables	Sample 1 Initial Model	Sample 1 Final Model	Sample 2 Initial Model	Sample 2 Final Model
Cognitive-Skill	.62	.61	.54	.51
Cognitive-Affective	.56	.55	.55	.55
Skill-Affective	.38	.36	.44	.42

Note: Unless otherwise indicated, all parameters estimates are significant at $p < .001$.



Fit Statistics: Phase I

Model	<i>N</i>	χ^2	<i>df</i>	$\Delta \chi^2$	GFI	CFI	NNFI	SRMSR	RMSEA
Sample 1									
	279								
Initial		31.26 (.0186)	17		.97	.99	.98	.05	.06 (.02-.09)
Final		9.37 (.5877)	11	21.89**	.99	1.00	1.00	.03	.00 (.00-.06)
Sample 2									
	279								
Initial		52.79	17		.96	.97	.94	.05	.09 (.06-.11)
Final		33.07 (.0005)	11	19.72**	.97	.98	.96	.05	.09 (.05-.12)



Correlations between the Latent Variables for Phase I

Latent Variables	Sample 1 Initial Model	Sample 1 Final Model	Sample 2 Initial Model	Sample 2 Final Model
Cognitive-Skill	-.67	.65	.84	.84
Cognitive-Affective	.43	.43	.40* ($t = 3.17$)	.40* ($t = 3.16$)
Skill-Affective	-.51	.54	.54	.60

Note. Unless otherwise indicated, all parameter estimates are significant at $p < .001$.

* $p < .01$.



Fit Statistics: Phase III

Model	<i>N</i>	X^2	<i>df</i>	ΔX^2	GFI	CFI	NNFI	SRMSR	RMSEA
Sample 1 279									
Initial		52.09	17		.96	.98	.97	.05	.09 (.06-.11)
Final		35.29 (.0002)	11	16.80*	.97	.99	.98	.04	.09 (.06-.12)
Sample 2 279									
Initial		46.98	17		.96	.98	.97	.05	.08 (.05-.11)
Final		27.43 (.004)	11	19.55**	.97	.99	.98	.04	.07 (.04-.11)



Correlations between the Latent Variables for Phase III

Latent Variables	Sample 1 Initial Model	Sample 1 Final Model	Sample 2 Initial Model	Sample 2 Final Model
Cognitive-Skill	.33	.33	.53	.53
Cognitive- Affective	.16* ($t = 1.76$)	.16* ($t = 1.75$)	.23* ($t = 1.66$)	.23* ($t = 1.66$)
Skill-Affective	.88	.87	.83	.83

Note. Unless otherwise indicated, all parameter estimates are significant at $p < .001$.

* $p > .05$



Fit Statistics: Phase I to Phase III

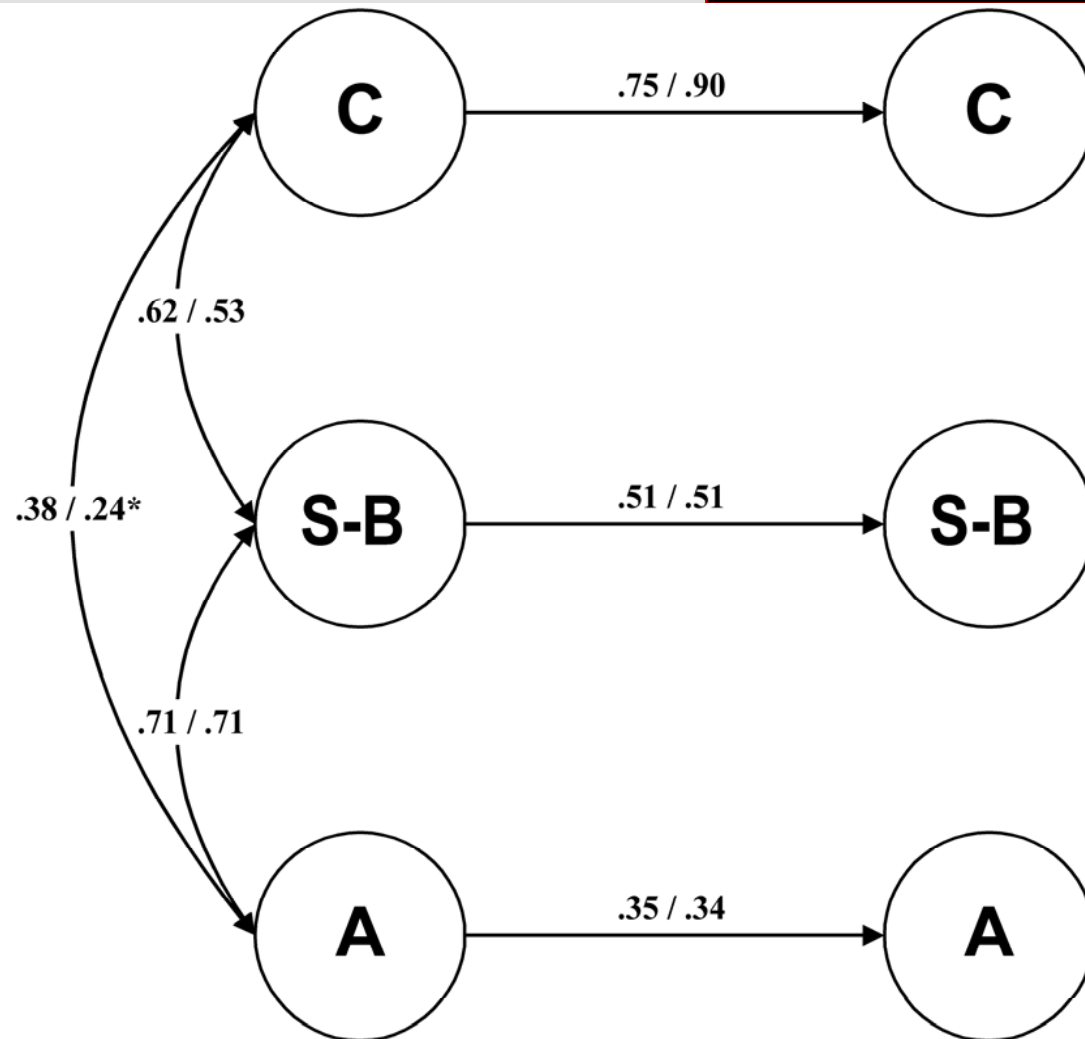
Model	<i>N</i>	X^2	<i>df</i>	ΔX^2	GFI	CFI	NNFI	SRMSR	RMSEA
<u>Sample 1</u>									
Initial	279	449.02	71		.87	.87	.84	.17	.14 (.13-.15)
Final		112.40 (.001)	70	336.62*	.95	.99	.98	.05	.05 (.03-.06)
<u>Sample 2</u>									
Initial	279	428.84	71		.86	.87	.84	.16	.14 (.12-.15)
Final		143.86	70	284.98*	.93	.97	.97	.06	.06 (.05-.08)

All X^2 values are significant at $p < .0001$ unless otherwise indicated. All ΔX^2 values are not significant unless otherwise marked.

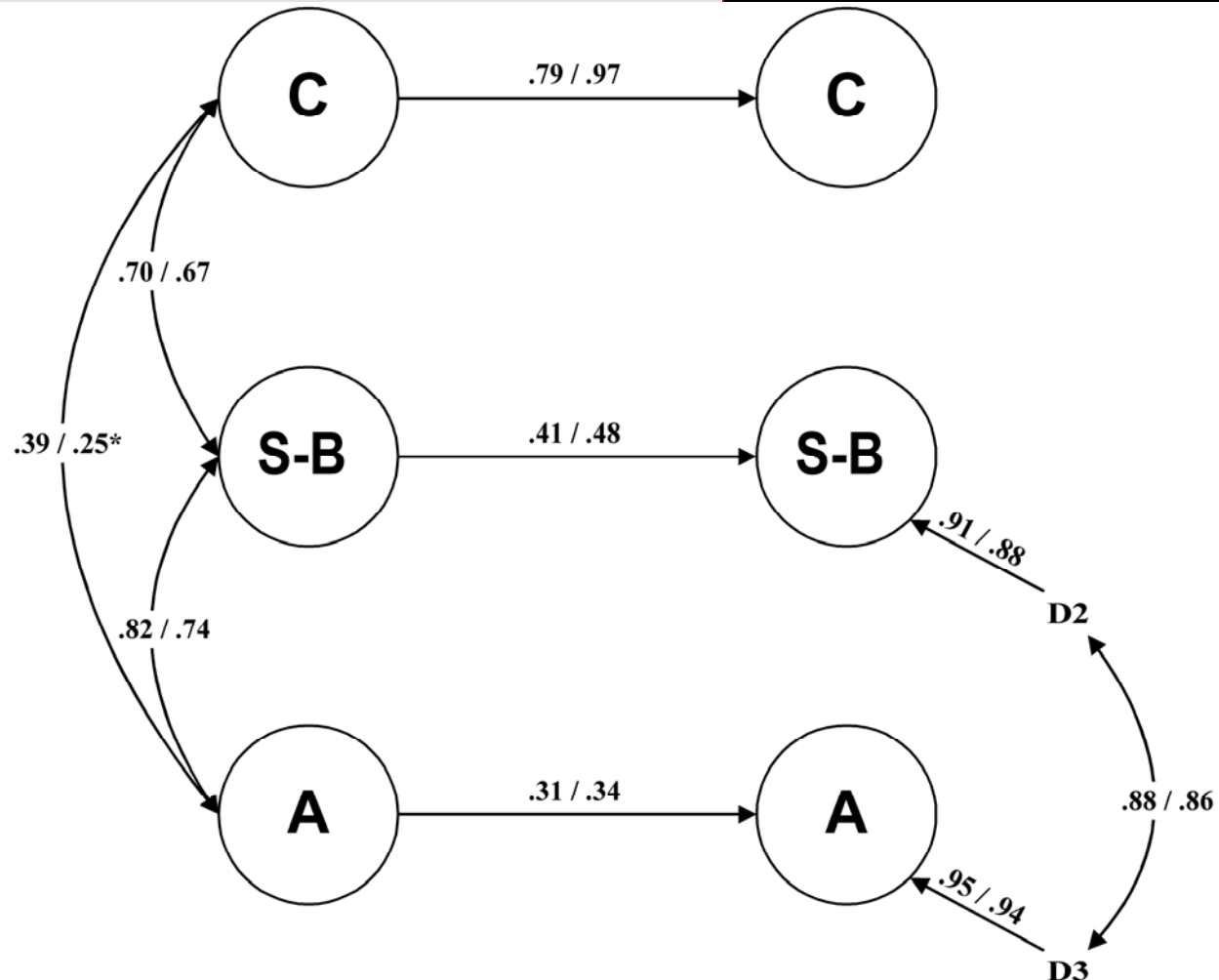
* $p < .0001$



Initial Structural Model for Phase I to Phase III



Final Structural Model for Phase I to Phase III



Findings Summarized

- ◆ The three-factor Kraiger et al. (1993) model was successfully confirmed at the latent level.
 - Course-Level
 - Phase-Level (Phase I and III)
 - MOS (Not Presented)
 - Alternative models tested and did not fit the data as well (Not Presented)
- ◆ The training performance constructs in the initial phase of training predicted their counterparts in a later phase of training.



Discussion

- ◆ First latent confirmation of the Kraiger et al. (1993)
- ◆ Scalable to level of training specificity
- ◆ Multiple manifest indicators can be utilized to operationalize the constructs.
- ◆ Latent correlations are impacted by the manifest variables utilized, therefore, these relationships must be interpreted on a case-by-case basis.



Discussion

- ◆ Suggests a multidimensional criterion model can be useful for SF research.
- ◆ Training can be related at the latent level to field performance and predictor data.
- ◆ Results suggest time and/or situational factors influence performance.
- ◆ Results suggest differences in MOS that are related to the use of cognitive ability for selection & placement.



Future Directions

- ◆ Measures and Data Collection
 - Improving existing measures and data collection
 - Developing supplemental measures
 - Electronic data collection (e.g., PDA)
- ◆ Performance Modeling
 - Extending to other training phases (e.g., language training)
 - Modeling the Situation—Utilizing CFA and LGM
- ◆ Predictor-Criterion Modeling
 - Collaborations with both the three-factor and situational models
- ◆ Training Evaluation Research



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- Organizational effectiveness
- Test development and validation
- Program/training evaluation
- Work/job analysis
- Needs assessment
- Selection system design
- Study and analysis related to human capital issues
- Metric development and data collection
- Advanced data analysis

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