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Information Processing Changes Following Extended Stress

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The psychological states and cognitive performance capacities of military participants were assessed prior to and following 1 week of field training at a Navy Survival, Evasion, Resistance, and Escape (SERE) School. The effect of this exposure resulted in significant cognitive performance deterioration and an increase in reported levels of subjective discomfort. Simple Reaction Time increased, and the capacity to perform information manipulation tasks such as Spatial Processing and Code Substitution deteriorated. Logical Reasoning proved the most susceptible of all tasks to the effects of the weeklong stressful exposure. These various effects were evident only in interaction with time on task. In the testing session following the stressful field exposure, participants' immediate response was at a level similar to their pretraining baseline. However, unlike their preexposure session, performance in the later condition declined as the session progressed. This pattern suggests that immediately following the stress exposure, participants are able to sustain their normal performance but only for a limited period of time. Because the duration of any one single task, each being less than 1 min, was very brief, the results indicated that this time-based degradation was fairly rapid. Overall results indicate, therefore, that for stress assessment, Simple Reaction Time task may be usefully and pragmatically diagnostic of stress-induced deterioration. Our results further indicate that cognitive performance decrements are associated with subjective report of decreased vigor and increased difficulty in concentrating. In addressing the issue of sustained performance capacity and resilience following extended stress exposure, we seek to facilitate one goal—a modern objective force that is responsive to rapid changes in mission profile and operations. These findings indicate that crucial information-processing response measures help to achieve this aim.

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In combat, soldiers experience sleep loss, high levels of physical and psychological discomfort, prolonged periods of heightened vigilance, and extreme danger (Hancock & Hoffman, 1997). Such battlefield conditions can completely incapacitate some soldiers (Mareth & Brooker, 1982), but the response variation of soldiers who continue to fight is more difficult to estimate. Performance disruption produced by stress can be inferred from reports that a large proportion of soldiers fail to fire their weapons in combat (Marshall, 1947) and the demonstration of impaired performance in simulated battlefield conditions (Villoldo & Tarno, 1984). Recognition of that and of allied findings means that the concern for the effect of stress on military personnel is not a new one. However, its importance is increasing in proportion to the complexity of equipment being developed to enhance war-fighter capability. Preparing for the high-tech battlefield therefore requires knowledge of information-processing tasks or task components that promise to be most vulnerable to stress (Orasanu & Backer, 1996). Our purpose here is to evaluate the change in such capacities under the effects of a realistic, operational stress.

Military personnel clearly exhibit performance variation during times of real stress (Belland & Bissell, 1994). Berkum (1964) showed that there are disruptive effects in response to just the perception of danger. Performance decrements in combat would be predicted because military decisions involve such a wide spectrum of information-processing components (Wickens & Flach, 1988), and stress impairs each of these different information-processing stages (see Hancock, 1986; Wickens, 1996). However, such stress-induced cognitive changes that have been proposed as the basis of reduced operational performance have been difficult to detect in general (Callister, Percival, & Retzlaff, 1999; Elsmore, Naitoh, & Linnville, 1992; Slaven & Windle, 1999).

Estimating the cognitive changes that occur in operational settings will always be difficult. Combat involves highly stressful incidents, embedded in extended periods of quiescence that still represent a chronic stress. The majority of soldier decisions are not made during actual combat but in comparatively less stressful, normal operating conditions. However, the quality of even these decisions is crucial to operational effectiveness. It is anathema to administer assessment instruments during an infantry engagement, but it is possible to collect data that can be used to model and predict cognitive performance change in the operational environment. In our study we sought to examine this issue by administering a battery of performance tasks immediately following stressful conditions specifically constructed to represent as closely as possible those present in actual operational settings. Thus, the specific goals of our work were (a) to assess the type and amount of cognitive change that follow a period of sustained physical and psychological stress, (b) to measure the subjective change that occurred during this period, and (c) to determine the relationship between subjective and cognitive performance change.

EXPERIMENTAL METHOD

Experimental Participants

Thirty-five active duty Navy and Marine Corps personnel enrolled in the Navy Survival, Evasion, Resistance, and Escape (SERE) School in Brunswick, Maine, acted as participants in the study. They were not recompensed in any way for their voluntary participation.

Assessment Instruments

The performance of complex tasks is often conceived as dependent on the person's ability to complete a sequence of simpler operations (Wickens & Flach, 1988). In consequence, a cognitive battery was selected that included tasks that represent critical components of complex real-world performance. The abilities to attend, perceive, abstract, and process information and to access information from memory were the prime components of information processing chosen. The effects of stress on information processing should be reflected in changes in one or more of these respective components. The Automated Neurological Assessment Metric (ANAM) battery was developed to assess such components of cognitive performance (Reeves et al., 1991). The ANAM is a computerized battery of cognitive functioning tests adapted from the Walter Reed Performance Assessment Battery (Englund et al., 1987), and respective subtests are available that assess the cited information-processing stages (Englund et al., 1987). In our study, subtests from the ANAM were used; the subtests assess cognitive abilities that have been proposed to comprise the information-processing components of complex tasks, including reaction time, stimulus encoding, memory, and the manipulation of spatial and symbolic information. The subtests were also selected based on their appropriateness for testing in sustained operations settings (Reeves et al., 1991). Selected tests included Simple Reaction Time (SRT), Code Substitution (CDS), Spatial Processing (SPD), Logical Reasoning (LRS), two memory set tasks (i.e., a Sternberg memory task [Sternberg, 1969] with a two-item memory set [ST2] and a six-item memory set [ST6]), and the Continuous Performance Task (CPT).

The experimental design entailed administration of the ANAM three times before field training and a comparison of the third and last prestress administration with immediate postfield training scores. Benedetto, Harris, and Goernert (1995) found that for repeated ANAM administration, scores improved rapidly during the first three administrations, after which time there were only small improvements. A classroom training session was included to maximize the effect of the present training regime. A particular concern was the effect of the weeklong exposure between the third and fourth ANAM administrations. Benedetto et al. only examined performance during repeated testing when assessments occurred during a single session. To estimate the expected ANAM score change between Sessions 3 and 4 when 1 week separated the sessions, 15 student members of the Army Reserve Officer Training Corps completed the same testing regime as the study participants. Accuracy and response time scores across Sessions 3 and 4 did not differ significantly, multivariate analysis of variance (MANOVA), $F(7, 8) = 0.47$, $p < .84$, and $F(7, 8) = 2.18$, $p < .15$, respectively. There was a trend toward faster responding in the more complex tasks (LRS, CDS, and SPD) during the fourth session. These results are consistent with all previous findings that the majority of improvement during repeated administration of the ANAM occurs during the second and third administrations but that small changes may be anticipated in the more complex tasks. It is evident from the test performed that this pattern persists when the third and fourth sessions are separated by 1 week. As a result of this companion evaluation, we ensured that changes in performance observed in the survival school participants were due to the stress exposure, not simply the weeklong hiatus in the training schedule.

Subjective state was assessed using the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1992), and the Sustained Operations Assessment Profile (SOAP; Retzlaff, King, Marsh, & French, 1997). The POMS comprises 65 adjectives, and participants were directed to indicate on a 5-point scale the degree to which each adjective was consistent with their current state. The POMS measures six specific mood states: Tension–Anxiety, Depression–Dejection, Anger–Hostility, Vigor–Activity, Fatigue–Inertia, and Confusion–Bewilderment. Approximately 5 min are required to complete the POMS. The SOAP is a list of 90 short phrases. Participants indicate the degree to which each item matches their current feelings on a 5-point scale. The SOAP scales are Poor Concentration, Boredom, Slowed Reactions, Anxiety, Depression, Irritability, Fatigue/Low Energy, Poor Sleep, Work Frustration, and Physical Discomfort.

Experimental Procedure

After signing the informed consent document, participants completed an ANAM training session, which included classroom instruction that summarized the assessment materials and two practice sessions. The training battery included on-screen instructions and comprised 10 trials per task. After training, participants completed the ANAM, the POMS, and the SOAP. Two SERE classes were tested. Prefield assessment of the first SERE class of 19 occurred at 1600 hr the day before they began field training. The second class of 16 completed the battery in the morning immediately before being transported to the training site. SERE students then completed the 7-day field-training exercise, which included survival training and an exercise that simulated being isolated in hostile territory. The training presented many of the elements of military operations, including physical discomfort, sleep loss, and high levels of perceived threat. Training encompasses those basic skills necessary for worldwide survival: expedite search and rescue efforts; evade capture by hostile forces; resist interrogation, exploitation, and indoctrination; and escape from detention by enemy forces in accordance with Department of Defense Directive 1300.7. Participants completed the ANAM battery, the POMS, and the SOAP immediately after they disembarked from the transport, which had brought them from the training site. The postfield training assessments were obtained at 1600 hr.

EXPERIMENTAL RESULTS

Cognitive performance and subjective state were measured before and after 1 week of SERE training. Assessment batteries contained multiple subscales; therefore, pre- and postfield training scores were initially compared using a MANOVA employing the Wilks's lambda criterion to determine whether pre- and posttraining assessments differed. Contingent on the outcome of the overall MANOVA significance level, individual scale changes were examined to determine their contribution to any observed differences. An analysis was then performed to examine the relationship between subjective state changes and cognitive performance changes.

Cognitive Performance

Analysis showed that accuracy changed significantly during the week of field training, MANOVA, $F(6, 24) = 5.56$, $p < .001$. Univariate analysis of accuracy scores indicated that the accuracy of SPD and the CPT improved significantly ($p < .02$ and $p < .03$, respectively). ST2 memory accuracy decreased to the extent that the analysis showed change, which approached the traditional level ($p < .06$). The overall data for accuracy on the ANAM tasks are summarized in Table 1. A significant change in response time was also found after field training, MANOVA, $F(7, 23) = 6.6$, $p < .001$. Univariate analysis indicated that SRT increased ($p < .03$) and that response time on SPD and one memory task (ST6) decreased ($p < .001$ and $p < .001$, respectively). All response time changes are presented in Table 1.

With two notable exceptions, these results are consistent with previous relevant findings (Callister et al., 1999; Elsmore et al., 1992; Slaven & Windle, 1999) that complex cognitive performance deterioration does not follow stressful exposure ubiquitously. Indeed, the accuracy of most tasks improved or was maintained after stressful exposure, and the ST6 was faster following stress. However, SRT was slower, and a trend toward less accurate performance on the least complex task, the ST2, was also found after the field exercise.

One explanation for the absence of complex cognitive task performance change after 1 week of stressful training coupled with the deterioration of SRT and a

TABLE 1
SERE ANAM Response Time and Accuracy

ANAM	*Accuracy*					*Response Time*				
Scale	*Pre*	*Post*	*Diff.*	*F*	*p <*	*Pre*	*Post*	*Diff.*	*F*	*p <*
SRT	100	100	0	—	—	224.3	234.7	10.4	5.16	.03*
CDS	96	96	0	<1	.623	1,014.0	1,007.3	–6.7	<1	.79
SPD	89.5	93.8	4.3	6.1	.015*	1,762.2	1,498.7	–263.5	17.8	.001*
LRS	88.1	86.5	–1.6	<1	.429	1,850.6	1,870.8	20.2	<1	.72
ST2	97.6	93.3	–4.3	3.8	.060	517.7	511.2	–6.4	<1	.73
ST6	92.2	93.2	1.0	<1	.497	758.1	674.9	–83.2	16.2	.001*
CPT	93.9	95.8	2.1	5.6	.029*	467.35	453.09	–14.26	4.04	.059

Note. SERE = Survival, Evasion, Resistance, and Escape; ANAM = Automated Neurological Assessment Metric; Diff. = difference; SRT = Simple Reaction Time; CDS = Code Substitution; SPD = Spatial Processing; LRS = Logical Reasoning; ST2 = two-item memory set; ST6 = six-item memory set; CPT = Continuous Performance.

*Denotes significant level of change.

low-demand memory task is that participants masked impaired cognitive functioning by increasing effort during the relatively brief assessment period, akin to the "end burst" effect in vigilance tasks. The absence of complex task change is consistent with reports that complex cognitive performance can be maintained during fatigue by increased effort during brief assessments (see Angus & Haslegrave, 1985). The decrements on the two least demanding tasks, SRT and the ST2, can be explained by a differential sensitivity of simple and complex tasks to effort. For example, Heuer, Spijkers, Kiesswetter, and Schmidtke (1998), among others, contended that increasing effort can maintain complex but not simple task performance. As increasing effort becomes more difficult as time on task increases (see Hancock & Desmond, 2001), the degree of performance decline during a trial would reflect this effort allocation required to maintain performance. Thus, if stress impairs information processing but the effect on complex tasks was masked by increased effort, performance decrements would be predicted to appear as time on task increases. Subsequent analysis was therefore performed on within-session performance change to explore this effort compensation hypothesis.

Analysis of Within-Session Cognitive Performance Changes

The within-session analysis compared accuracy and response time changes during the pre- and postfield training sessions. For each session, an average performance was calculated for the first- and second-half portions of trials, and the differences were subjected to analysis. There were 20 trials per subtasks, and because the first

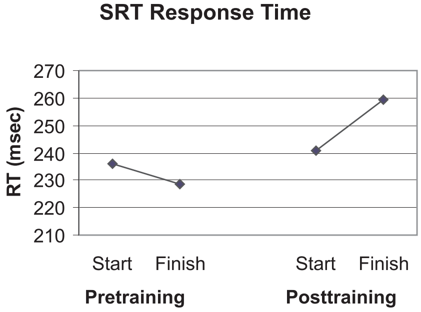

FIGURE 1 Within-session Simple Reaction Time (SRT) response time (RT) changes.

response is typically longer than responses during the remainder of the session, the mean of Responses 2 through 10 was compared with the mean of Responses 12 through 20. There were 64 trials in the CDS subtask, and Trials 2 to 21 were compared with Trials 45 to 64. Within-session changes during the pre- and posttraining sessions were then compared. The battery contained three types of tasks, and within-session performance changes are discussed separately for each type of task. SRT requires stimulus detection, and there is no manipulation or comparison of stimuli. In the previous analysis, mean posttraining reaction time was significantly slower than mean pretraining time ($p < .03$). The within-session analysis indicated that response time at the beginning of the pre-and posttraining sessions was similar; however, response time decreased during the pretraining session and increased during the posttraining session ($p < .05$). Figure 1 and Table 2 are illustrative confirmations of these effects.

Within-session changes of information manipulation tasks (CDS, LRS, and SPD) also differed during the pre- and posttraining sessions (Table 2). Although

TABLE 2
Within-Session Cognitive Performance Analysis

	Accuracy			*Response Time*		
Task	*Prechange*	*Postchange*	*p*	*Prechange*	*Postchange*	*p*
SRT				–7.31	18.2	.05*
CDS	–0.69	–1.10	.29	–115.4	107.0	.001*
SPD	0.90	–0.48	.001*	–25.50	15.84	.41
LRS	–0.17	–1.41	.008*	77.83	377.08	.006*
ST2	–0.28	0.62	.05*	15.32	37.18	.26
ST6	0.07	0.14	.75	–1.73	–85.41	.09
CPT	–1.0	–0.50	.36	–41.97	21.09	.008*

Note. SRT = Simple Reaction Time; CDS = Code Substitution; SPD = Spatial Processing; LRS = Logical Reasoning; ST2 = two-item memory set; ST6 = six-item memory set; CPT = Continuous Performance.

*Denotes significant level of change.

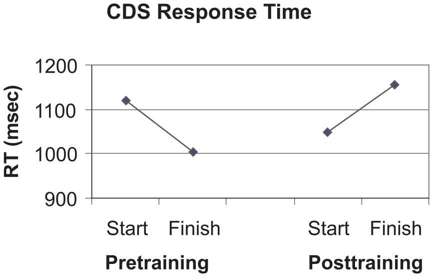

FIGURE 2 Within-session Code Substitution (CDS) response time (RT) changes during pre- and postfield training sessions.

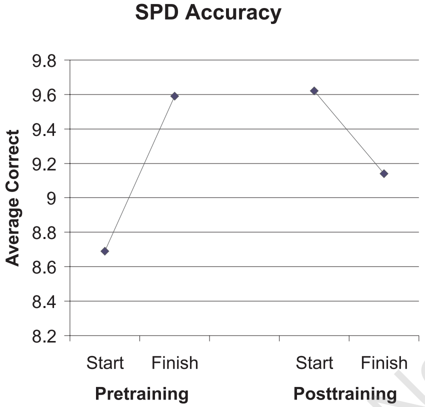

FIGURE 3 Within-session Spatial Processing (SPD) accuracy changes during pre- and postfield training sessions.

the specific change varied with the task, information management tasks were stable or improved during the pretraining assessment but then deteriorated during the posttraining session. CDS response time decreased during the pretraining trial but increased during the posttraining trial (Figure 2). SPD accuracy improved as the pretraining trial progressed and declined during the posttraining trial (Figure 3). LRS accuracy was relatively stable during the pretraining trials, but accuracy declined and response time increased as the posttraining trials progressed (Figure 4).

Significant differences between pre- and posttraining sessions were also noted for two of the memory tasks. ST2 accuracy was marginally worse ($p < .06$) during the posttraining session. In contrast to the within-trial pattern of information manipulation tasks, accuracy decreased as the pretraining trial progressed and increased in the later portions of the posttraining trial (Figure 5). The decreased accuracy in the posttraining session was therefore the result of poor initial performance during the posttraining session rather than change in performance during that session. The CPT showed response time decrease in the second session, which approached traditional significance level ($p < .06$). The within-session analysis indicated that response time decreased during the pretraining session but increased during posttraining trials ($p < .007$). Overall, the results of the within-session analysis suggest that previous studies did not find cognitive perfor-

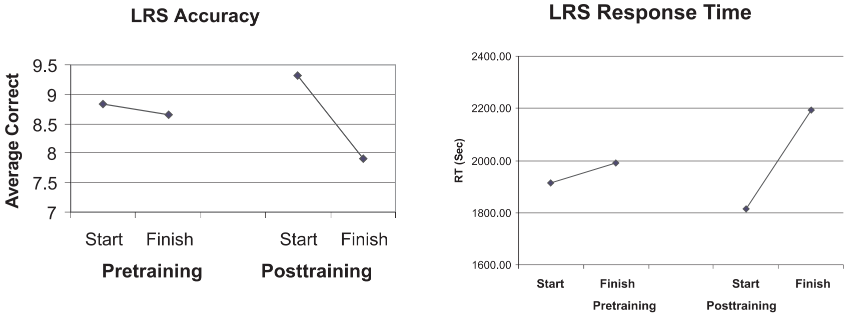

FIGURE 4 Within-session Logical Reasoning (LRS) accuracy and response time (RT) changes during pre- and postfield training sessions.

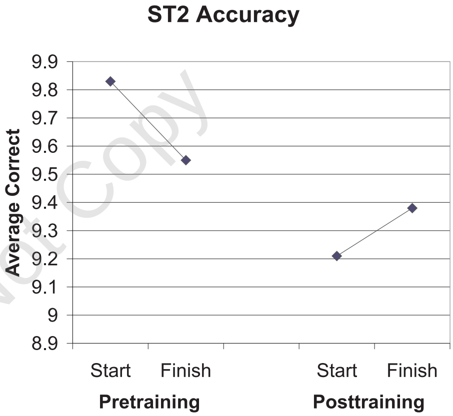

FIGURE 5 Within-session two-item memory set (ST2) accuracy changes during pre- and postfield training session.

mance decrements following stress because highly motivated participants were able to mask these complex task performance deficits by a transitory increase in effort during the relatively brief assessment interval. Because simpler performance tasks are relatively insensitive to the effects of effort, they do not show this change and thus show undisputed decrement effects.

Subjective State

For subjective state assessment, participants completed two paper-and-pencil measures, the POMS and the SOAP. Both measures indicated increased discomfort; however, there is no indication of serious psychological problems such as depression or tension/anxiety. Analysis of POMS data indicated that significant changes occurred during the week of survival training, MANOVA, $F(6, 29) = 32.44$, $p < .0001$. Univariate analysis indicated that Fatigue and Confusion scores increased and that the Vigor score decreased (all *p*s < .001). A summary of these changes is

TABLE 3
Profile of Mood States

Scale	*Pre*	*Post*	*Change*	*F*	*p <*
Tension	10.4	10.8	1.29	1.0	.321
Depression	7.5	6.6	1.37	1.43	.240
Anger	10.2	8.4	1.86	1.25	.272
Vigor	15.6	8.0	–7.83	50.4	.001*
Fatigue	45.4	67.5	19.31	179.6	.001*
Confusion	41.9	45.8	3.86	13.2	.001*

*Denotes significant level of change.

TABLE 4
SERE Students SOAP Changes

Scale	*Pre*	*Post*	*Change*	*F*	*p <*
Poor Concentration	20.0	26.3	5.97	21.96	.001*
Boredom	13.8	21.0	3.82	5.81	.022*
Slowed Reactions	15.6	28.6	12.47	85.85	.001*
Anxiety	18.59	19.91	1.32	1.08	.306
Depression	14.6	14.1	0.15	<1	.874
Irritability	18.7	19.8	3.06	4.72	.037*
Fatigue/Low Energy	16.6	37.2	21.82	219.82	.001*
Poor Sleep	21.0	30.7	15.15	64.51	.001*
Work Frustration	18.3	31.4	13.71	84.48	.001*
Physical Discomfort	39.0	24.32	250.93		.001*

Note. SERE = Survival, Evasion, Resistance, and Escape; SOAP = Sustained Operations Assessment Profile.

*Denotes significant level of change.

given in Table 3. A significant change occurred in SOAP profiles, MANOVA, $F(10, 24) = 33.8$, $p < .0001$. All scales changed significantly with the exception of the Anxiety and Depression subscales. As documented in Table 4, Fatigue and Physical Discomfort scales exhibited the largest changes.

Relationship Between Mood and Cognitive Performance Change

The effect of 1 week of SERE training that included physical discomfort, sleep disruption, and psychological stress produced reports of high levels of subjective discomfort and selective cognitive performance change. The significantly longer SRT and the marginal accuracy decrement on the ST2 suggest that these tasks are immediately sensitive to stress effects. A regression analysis was conducted to determine whether changes in these two cognitive tasks were related to subjective state self-report changes. SRT, the single response time that increased significantly following stress, was regressed on the POMS scales that changed during the week—Fatigue, Confusion, and Vigor. Analysis indicated a significant relationship between SRT and the three POMS subscales, $F(3, 15) = 4.41$, $p < .02$, adjusted $R^2 = .362$. The standardized coefficients and significance of the three scales were as follows: Fatigue, $\beta = -0.866$, $p < .30$; Confusion, $\beta = 0.627$, $p < .02$; and Vigor, $\beta = -0.292$, $p < .20$. Thus, although increased fatigue is the most prominent subjective change, it was the Confusion scale that was directly associated with increased SRT, not the Fatigue scale.

Although the level of accuracy change did not reach traditional levels of significance, the ST2 accuracy declined ($p < .06$), whereas slightly improved performance would be expected. The ST2 was therefore also regressed on the three POMS scales. Analysis indicated a significant relationship between the ST2 accuracy and the three POMS subscales, $F(3, 15) = 4.71$, $p < .02$, adjusted $R^2 = .382$. The standardized coefficients and significance of the three scales were as follows: Fatigue, $\beta = 0.355$, $p < .43$; Confusion, $\beta = 1.255$, $p < .06$; and Vigor, $\beta = 1.723$, $p < .01$. Decreased vigor was associated with decreased accuracy, but consistent with the relationship between mood and SRT, fatigue was not related to accuracy. Although the relationship between confusion and memory approaches significance, it is surprising to find that increased subjective confusion is associated with increased accuracy on the memory task.

Although performance changes are typically associated with fatigue (see Hancock & Desmond, 2001), the Fatigue scale was not related to presently recorded performance changes. However, decreased vigor and increased confusion were related to performance changes. This is consistent with some of our previous work that has indicated that changes in the Vigor scale of the POMS are most closely related to demanding physical performance (Bricker & Harris, 1999). It would appear that although people who have been exposed to an extended period of stress report that they are tired, concomitant reports of decreased vigor and thinking difficulty are better predictors of cognitive performance deterioration.

DISCUSSION

Military personnel perform physically and psychologically demanding tasks for extended periods during sustained and continuous operations, and the stress created under those conditions is expected to impair information processing (Wickens, 1996). However, several studies have surprisingly failed to detect significant acute cognitive performance deterioration in stressful military settings

(Callister et al., 1999; Elsmore et al., 1992; Slaven & Windle, 1999). This study examined cognitive performance change following a highly stressful military training exercise. Analyses provided an overall picture of cognitive performance variation that allowed testing of a number of subsidiary hypotheses. Subjective reports confirmed that the participants were physically uncomfortable after training and that fatigue increased and vigor decreased during the week of field training. In addition, participants reported difficulty concentrating in the posttraining session, a finding consistent with impaired information processing. In contrast to earlier studies, cognitive changes were found after 1 week of intense training. SRT was slower following field training. However, average complex task performance exhibited little change, which is consistent with earlier findings. However, when within-trial performance was examined to determine whether participants were maintaining poststress performance by exerting high levels of effort during the relatively brief assessment interval, it was found that transient levels of high performance could be maintained but that performance could not be sustained following chronic stress. The complex cognitive task performance deterioration within trials, which supports this interpretation, is consistent with the notion that performance at the beginning of the postfield assessment was at prestress levels as the result of increased effort (Angus & Haslegrave, 1985). Deterioration within the trial was thus the result of participants' decreasing ability to maintain effort with time on task (see Hancock & Desmond, 2001). Increased SRT would be predicted by Heuer et al. (1998), who contend that complex, but not simple, tasks can be maintained by effort. The within-trial analysis suggests that field training decreases participants' ability to continue to mobilize the resources required to perform complex tasks. Participants' ability to maintain performance levels appears to be quite limited as the number of stimulus presentations in each trial varied only between 20 and 64 and the time to complete a trial varied from 30 to 60 sec. The absence of cognitive deterioration in previous studies appears to be the result of assessment and data analysis procedures that masked complex cognitive task deficits by allowing transient effort to temporarily sustain performance level. In addition, assessments designed to detect changes in complex task performance have typically not included SRT, a task in which deficits are more difficult to mask. SRT may therefore provide an easily administered estimate of the effect of stress on complex cognitive performance.

Subjective reports are one tool to measure psychological state, but there is a reasonable concern that self-reports can be easily distorted and that they may not accurately convey psychological changes. In this study, subjective reports of vigor and ability to concentrate were related to cognitive performance variation. An unexpected finding was that although the dominant subjective change was increased fatigue, the fatigue changes themselves were not related to performance deterioration. These findings are consistent with reports that significant physical performance is related to vigor rather than fatigue (Bricker & Harris, 1999). The results of our study have implications for operators, equipment designers, and fitness for duty testing. After periods of extended stress, military personnel can be expected to have difficulty operating equipment requiring complex information-processing capacities, and as the change appears to be the result of a decreased capacity to exert effort, their difficulty should increase with the length of the task, the number of tasks, or the complexity of the task. When a brief assessment is necessary, increased SRT appears to be the best test, but when sufficient time is available to assess complex task performance, sufficient prestress training must be provided to ensure that performance has stabilized. Thus, trials must be of sufficient length to avoid the masking of deficits by increased effort, and within-trial changes should be assessed to determine whether performance deterioration is an ongoing process. The results of our study are consistent with the model that stress decreases resource reserves and that as time on task increases, the resources available to process information begin to decline rapidly (Hancock & Warm, 1989). Individuals prioritize tasks and allocate available resources to high-priority tasks when such resources become limited (Hockey, Wastell, & Sauer, 1998). Therefore, performance during the initial portion of posttraining sessions showed minimum deficits. However, as time on task increased, the effect of stress becomes apparent as less effort can be mobilized to perform tasks. Application of these findings is important for improved military functioning in all phases and theaters of operation.

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