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Adaptability in the Workplace:

Development of a Taxonomy of Adaptive Performance

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Abstract

The purpose of the present research was to develop a taxonomy of adaptive job performance and examine the implications of this taxonomy for understanding, predicting, and training adaptable behavior in work settings. Two studies were conducted to address this issue. In Study 1, over 1,000 critical incidents from 21 different jobs were content analyzed to identify an eight-dimension taxonomy of adaptive performance. Study 2 reports the development and administration of an instrument, titled the Job Adaptability Inventory (JAI), that was used to empirically examine the proposed taxonomy and investigate the presence of the eight adaptive performance dimensions in 24 different jobs. Exploratory factor analyses using data from 1,619 respondents yielded an eight-factor solution that mirrored the proposed eight-dimension taxonomy from Study 1. Subsequent confirmatory factor analyses on the remainder of the sample (N=1,715) indicated a good fit for the eight factor model. Results and implications for selecting and training an adaptable workforce are discussed.

Adaptability in the Workplace:

Development of a Taxonomy of Adaptive Performance

Today's organizations are characterized by changing, dynamic environments in which the need for adaptive workers has become increasingly important (Edwards & Morrison, 1994; Hollenbeck, LePine, & Ilgen, 1996; Ilgen & Pulakos, 1999; Smith, Ford, & Kozlowski, 1997). Although adaptability is not a new concept, the pace and types of change we are experiencing only continues to grow, which has caused research sponsors, academic researchers, and practitioners in organizations to become increasingly interested in understanding and enhancing adaptability in the workplace. For example, changing technologies and automation continue to alter the nature of work tasks (Patrickson, 1987; Thach & Woodman, 1994), requiring employees to learn new ways to perform their jobs. Mergers, "rightsizing," and corporate restructuring also require individuals to learn new skills to be competitive for different jobs (Kinicki & Latack, 1990). In a global economy, many jobs require individuals to learn to operate effectively in a variety of different countries and with individuals who possess different values and orientations than themselves (Black, 1990; Noe & Ford, 1992). Workers need to be increasingly adaptable, versatile, and tolerant of uncertainty to operate effectively in these changing and varied environments. Yet, adaptability, flexibility, and versatility are elusive concepts that have not been well defined in the psychological literature and are therefore difficult to measure, predict, and train effectively.

The purpose of the present research was to explore the concept of adaptive performance in work contexts and more precisely define the adaptive performance requirements of jobs. While the attributes individuals need to be adaptable and the processes by which adaptation occurs in organizations are important, it is our contention that it is not possible to accurately

specify what attributes lead to adaptive performance or how this adaptation occurs until we have a solid understanding of the job performance requirements we are trying to predict. In the next section, we discuss a general framework that was used as a model for developing the present taxonomy of adaptive performance.

A Framework for Developing a Model of Adaptive Performance

The goal of this research was to develop a taxonomy of *adaptive job performance* along the lines of the job performance model developed by Campbell, McCloy, Oppler, and Sager (1993). Specifically, Campbell et al. (1993) proposed and tested alternative models for the substantive content and latent structure of job performance. In their theory, job performance is defined as synonymous with behavior – it is what people do that can be observed and measured in terms of each individual's proficiency or level of contribution.

An important contribution of the Campbell et al. (1993) theory of performance was the specification of a taxonomy of eight major performance components, some subset of which can describe the highest order latent variables for every job in the occupational domain. The performance components include: (1) job-specific task proficiency, (2) non-job-specific-task proficiency, (3) written and oral communication, (4) demonstrating effort, (5) maintaining personal discipline, (6) maintaining peer and team performance, (7) supervision/leadership, and (8) management/administration. Since development of the initial performance taxonomy, additional substantive specifications for performance have been offered by several authors, including Borman and Motowidlo (1993), Ilgen and Hollenbeck (1991), Murphy (1989), and Organ (1997), among others. Campbell (1999) points out that the performance factors suggested by these authors can be easily integrated as sub-factors into the eight component taxonomy, forming a hierarchical description of the latent structure of performance. However, Campbell

(1999) also recently noted that an important performance component not included in the original model that would be a genuine addition to the taxonomy is one dealing with how well individuals adapt to new conditions or job requirements. Hesketh and Neal (1999) have also persuasively argued that the current partitioning of the performance domain into task and contextual performance be expanded to include adaptive performance. The primary purpose of the present research was thus to contribute to the performance model literature by defining and empirically examining adaptive performance in work contexts.

Defining Adaptive Performance

Numerous authors have discussed adaptability (see, for example, Ilgen & Pulakos, 1999) in relation to different phenomena at the individual, team, and organizational levels, often using many different names and definitions for this concept. For instance, Hesketh and Neal (1999) refer to "adaptive performance," Murphy and Jackson (1999) discuss "role flexibility," and London and Mone (1999) write about the proficiency with which individuals self-manage their new learning experiences. Further, adaptation has been discussed in relation to many different organizationally relevant variables (e.g., new people and teams, novel and ill-defined problems, different cultures, new technology, challenging physical conditions, and others), encompassing a wide range of behaviors across a variety of different task demands. Like Campbell et al (1993) argued with respect to performance in general, to identify what is important and to enable researchers to clearly define their variables, there needs to be understanding and consensus about what *adaptive performance* means across job, occupational, or role assessment situations. Towards this end, the present research began with a review of the literature that discussed different aspects of job-relevant adaptive performance to develop a definition and preliminary model that could be used as a starting point for understanding the adaptive performance

requirements of jobs. The following six preliminary dimensions of adaptive performance were conceptualized and developed based on this literature review.

Solving Problems Creatively. Adapting to novel situations or dynamic and changing situations frequently requires one to solve new and unfamiliar problems. Accordingly, one aspect of adaptive performance that has been discussed by several authors involves the effectiveness with which employees solve the atypical, ill-defined, and complex problems that confront today's work situations and organizations (e.g., Holyoak, 1991; Hatano & Inagaki, 1986). What is required in this aspect of performance is bringing complex matters or situations to their desired end or developing creative solutions to novel, difficult problems.

Dealing with Uncertain/Unpredictable Work Situations. Several authors have also discussed adaptability in relation to a wide variety of unpredictable and uncertain work situations. These situations can result from many different factors, including such things as formal organizational restructuring, shifting business priorities, reductions or changes in available resources, or joining a new organization or group (e.g., Ashford, 1986; Dix & Savickas, 1995; Weiss, 1984; Murphy, 1989; Edwards & Morrison, 1994; Goodman, 1994; Hall & Mirvis, 1995). Key aspects of performance that relate to such events are how easily workers adjust to and deal with the unpredictable nature of these situations, how efficiently and smoothly they can shift their orientation or focus when necessary, and the extent to which they take reasonable action, in spite of inherent uncertainty and ambiguity in the situation.

While this aspect of adaptive performance is certainly related to the problem-solving component discussed above in the sense that creative problem solving might be employed in a uncertain or unpredictable situation, the ease and effectiveness with which one confronts and deals with uncertainly in general is conceptually distinct from how creatively and effectively he

or she solves novel problems. Further, somewhat different predictors have been shown to be indicative these two general performance areas. For instance, research has shown that general intelligence, problem understanding, and problem solving constructs make unique contributions to creative problem solving performance (Hoover & Feldhusen, 1990; Krietler & Kreitler, 1987; Owens, 1969). On the other hand, personality constructs such as self-esteem, self-efficacy, and locus of control have been shown to be effective predictors of coping with uncertain and changing situations (e.g., Andersen, 1977; Jones, 1986; Callen, Terry, & Schweitzer, 1994). Thus, while creative problem solving and coping with unpredictable situations may well be related, we felt that they should be treated as distinct components of adaptive performance in our preliminary model.

Learning New Tasks, Technologies, and Procedures. A third aspect of adaptive performance discussed in the literature involves learning new ways to perform a job or learning different skill sets or tasks to re-tool for a job or new career (e.g., Kinicki & Latack, 1990; Noe & Ford, 1992; Patrickson, 1987; Thach & Woodman, 1994). This aspect of adaptive performance has become important largely as a result of the rapid pace of technological advancement and an increasing emphasis on continual learning in organizations. Today's workers are increasingly faced with technical innovation that is forcing them to learn new ways to perform their jobs (Hesketh & Neal, 1999). Similarly, continuous learning involves the ongoing process of planning for and participating in development to prepare for anticipated future job requirements (London & Mone, 1999). Many workers can no longer expect to learn one job or one set of skills and then apply these throughout an entire career. Instead, effective performers in today's organizations are those who anticipate future needs and adapt to changing job requirements by learning new tasks, technologies, procedures, and roles.

While technological and job change can certainly be conceived of as a type of unpredictable situation, the effectiveness with which one anticipates, prepares for, and learns future job requirements is conceptually distinct from how well they cope with ongoing ambiguous and uncertain work situations in general. Also, somewhat different predictors are likely to be associated with these different performance areas. Cognitively-oriented constructs have been shown to facilitate learning and skill acquisition (Ackerman, 1988; Fleishman, 1992) and are therefore likely to be important predictors of adaptive learning performance while, as discussed above, personality and temperament constructs are likely to be important predictors of the dealing with uncertainty dimension. Thus, while a relationship may exist between the learning and dealing with uncertainty aspects of adaptive performance, they were treated as separate components in the preliminary model.

Demonstrating Interpersonal Adaptability. A fourth aspect of adaptive performance that has been discussed by several researchers is interpersonal adaptability. The need for this type of adaptive performance has become salient due to more fluid work environments that are increasingly characterized by work or project teams (Hollenbeck, et al., 1996; Kozlowski, Gully, Salas, & Cannon-Bowers, 1996) and the shift from manufacturing-oriented businesses to service-oriented businesses (Schneider, 1994; Zeithaml & Bitner, 1996). More specifically, aspects of interpersonal adaptive performance that have been discussed in the literature include such things as demonstrating interpersonal flexibility, adjusting interpersonal style to achieve a goal, adapting interpersonal behavior to work effectively with a new team, co-workers, or customers, and being a flexible, responsive service-provider who can effectively anticipate and fulfill customer needs (e.g., Aronoff, Stollak, & Woike, 1994; Bowen & Schneider, 1988; Paulhus & Martin, 1988; Spiro & Weitz, 1990).

Demonstrating Cultural Adaptability. Another aspect of adaptive performance concerns adapting to cultural demands within an organization (Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994) or a new country (Black, 1990). With the globalization of the business environment and extent to which workers today change jobs and organizations, the ability to perform effectively in different cultures and environments is increasingly being recognized as important (Ilgen & Pulakos, 1999; Noe & Ford, 1992). As Chao et al. (1994) proposed, one component of this performance involves learning such things as language (another language entirely or acronyms, slang, and jargon that are unique to the organization or culture), goals and values (formal rules and principles as well as unwritten, informal goals and values that govern behavior), history (traditions, customs, myths, and rituals that convey cultural knowledge), and politics (formal and informal relationships and power structures within the culture). Beyond simply learning about a new culture or environment, however, the key aspect of this type of adaptive performance involves successfully *integrating* into a new culture or environment by fully understanding and willingly behaving in accordance with the accepted customs, values, rules, and structures operating within it.

Demonstrating Physically Oriented Adaptability. A final aspect of adaptive performance discussed in the literature involves adapting to various physical factors such heat, noise, uncomfortable climates, and difficult environments (e.g., Edwards & Morrison, 1984; Fiedler & Fiedler, 1975; Weinstein, 1978). Adapting quickly and effectively to different physical conditions is required in many different jobs (e.g., environmental sciences research jobs, foreign service jobs, law enforcement officers, expedition and travel-related jobs), but this aspect of adaptive performance is becoming especially important within the military and related jobs. With the collapse of the Soviet Union, the military's primary mission has changed from

protecting against a single, well-defined enemy to protecting against more varied and ill-defined enemies (Edwards & Morrison, 1984). The missions being undertaken today are unique and qualitatively different then those of the past, because they involve small intervention units that perform a variety of operations in many different cultures and climates. Quickly adapting to the varied and challenging physical conditions as one moves from country to country and climate to climate is a key aspect of effective performance in these types of jobs.

Summary of the Present Research

Due to the significant changes occurring in today's organizations, adaptive performance has become increasingly important in work environments. Although models have been published in the literature covering various aspects of the performance domain (e.g., technical performance, contextual performance), researchers have recently recognized a void in these models and have called for expansion of them to include adaptive performance components (Campbell, 1999; Hesketh & Neal, 1999; London & Mone, 1999; Murphy & Jackson, 1999). Accordingly, the primary purpose of the present research was to address this void and contribute to the performance model literature by developing and testing models of adaptive job performance, using the six preliminary dimensions described above as a starting point for this effort. Although the idea that adaptive performance is multidimensional seems reasonable based on the wide range of behaviors "adaptability" has encompassed in the literature, no published research to date has systematically defined or empirically examined specific dimensions of adaptive job performance. However, this is important because if subsequent advances are to be made in selecting adaptable workers or training adaptation skills, it is essential that we have a solid understanding of the "adaptive performance" we are trying to predict or improve through training.

The present research consisted of two studies. First, in Study 1, we sought to gather empirical evidence for the existence of the six proposed adaptive performance dimensions. Consistent with Campbell et al. (1993), performance was defined in terms of "behavior," and we examined the existence of the dimensions by content analyzing a large number of critical incidents from 21 different jobs that described work-relevant adaptive behavior. A revised taxonomy of adaptive performance containing eight dimensions resulted from this effort. Next, in Study 2, we developed an instrument to further assess the taxonomy, called the Job Adaptability Inventory (JAI). We empirically examined the eight adaptive performance dimensions using data collected with this instrument across 24 different jobs, and we also demonstrate how this instrument can be used to assess a job's adaptive performance requirements.

Study 1: Development of a Model of Adaptive Performance

The purpose of the first study was to investigate the extent to which empirical support could be found for the existence of the six adaptive performance dimensions suggested by the literature and discussed above. This was accomplished through review and content analysis of over 1,000 critical incidents that described actual examples of adaptive performance demonstrated on several different types of jobs.

Method

The data for this study were obtained from critical incidents collected from 21 different jobs within 11 different military, federal government, state government, and private sector organizations. The jobs included were specifically selected to represent a wide variety of different job types, including service jobs, technical jobs, support jobs, law enforcement jobs, several different types of military jobs, as well as supervisory and managerial jobs.

Between 12 and 56 job incumbents and/or supervisors with at least six months of experience generated the incidents for each of the 21 jobs. Workshop data collection procedures were used to collect the incidents. During these workshops, participants were first trained how to write critical incidents. Then, each participant independently generated a set of incidents, typically writing between 12-20 each. The training for workshop participants involved: (1) describing critical incidents and their components (situation, action, and result), (2) discussing how to generate behavioral examples that cover the job performance domain, and (3) reviewing and providing feedback on the first few incidents participants wrote to ensure the incidents were "on target" and contained the necessary information. These data collection procedures have been found to yield a large number of high quality critical incidents that provide good coverage of a job's performance domain.

A total of 9,462 incidents were reviewed from the 21 jobs. The incidents contained examples of demanding or challenging situations employees encountered on their jobs as well as a description of the actions taken to deal with these situations and the resulting outcomes. The incidents were generated to identify the performance requirements of each job and as such, they encompassed a wide variety of situations and behaviors that ranged from highly effective to highly ineffective. We felt that content analyses of a broad array of critical incidents would provide a solid foundation to begin to understand the nature of work-relevant adaptive performance.

Five industrial/organizational psychologists began by reading each of the incidents and identifying those that represented examples of adaptive performance on the job (i.e., situations in which individuals modified their behavior to meet the demands of a new situation, event, or a changed environment). Any incident in which the performer was required to adapt to a job

situation was retained. Of the 9,462 incidents examined, a total of 1,311 incidents were judged to require some type of adaptation.

Using the six adaptive performance dimensions suggested by the literature review as a starting point, three industrial/organizational psychologists independently read and categorized a subset of 150 of the critical incidents and then met to discuss their preliminary category definitions and make refinements. All three researchers had extensive experience conducting critical incident content analyses. Although the researchers used the dimensions suggested by the literature as a starting point, they were also open to the possibility that a somewhat different configuration of dimensions would emerge from the critical incidents. In fact, after categorizing the incidents, researchers agreed that two additional adaptive performance dimensions were suggested by the incidents and should be added to the model: (1) Handling Work Stress and (2) Handling Emergencies or Crisis Situations.

Handling stress effectively was not initially conceived of as an adaptive *performance* dimension, but rather, as more of a predictor of adaptive performance across several dimensions. However, the critical incident content analysis revealed several incidents from many of the jobs that dealt with remaining composed and cool under pressure, not over reacting and managing frustration well, and acting as a calming and settling influence on others. Therefore, the researchers decided to formulate and add a dimension to the model to cover this behavioral content and named this dimension “Handling Work Stress.” Similarly, while the literature did not suggest that “Handling Emergencies or Crisis Situations” should be a separate component of adaptive performance, several critical incidents from quite a few jobs reflected this behavioral content. Furthermore, the researchers performing the content analysis felt that these incidents

were qualitatively different from those representing the other dimensions and thus decided to add another dimension to the preliminary model to cover these behaviors.

While “Handling Work Stress” and “Handling Emergencies or Crisis Situations” were not included in the initial six dimensions, Lopez, Kesselman, and Lopez (1981) identified adaptability to hazards and adaptability to pressure as two adaptability traits in their KSAO taxonomy. Thus, there is some support in the literature for conceiving of the general content areas covered in the two additional performance dimensions as separate aspects of “adaptability.” In all, then, a total of eight adaptive performance dimensions resulted from this phase of the critical incident content analyses. The six dimensions suggested by the literature were supported and two additional dimensions were added.

The remaining incidents were then sorted by five industrial/organizational psychologists into the proposed eight dimensions. The individuals who participated in this exercise were not involved in the selection of the adaptive performance incidents or in the development of the initial set of dimensions. After categorizing all 1,311 critical incidents, the reviewers met to discuss their categorizations and the dimension definitions. A comparison of their judgments indicated that 83% of the incidents (N = 1,088) were categorized into the same dimension by at least 60% (3 of the 5) psychologists. Moreover, the retranslation results provided support for the eight-dimension model (i.e., there were not any obvious problems with the dimension structure, as evidenced by groups of conceptually similar incidents that were not reliably retranslated). Where discrepancies existed, the reviewers discussed their categorizations of the incidents and attempted to resolve their differences. In cases where agreement could not be reached, the incident was eliminated. In the process of reviewing the incidents, some were judged to be redundant or not to reflect adaptive performance (i.e., altering behavior to meet the demands of a

new situation, event, or set of circumstances) and these incidents were also eliminated. Incidents were deemed to be redundant if the reviewers agreed that they described highly similar circumstances requiring adaptation and essentially the same actions/behaviors to address those situations. The number of unique adaptive performance incidents included in the model was 767. As a final step, the psychologists reviewed and fine-tuned the dimension definitions based on the entire set of incidents.

Results

As discussed above, the eight dimensions of adaptive performance included A. Handling Emergencies or Crisis Situations, B. Handling Work Stress, C. Solving Problems Creatively, D. Dealing with Uncertain/Unpredictable Work Situations, E. Learning Work Tasks, Technologies, and Procedures, F. Demonstrating Interpersonal Adaptability, G. Demonstrating Cultural Adaptability, and H. Demonstrating Physically Oriented Adaptability. The definitions of the dimensions are presented in Table 1.

Insert Table 1 About Here

The results of the content analysis and categorization of incidents are presented in Table 2. Shown in the table are the total number and percentage of adaptive performance incidents for each of the 21 jobs. The proportion of incidents judged to involve adaptive performance ranged from 25% for some jobs to as low as 1% for others. Thus, these data suggest that certain jobs may require greater amounts of adaptive behavior than others. Another interesting finding from the critical incident analysis was that the incidents for each job were not distributed proportionally across the adaptive performance categories. That is, representation of the eight

categories varied to a fairly great extent by job, as shown in the table. This suggested that different types of adaptive performance may be required in different types of jobs.

Insert Table 2 About Here

To summarize the Study 1 findings, the critical incident data suggest that adaptive performance is multi-dimensional, encompassing a wide range of different behaviors. A review of nearly 1,311 critical incidents derived from a total set of 9,462 incidents from 21 different jobs resulted in a proposed eight-dimension taxonomy of adaptive performance. An examination of the incidents indicated that some jobs might encompass numerous adaptive behaviors while others require only a few key dimensions. Moreover, different jobs appear to require different types of adaptive performance. Having identified a taxonomy of work-relevant, adaptive behavior, the next step was to further examine the proposed model as well as the hypothesis that different jobs may be characterized by different adaptive performance requirements.

Study 2: Empirical Evaluation of the Eight-Dimension Adaptive Performance Model

The purpose of Study 2 was to test the proposed eight-dimension model of adaptive performance as well as other possible alternative models. This was accomplished by developing an instrument, titled the Job Adaptability Inventory (JAI), which was designed to measure the eight adaptive performance dimensions, and then administering this inventory to a large number of individuals occupying several different jobs. The underlying structure of the JAI was examined using exploratory and confirmatory factor analyses.

Method

Development of the JAI. Based on the critical incidents describing adaptive performance and the adaptive performance dimension definitions, behavioral items tapping each of the eight dimensions were developed. In developing the JAI, item writers were careful to ensure that each JAI item reflected *adaptive* performance (i.e., altering behavior to meet the demands of the environment, an event, or a new situation), not just general performance relevant to the dimension. Using the interpersonal adaptability dimension as an example to illustrate this point, we did not include items that reflected interpersonal behavior in general (e.g., being kind to others) but rather, the items had to reflect interpersonal adaptation (e.g., altering own behavior in response to another). Examples of four JAI items are shown below.

1. Tailor own behavior depending on others' needs and interests to help them feel more comfortable (Demonstrating Interpersonal Adaptability).
2. Change plans because the necessary supplies or equipment are unexpectedly unavailable (Dealing Uncertain/Unpredictable Changing Work Situations).
3. Develop new systems or procedures to improve efficiency or fix problems (Solving Problems Creatively).
4. Learn new technologies that apply to own work (Learning Work Tasks, Technologies, and Procedures).

After an initial pool of 190 items was developed, the items were reviewed by a panel of three experienced industrial/organizational psychologists. These psychologists were asked to ensure that the JAI items required one to adapt in a manner that was consistent with the dimension definition and that the JAI items for each dimension were comprehensive in their coverage of the different aspects of that dimension. After revisions were made based on the

reviewers' comments, the JAI items were submitted to a retranslation exercise to assess their clarity. A total of 13 experienced industrial/organizational psychologists not involved in the item development or review process were asked to retranslate the JAI items into the eight dimensions. Results indicated that 93% of the items (N = 177) were retranslated correctly by at least 69% of the judges. Any items that were not reliably retranslated were eliminated. In addition, highly similar items were also eliminated to reduce the length of the JAI, yielding 132 total items (15 to 18 items per dimension) in the instrument. Before eliminating items, however, we ensured that the remaining items provided thorough coverage of the dimension definitions.

JAI respondents were asked to indicate the importance of and time spent on each JAI behavior compared to other things they do on their jobs. Respondents were specifically instructed to consider all of their performance requirements, not just the behaviors included on the questionnaire, when responding to each JAI item. The Importance scale was a 5-point scale, ranging from 1 = this is of minor importance compared to other things I do on my job to 5 = this is extremely important compared to other things I do on my job. If respondents felt that the item was not part of their job, they were instructed to select "0" (Not Part of Job) and proceed to the next item. The Time Spent scale was also a 5-point scale ranging from 1 = I spend much less time on this than other things I do on my job to 5 = I spend much more time on this than other things I do on my job.

The JAI was pilot tested on a sample of 175 Army soldiers, representing nine different Military Occupational Specialties (MOS) or jobs. The pilot test sample was 90% male and the majority was Caucasian (59%). Other ethnic backgrounds represented included African American (22%), Hispanic/Latino (15%), Asian/Pacific Islander (2%), and Native American (2%). The modal age category was 23 to 27 years.

The purpose of the pilot test was to examine the psychometric properties of the JAI, to refine and reduce the length of the instrument in order to make its administration time shorter and more manageable for respondents. Analyses of the pilot test data included calculation of reliabilities, descriptive statistics, and correlations. The scores used in these analyses were based on a composite Importance and Time Spent rating. In these composites, the importance ratings were weighted twice as much as the time spent ratings, based on previous research showing that job experts do, in fact, weight importance more heavily than time spent in determining the criticality of job activities (Bosshardt, Rosse, & Peterson, 1984). The equation used to calculate the criticality index is shown below.

$$\text{Criticality Index} = \frac{(2 \times \text{Importance Rating}) + \text{Time Spent Rating}}{3}$$

In selecting items for inclusion on the shortened JAI, our primary goal was ensuring that the items provided good coverage of the dimension definitions. Beyond item content, however, we also examined the retranslation data collected previously as well as alphas and item-total correlations at the dimension level to guide our choice of items. More specifically, the retranslation results and correlations between each item and all of the scales (with each item removed from its target scale) were examined to identify potentially ambiguous items. These results were considered along with content coverage of the dimension definitions, and we selected a set of items for potential inclusion on the final instrument. We then computed coefficient alpha to ensure that we had not removed too many items from each scale to allow for reasonable internal consistency reliabilities. Before finalizing which items would be eliminated, the panel of three experienced industrial/organizational psychologists again independently reviewed the proposed final set of items to ensure that content coverage of the dimension

definitions had not been compromised. A total of 68 items were selected (eight or nine items per dimension) for inclusion in the final instrument. For space considerations, we do not present the pilot test data analyses here but do present analyses of the final instrument administered to a much larger sample in the sections that follow.

Participants. JAI data were collected from a total of 3,411 participants: 374 Army personnel, 3,035 non-managerial employees from a large telecommunication company, and 13 research scientists from a personnel research firm. The sample demographics were as follows: 34% female and 66% male, and 70% white, 19% African American, and 11% Hispanic. Participants represented 24 different jobs as follows: accounting (N = 337), administration (N = 532), secretarial (N = 386), technical support (N = 510), engineer support (N =345), transportation (N = 68), sales/marketing (N = 115), craft A (N = 331), craft B (N = 109), operator (N = 77), equipment operation (N = 37), vehicle maintenance (N = 58), building maintenance (N = 31), Special Forces (N =17), combat NCOs (N = 99), combat support NCOs (N = 108), service support NCOs (N = 26), radio operators (N = 37), administrative specialists (N = 22), rocket launchers (N = 11), military police (N = 29), officers (N = 20), truck drivers (N = 5), and research scientists (N = 13). Both craft A and B involve installing and repairing equipment but craft A jobs are much more complex and higher level than craft B jobs.

Data Analyses. To evaluate the JAI, descriptive statistics and reliability estimates were computed for the whole sample. To test the adaptive performance taxonomy, a two-step approach was employed. First, an exploratory factor analysis was conducted on half of the sample to examine the underlying factor structure of the data. Then, confirmatory factor analyses were performed to further test models of adaptive performance using the other half of the sample. We also selected a subset of nine jobs from the sample and used multivariate analysis of variance

(MANOVA) to test the hypothesis that different jobs are characterized by different adaptive performance requirements.

Results

Reliabilities. First, a composite index was calculated for each JAI item by combining the importance and time spent ratings. As described above, the importance ratings were again weighted twice as much as the time spent ratings. Internal consistency reliabilities were computed for the importance ratings, time spent ratings, and criticality indices for each of the eight dimensions. As seen in Table 3, the alphas for the importance and time spent ratings ranged from .89 to .97 with means of .94 (SD = .20) and .93 (SD =.24), respectively. The alphas for the criticality index ranged from .92 to .97 with a mean of .94 (SD = .20). These alpha levels indicate a high degree of internal consistency for the items comprising each dimension. Intraclass correlations [ICC (2, k)] were also computed for the importance, time spent, and composite criticality ratings among the respondents within jobs (Shrout & Fleiss, 1979). These reliabilities reflect the extent to which respondents within the same job provided similar ratings of the behaviors in terms of pattern and level. ICCs ranged from .73 to .98, indicating high agreement among respondents regarding the adaptive performance requirements of their jobs.

Insert Table 3 About Here

Table 3 also presents descriptive statistics and intercorrelations of the criticality indices of the eight adaptive performance dimensions. As shown in the table, the correlations among the dimensions ranged from .30 to .69. More specifically, reasonably high correlations (r's ranging from .59 to .69) resulted between the following dimensions: Dealing Uncertain/Unpredictable

Work Situations, Solving Problems Creatively, Learning Work Tasks, Technologies, and Procedures, and Handling Work Stress. These results reflect some inherent overlap between these dimensions, for example, solving problems and learning is often what one does to deal with unpredictable and changing situations, and unpredictable situations, learning new tasks, and dealing with difficult problems can easily cause stress. Handling Emergencies or Crisis Situations and Demonstrating Physically Oriented Adaptability were highly correlated with each other (r = .63), but they were generally the least correlated with the other dimensions.

Exploratory and Confirmatory Factor Analyses. The sample was split to ensure matching in each sub-sample with respect to job, organization, and other key demographic factors (race, gender, etc.). Approximately half of the sample (N=1,619) was used to conduct an exploratory factor analysis to examine the underlying factor structure of the JAI, while the remainder of the sample was held out for subsequent testing of adaptive performance models using confirmatory analyses. Although we had hypothesized an eight-dimension taxonomy, we wanted to examine the possibility (using exploratory analyses) that a more parsimonious or otherwise differently configured model would be suggested by the data, especially in light of some of the high correlations that resulted between the dimensions. The exploratory analysis we conducted was a principal components analysis with an oblimin rotation. Using an eigenvalue greater than 1.0 criterion, an eight-factor solution emerged and the factor pattern is shown in Table 4. The eight resulting factors exactly mirrored the eight dimensions of adaptive performance hypothesized to be measured by the JAI. Correlations between the factors are shown in Table 5.

Insert Tables 4 and 5 About Here

To apply a more rigorous test of the eight-dimension model and also to further test possible alternative models, we conducted maximum likelihood confirmatory factor analyses on the reminder of the sample (N=1,715), using LISREL VIII (Joreskog & Sorbom, 1993). In the confirmatory analyses, we created three manifest indicators for each adaptive performance dimension that were parallel in terms of the statistical properties of the items (see Fitzgerald, Drasgow, Hulin, Gelfand, & Magley, 1997 for a description of this procedure). We tested the eight-factor model and report correlations between the factors in Table 5 and fit indices for this model in Table 6.

Insert Table 6 About Here

Since the exploratory factor analysis showed a considerable drop in the eigenvalues after the first and second factors, we also decided to test alternative one and two two-factor models. The two-factor model consisted of items comprising the following sets of dimensions: (1) Handling Emergencies or Crisis Situations and Demonstrating Physically Oriented Adaptability and (2) Handling Work Stress, Solving Problems Creatively, Dealing Uncertain/Unpredictable Work Situations, Learning Work Tasks, Technologies, and Procedures, Demonstrating Interpersonal Adaptability, and Demonstrating Cultural Adaptability. The fit indices for these two alternative models are also presented in Table 6. Comparison of the fit indices for the three models suggests that the eight-factor model offers the best fit for the data, and chi-square difference tests also showed significant improvement in fit for the eight-factor model compared to the one-factor ($\chi^2 = 20923$, $df = 28$, $p < .001$) and two-factor alternatives ($\chi^2 = 4325$, $df = 27$, $p < .001$).

Analyses of Job Profiles. Multivariate analysis of variance (MANOVA) was used to test whether criticality indices for the eight adaptive performance dimensions differed significantly for a subset of nine jobs included in this research. The nine jobs included in this analysis (i.e., accounting, engineer support, sales/marketing, craft A, special forces, combat NCOs, administrative specialists, military police, and research scientists) were selected to be diverse with respect to type, level, and content. As expected, the MANOVA was significant ($F_{(64,7459)} = 30.32$, $p < .001$), as were the eight univariate tests conducted to examine differences between jobs for each dimension. Table 8 presents F-values for the eight univariate tests and effect size estimates (h^2) as well as criticality index means and standard deviations for each adaptive performance dimension by job.

Insert Table 7 About Here

A comment about the overall level of adaptive performance requirements seems warranted at this point. Based on the mean criticality data presented in Tables 3 and 7, it appears that the adaptive performance dimensions are of low to moderate criticality for several of the present jobs. In fact, a significant number of the jobs examined here were lower level, non-managerial jobs. The jobs with higher adaptive performance requirements tended to be higher-level professional or supervisory jobs (NCOs, Special Forces, research scientists). It is important to point out that in order to adequately test the proposed taxonomy, the present study was intentionally designed to include jobs that would be expected to vary from low to high in terms of their adaptive performance requirements. Accordingly, it is likely that higher adaptive performance requirements would be observed overall with a higher level, more professional

sample. On the other hand, it is also interesting to note that subsets of the dimensions were deemed to be critical (mean > 3.00) for several of the present jobs. This is particularly noteworthy given that respondents were instructed to rate the importance of and time spent on the JAI behaviors in light of other behaviors they perform on their jobs. These results suggest that the dimensions are likely to be of sufficient importance in some jobs to warrant serious attention. Overall, then, results of the JAI analyses further support the notion that adaptive performance is multi-dimensional and that different types of adaptive performance are required for different jobs.

Discussion

New technology, globalization, and alterations in jobs require workers to adapt to new and varied situations at work. The present research is an important first step in articulating the adaptive performance requirements of jobs and contributes to the literature in three important ways. First, it offers a conceptual framework for defining and understanding adaptive job performance that heretofore did not exist in the literature, thereby fulfilling the need articulated by Campbell (1999), Hesketh and Neal (1999), and others to expand our current conceptualizations of the performance domain to include add adaptive performance. Second, while it seems reasonable that adaptive performance would be multidimensional given the wide range of behaviors that have been associated with “adaptability” in the literature, this research is the first effort that has been undertaken to systematically identify potential dimensions of adaptive performance and to empirically examine the dimensionality of this construct. Finally, this research provides an instrument, the Job Adaptability Inventory, which can be used to diagnose a job’s adaptive performance requirements. This is important because as we discuss

further below, different selection measures or training strategies may well be needed depending on a job's specific adaptive performance requirements.

The major results and conclusions of this research can be summarized as follows. First, adaptive performance appears to be a multi-dimensional construct, as evidenced by exploratory and confirmatory factor analyses of the JAI data that supported an eight dimension taxonomy. Of course, it is possible that future research using other measures of these same eight dimensions (e.g., performance ratings) may result in a more parsimonious model of adaptive performance. The second major conclusion of this research is that the adaptive performance components identified are more or less relevant to particular jobs. That is, the profile of a job's adaptive performance requirements vary along the eight dimensions identified in our model. Support for this notion was derived from both a critical incident analysis involving over 1,000 incidents collected from individuals representing 21 different jobs as well as JAI data collected from individuals in 24 largely different jobs. The jobs included in the present research were representative of 15 of 23 major occupational groups and all six higher level occupational categories contained in the Standard Occupational Classification System (SOC), a job classification system designed by the Federal government to cover all jobs in the national economy. Therefore, the dimensions in our taxonomy appear to represent adaptive performance requirements that exist across many different types of jobs. On the other hand, the generalizability of the present adaptive performance framework also needs to be further evaluated in future research. Although we attempted to include a broad array of jobs in Study 1, which formed the basis of our adaptive performance taxonomy, it is possible that these jobs may not have included the full array of adaptability behaviors that could be relevant in other jobs.

The present research has potentially important implications for selecting adaptable workers and also for training employees to be more adaptable. Although the present research focused on defining adaptive performance, future research should specify the knowledge, skills, abilities, and other characteristics (KSAOs) that underlie and can be used to predict adaptive performance in the dimensions proposed here. Given the variable nature of adaptation depicted in the taxonomy, it seems reasonable to expect that somewhat different individual attributes may be associated with different dimensions of adaptive performance. For example, cognitively-oriented constructs may be important in predicting adaptive performance dimensions such as Solving Problems Creatively and Learning New Tasks, Technologies, and Procedures, whereas interpersonal or other temperament constructs may be better predictors of dimensions such as Interpersonal Adaptability, Cultural Adaptability, and Handling Work Stress. Similarly, physically-oriented constructs may be uniquely relevant to dimensions such as Handling Emergency Situations and Physically-Oriented Adaptability. The implication is that different composites of predictor measures might be necessary depending on the types of adaptive performance that are most critical for a given job. To the extent that this is the case, effective selection of adaptable workers may be contingent on, first, diagnosing the particular adaptive performance requirements of specific jobs and then specifying the individual differences constructs that are most relevant for predicting those adaptive performance dimensions. Future research should develop and test specific hypotheses about how various individual differences constructs (e.g., cognitive, non-cognitive, and physical) relate to each of the eight dimensions.

Another potentially fruitful area for selection research is assessing past experience in situations like those described by the adaptive performance dimensions. For instance, biodata instruments that focus on prior experience Dealing with Emergencies, Demonstrating

Interpersonal Adaptability, and the other adaptive performance dimensions proposed here may prove to be effective selection measures. This is consistent with "behavioral consistency" notions (Wernimont & Campbell, 1968) which argue that the potential to perform successfully in a job can best be predicted by past performance in conditions that are as similar to the job as possible. A key issue in any future selection research will be ensuring that performance measures are used which measure relevant aspects of adaptive performance for the job in question. General or technically-oriented performance measures may not be especially useful in attempts to predict adaptive job performance.

The present research also has implications for training adaptable responses. Certainly, one potentially effective way to train employees to adapt is to expose them to situations like those they will encounter on their jobs that require adaptation. This would not only be expected to promote transfer of training but is also consistent with the idea that adaptive performance will be enhanced by gaining experience in similar situations. The present research provides a framework for diagnosing and defining what type(s) of adaptive behavior are required on a given job, via use of the JAI. This should greatly facilitate the development of training scenarios to teach job-relevant adaptation. An obvious extension of this research would be to develop such scenarios and then evaluate the effectiveness of this type of training on adaptive job performance.

A final extension of the present research would be to expand the present individual adaptive performance taxonomy to the team and organizational levels. For example, several researchers have discussed the importance of team adaptability (e.g., Kozlowski, Gully, Nason, & Smith, 1999), but the team literature suffers from the same proliferation of adaptability definitions and operationalizations as the literature concerning individual adaptability. Thus, effort expended to identify dimensions of team adaptive performance might prove particularly

useful for efforts targeted at team adaptability training and studying team composition issues. At the organizational level, it may also be fruitful to more clearly delineate the dimensions of organizational adaptive performance. This should not only help to clarify the definition of "adaptability" in these domains but should also provide an important roadmap for enhancing adaptation at different organizational levels.

References

Ackerman, P. L. (1988). Determinants of individual differences during skill acquisition: Cognitive abilities and information processing. *Journal of Experimental Psychology: General*, *117*, 288-318.

Andersen, C. R. (1977). Locus of control, coping behaviors, and performance in stress setting: A longitudinal study. *Journal of Applied Psychology*, *62*, 446-451.

Aronoff, J., Stollak, G. E., & Woike, B. A. (1994). Affect regulation and the breadth of interpersonal engagement. Journal of Personality and Social Psychology, 67(1), 105-114.

Ashford, S. J. (1986). Feedback-seeking in individual adaptation: A resource perspective. Academy of Management Journal, 29(3), 465-487.

Black, J. S. (1990). Locus of control, social support, stress, and adjustment in international transfers. Asia-Pacific Journal of Management, 7, 1-29.

Borman, W. C., & Motowidlo, S. J. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt & W. C. Borman (Eds.), Personnel selection in organizations (pp. 35-70). San Francisco: Jossey-Bass.

Bosshardt, M. J., Rosse, R. L., & Peterson, N. G. (1984). Electric power plant maintenance study: Analysis of job activities and personal qualifications of maintenance employees in electric power generating plants. (Institute Report #90). Minneapolis: Personnel Decisions Research Institutes, Inc.

Bowen, D. E., & Schneider, B. (1988). Services marketing and management: Implications for organizational behavior. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior* (Vol. 10). Greenwich, CT: JAI Press.

Callan, V. J., Terry D. J., & Schweitzer, R. (1994). Coping resources, coping strategies and adjustment to organizational change: Direct or buffering effects? *Work and Stress, 8*, 372-383.

Campbell, J. P. (1999). The definition and measurement of performance in the new age. In D. R. Ilgen & E. D. Pulakos (Eds.), The changing nature of performance: Implications for staffing, motivation, and development. San Francisco: Jossey-Bass.

Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C. E. (1993). A theory of performance. In N. Schmitt & W. C. Borman (Eds.), Personnel selection in organizations (pp. 35-70). San Francisco: Jossey-Bass.

Chao, G. T., O'Leary-Kelly, A. M., Wolf, S., Klein, H. J., & Gardner, P. D. (1994). Organizational socialization: Its content and consequences. Journal of Applied Psychology, 79(5), 730-743.

Dix, J. E. & Savickas, M. L. (1995). Establishing a career: Developmental tasks and coping responses. Journal of Vocational Behavior, 47, 93-107.

Edwards, J. E., & Morrison, R. F. (1994). Selecting and classifying future naval officers: The paradox of greater specialization in broader areas. In M. G. Rumsey, C. B. Walker, & Harris, J. H. (Eds.). Personnel selection and classification. Hillsdale, NJ: Lawrence Erlbaum Associates.

Fiedler, F. E. & Fiedler, J. (1975). Port noise complaints: Verbal and behavioral reactions to airport related noise. Journal of Applied Psychology, 60(4), 498-506.

Fitzgerald, L. F., Drasgow, F., Hulin, C. L., Gelfand, M. J., & Magley, V. J. (1997). Antecedents and consequences of sexual harassment in organizations: A test of an integrated model. Journal of Applied Psychology, 82 (4), 578-589.

Fleishman, J. A. (1992). *Fleishman-Job Analysis Survey (F-JAS).* Palo Alto, CA: Consulting Psychologists Press.

Goodman, J. (1994). Career adaptability in adults: A construct whose time has come. The Career Development Quarterly, 43, 74-84.

Hall, D. T., & Mirvis, P. H. (1995). The new career contract: Developing the whole person at mid-life and beyond. Journal of Vocational Behavior, 47, 269-289.

Hatano, G. & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta, Child Development and Education in Japan. W. H. Freeman and Company: New York.

Hesketh, B., & Neal, A. (1999). Technology and performance. In D. R. Ilgen & E. D. Pulakos (Eds.), The changing nature of performance: Implications for staffing, motivation, and development. San Francisco: Jossey-Bass.

Hollenbeck, J. R., LePine, J. A., & Ilgen, D. R. (1996) Adapting to roles in decision-making teams. In K. R. Murphy (Ed.), Individual Differences and Behavior in Organizations. San Francisco, CA: Jossey-Bass.

Holyoak, K. J. (1991). Symbolic connectionism: Toward third-generation theories of expertise. In K. A. Ericsson & J. Smith, Toward a General Theory of Expertise. Cambridge: Cambridge University Press.

Hoover, S. M., & Feldhusen, J. F. (1990). The scientific hypothesis formulation of ability of gifted ninth grade students. *Journal of Educational Psychology, 82,* 838-848.

Ilgen, D. R., & Hollenbeck, J. R. (1991). The structure of work: Jobs and roles. In M. D. Dunnette & L. M. Hough (Eds.), Handbook of industrial and organizational psychology (Vol. 2, 2nd ed., pp. 165-208). Palo Alto: Consulting Psychologists Press.

Ilgen, D. R., & Pulakos, E. D. (1999). Employee performance in today's organizations. In D. R. Ilgen and E. D. Pulakos (Eds.), The changing nature of work performance: Implications for staffing, motivation, and development. San Francisco: Jossey-Bass.

Jones, G. R. (1986). Socialization tactics, self-efficacy, and newcomers' adjustments to organizations. *Academy of Management Journal*, *29*, 262-279.

Joreskog, K. G., & Sorbom, D. (1993). New features in LISREL 8. Chicago: Scientific Software.

Kinicki, A. J., & Latack, J. C. (1990). Explication of the construct of coping with involuntary job loss. Journal of Vocational Behavior, 36, 339-360.

Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. (1999). Developing adaptive teams: A theory of compilation and performance across levels and time. In D. R. Ilgen and E. D. Pulakos (Eds.), The changing nature of work performance: Implications for staffing, motivation, and development. San Francisco: Jossey-Bass.

Kozlowski, S. W. J., Gully, S. M., Salas, E., & Cannon-Bowers, J. A. (1996). Team leadership and development: Theory, principles, and guidelines for training leaders and teams. In M. Beyerlein, S. Beyerlein, & D. Johnson (Eds.), Advances in Interdisciplinary Studies of Work Teams: Team Leadership (Vol. 3). Greenwich, CT: JAI Press.

Krietler, S., & Krietler, H. (1987). The psychometric aspects of the self. In T. Horess and K. Yardley (Eds.), *Self and identity: Perspectives across the life span.* New York: Rutledge.

London, M. & Mone, E. M. (1999). Continuous learning. In D. R. Ilgen & E. D. Pulakos (Eds.), The changing nature of performance: Implications for staffing, motivation, and development. San Francisco: Jossey-Bass.

Lopez, F. M., Kesselman, G. A., & Lopez, Felix E. (1981). An empirical test of a trait oriented job analysis technique. *Personnel Psychology, 34,* 479-502.

Murphy, K. (1989). The role of cognitive ability in validity generalization. Human Performance, 2, 183-200.

Murphy, K. (1989). Dimensions of job performance. In R. Dillon & J. Pelligrino (Eds.), Testing: Applied and theoretical perspectives (pp.218-247). New York: Praeger.

Murphy, P. R., & Jackson, S. E. (1999). Managing work role performance: Challenges for twenty-first century organizations and their employees. D. R. Ilgen & E. D. Pulakos (Eds.), The changing nature of performance: Implications for staffing, motivation, and development. San Francisco: Jossey-Bass.

Noe, R. & Ford, K. J. (1992). Emerging issues and new directions for training research. Research in Personnel and Human Resource Management, 10, 345-384.

Organ, D. W. (1997). Organizational citizenship behavior: It's construct clean-up time. Human Performance, 10, 85-97.

Owens, W. A. (1969). Cognitive, noncognitive, and environmental correlates of mechanical ingenuity. *Journal of Applied Psychology, 53,* 199-208.

Patrickson, M. (1987). Adaptation by employees to new technology. Journal of Occupational Psychology, 59, 1-11.

Paulhus, D. L., & Martin, C. L. (1988). Functional flexibility: A new conception of interpersonal flexibility. Journal of Personality and Social Psychology, 55 (1), 88-101.

Schneider, B. (1994). HRM: A service perspective – toward a customer-focused HRM. *International Journal of Service Industry Management, 5,* 64-76.

Shrout & Fleiss (1979). Intraclass correlations: Uses in assessing rater relaibility. *Psychological Bulletin*, *86*, 420-428.

Smith, E. M., Ford, J. K., & Kozlowski, S. W. J. (1997). Building adaptive expertise: Implications for training design. In M. A. Quinones & A. Dudda (Eds.), Training for 21st century technology: Applications of psychological research. Washington, DC: APA Books.

Spiro, R. L., & Weitz, B. A. (1990). Adaptive selling: Conceptualization, measurement, and nomological validity. Journal of Marketing Research, 27, 61-69.

Thach, L., & Woodman, R. W. (1994). Organizational change and information technology: Managing on the edge of cyberspace. Organizational Dynamics, 23 (1), 30-46.

Weinstein, N. D., (1978). Individual differences in reactions to noise: A longitudinal study in a college dormitory. Journal of Applied Psychology, 63 (4), 458-466.

Weiss, S. J. (1984). The effects of transition modules on new graduate adaptation. Research in Nursing and Health, 7, 51-59.

Wernimont, P. F., & Campbell, J. P. (1968). Signs, samples, and criteria. Journal of Applied Psychology, 52, 372-376.

Zeithaml, V. A., & Bitner, M. J. (1996). *Services marketing*. New York: McGraw-Hill.

Table 1

Definitions of the Eight Dimensions of Adaptive Performance

Dimension Title	Dimension Definition
A. Handling Emergencies or Crisis Situations	Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations; quickly analyzing options for dealing with danger or crises and their implications; making split second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate.
B. Handling Work Stress	Remaining composed and cool when faced with difficult circumstances or a highly demanding workload/schedule; not overreacting to unexpected news or situations; managing frustration well by directing effort to constructive solutions rather than blaming others; demonstrating resilience and the highest levels of professionalism in stressful circumstances; acting as a calming and settling influence that others look to for guidance.

Table 1 (continued)

Definitions of the Eight Dimensions of Adaptive Performance

Dimension Title	Dimension Definition
C. Solving Problems Creatively	Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside-down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide ranging possibilities others may miss, thinking outside the given parameters to see if there's a more effective approach; developing innovative methods of obtaining or utilizing resources when insufficient resources are available to do the job.
D. Dealing with Uncertain/Unpredictable Work Situations	Taking effective action when necessary without having to know the total picture or have all the facts at hand; readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and others that provide as much focus as possible in dynamic situations; not needing things to be black or white, and refusing to be paralyzed by uncertainty or ambiguity.

Table 1 (continued)

Definitions of the Eight Dimensions of Adaptive Performance

Dimension Title	Dimension Definition
E. Learning Work Tasks, Technologies, and Procedures	Demonstrating enthusiasm for learning new approaches and technologies for conducting work; doing what is necessary to keep knowledge and skills current; quickly and proficiently learning new methods or how to perform previously unlearned tasks; adjusting to new work processes and procedures; anticipating changes in the work demands and searching for and participating in assignments or training that will prepare self for these changes; taking action to improve work performance deficiencies.
F. Demonstrating Interpersonal Adaptability	Being flexible and open-minded when dealing with others; listening to and considering others' viewpoints and opinions, and altering own opinion when it is appropriate to do so; being open and accepting of negative or developmental feedback regarding work; working well and developing effective relationships with highly diverse personalities; demonstrating keen insight of others' behavior and tailoring own behavior to persuade, influence, or work more effectively with them.

Table 1 (continued)

Definitions of the Eight Dimensions of Adaptive Performance

Dimension Title	Dimension Definition
G. Demonstrating Cultural Adaptability	Taking action to learn about and understand the climate, orientation, needs, values, etc. of other groups, organizations, or cultures; integrating well into and being comfortable with different values, customs and cultures; willingly adjusting behavior or appearance as necessary to comply with or show respect for others' values and customs; understanding the implications of one's actions and adjusting approach to maintain positive relationships with other groups, organizations, or cultures.
H. Demonstrating Physically Oriented Adaptability	Adjusting to challenging environmental states such as extreme heat, humidity, cold, dirtiness, etc.; frequently pushing self physically to complete strenuous or demanding tasks; adjusting weight/muscular strength or becoming proficient in performing physical tasks as necessary for the job.

Table 2

Total Incidents and Adaptive Performance Incidents by Performance Dimension and Job

Job Title	Total Incidents	Adaptation Incidents	Proportion of Adaptive Incidents by Dimension							
			A	B	C	D	E	F	G	H
Aircraft Commander	326	73 (22%)	36%	19%	3%	33%	3%	7%	0%	0%
Armor Crewman	603	10 (2%)	10%	30%	40%	0%	20%	0%	0%	0%
Cannon Crewman	684	18 (3%)	33%	0%	56%	11%	0%	0%	0%	0%
Infantryman	671	10 (1%)	10%	0%	20%	70%	0%	0%	0%	0%
NCO and Officer	859	73 (8%)	11%	5%	16%	22%	15%	23%	5%	1%
Military Peace Keeper	155	21 (14%)	19%	0%	0%	14%	29%	5%	24%	10%
Soldier	1111	82 (7%)	23%	5%	7%	22%	29%	1%	2%	10%
SF Commander Sergeant	*	18	6%	0%	39%	11%	6%	11%	28%	0%
SF Engineer	*	40	13%	3%	43%	3%	18%	0%	20%	3%
SF Medical Sergeant	*	54	44%	17%	2%	2%	2%	11%	19%	4%
SF Team Leader	*	27	7%	15%	22%	11%	7%	15%	22%	0%
SF Weapons Sergeant	*	26	4%	0%	54%	4%	15%	0%	19%	4%
Expatriate	121	29 (24%)	0%	3%	0%	7%	7%	17%	66%	0%
Narcotics Investigator	300	75 (25%)	0%	7%	20%	19%	13%	28%	13%	0%
Air Traffic Controller	466	29 (6%)	59%	10%	17%	7%	0%	7%	0%	0%
Criminal Investigator	900	55 (6%)	11%	5%	25%	18%	27%	9%	2%	2%
Attorney	854	30 (4%)	0%	3%	10%	10%	17%	60%	0%	0%
Military Recruiter	615	30 (5%)	0%	0%	13%	0%	17%	67%	3%	0%

Table 2

Total Incidents and Adaptive Performance Incidents by Performance Dimension and Job

Job Title	Total Incidents	Adaptation Incidents	Proportion of Adaptive Incidents by Dimension							
			A	B	C	D	E	F	G	H
Executive Assistant	230	11 (5%)	0%	0%	0%	64%	27%	9%	0%	0%
Manager	300	28 (9%)	0%	0%	14%	25%	50%	7%	4%	0%
State Police Trooper	500	28 (6%)	18%	4%	21%	4%	36%	0%	4%	14%
Ave. % Across Jobs			15%	6%	20%	17%	16%	13%	11%	2%

Note. *The combined total of the Special Forces (SF) jobs critical incidents is 1,760. A very large proportion of these incidents were repeated across the Special Forces specialties. Approximately 10% of the Special Forces incidents were identified as adaptive performance incidents. A = Handling Emergency or Crisis Situations; B = Handling Work Stress; C = Solving Problems Creatively; D = Dealing with Uncertain/Unpredictable Work Situations; E = Learning Work Tasks Technologies and Procedures; F = Demonstrating Interpersonal Adaptability; G = Demonstrating Cultural Adaptability; and H = Demonstrating Physically Oriented Adaptability.

Table 3

Descriptive Statistics, Reliability Coefficients, and Correlations Between Adaptive Performance Dimensions

Adaptive Performance Dimension	N Items	Mean	SD	Criticality Index Reliability	Importance Rating Reliability	Time Spent Rating Reliability	Correlations							
							A	B	C	D	E	F	G	H
A. Handling Emergencies	9	1.25	1.47	.97	.97	.97								
B. Handling Work Stress	8	2.88	1.11	.92	.92	.92	.30							
C. Solving Problems Creatively	9	1.68	1.25	.93	.93	.92	.47	.62						
D. Dealing with Changing Situations	8	2.62	1.09	.92	.91	.92	.38	.63	.64					
E. Learning	8	2.01	1.19	.92	.92	.89	.51	.65	.69	.59				
F. Interpersonal Adaptability	8	2.25	1.08	.92	.92	.92	.38	.64	.53	.56	.62			
G. Cultural Adaptability	9	1.10	1.16	.94	.94	.95	.50	.46	.55	.50	.49	.52		
H. Physically Oriented Adaptability	9	1.11	1.31	.96	.95	.94	.63	.30	.49	.40	.51	.33	.53	

Note. Reliabilities are internal consistencies. Criticality indices were used to compute correlations between the dimensions.

Table 4

Principal Component Analysis Pattern Matrix of JAI Criticality Indices

	Factor								
Item	F1	F2	F3	F4	F5	F6	F7	F8	Communality
Emergencies-1	-.02	**.84**	.01	.04	.03	.04	.00	-.08	.74
Emergencies-2	-.07	**.87**	.05	.00	.05	.03	.00	-.04	.80
Emergencies-3	.09	**.87**	.02	-.02	-.04	-.05	-.02	.04	.79
Emergencies-4	-.03	**.94**	.00	.02	-.01	.04	.04	-.08	.85
Emergencies-5	-.04	**.86**	.04	.00	.09	.01	-.03	.01	.84
Emergencies-6	.00	**.91**	-.02	.03	.03	-.01	.01	.02	.87
Emergencies-7	-.02	**.94**	-.03	.01	.01	-.01	.03	.02	.89
Emergencies-8	.03	**.92**	-.03	-.01	-.02	.01	.01	.04	.85
Emergencies-9	.05	**.84**	-.01	-.03	.03	-.01	-.02	.10	.81
Handling Stress-1	.11	-.05	.01	-.06	.06	.01	**.79**	-.03	.65
Handling Stress-2	.18	-.03	-.00	-.07	-.05	.03	**.72**	.07	.66
Handling Stress-3	.24	.09	.08	-.01	-.01	.14	**.46**	.13	.65
Handling Stress-4	.25	.08	.09	.01	.00	.08	**.36**	.20	.59
Handling Stress-5	.03	-.02	.02	.08	.02	.08	**.62**	.17	.66
Handling Stress-6	-.07	.06	.05	.06	.02	.02	**.82**	.03	.80
Handling Stress-7	-.10	.02	.06	.07	.06	.03	**.83**	.01	.79
Handling Stress-8	-.11	.10	.03	.06	.00	.04	**.83**	.03	.80
Solving Problems-1	.11	-.00	.03	.02	-.00	.00	-.04	**.74**	.65
Solving Problems-2	.10	.04	.03	.01	-.01	.05	.03	**.73**	.74
Solving Problems-3	.17	.12	.11	-.06	.09	.01	-.07	**.50**	.53
Solving Problems-4	.04	-.01	.01	.06	-.04	.09	.08	**.70**	.67

Table 4

Principal Component Analysis Pattern Matrix of JAI Criticality Indices

	Factor								
Item	F1	F2	F3	F4	F5	F6	F7	F8	Communality
Solving Problems-5	-.08	.01	-.01	.03	.10	.07	.10	**.71**	.66
Solving Problems-6	.02	.06	.11	-.02	.01	-.00	-.05	**.74**	.66
Solving Problems-7	-.07	-.03	.03	.04	.11	.16	-.01	**.64**	.59
Solving Problems-8	-.08	-.02	.01	.20	.02	.01	.19	**.66**	.69
Solving Problems-9	.03	.03	-.00	.08	.00	.05	.13	**.71**	.74
Change-1	-.07	.02	.00	.11	-.01	**.75**	.01	-.07	.58
Change-2	.18	.02	.04	-.02	-.02	**.63**	.01	.11	.64
Change-3	.04	.08	.07	-.01	-.06	**.74**	-.03	.05	.65
Change-4	.11	.03	.06	.05	-.07	**.64**	.05	.09	.65
Change-5	.11	.03	-.02	-.03	-.03	**.76**	.02	.09	.71
Change-6	-.04	-.01	.01	-.01	-.02	**.84**	.02	.06	.74
Change-7	-.03	.03	-.02	-.05	.19	**.70**	-.03	.04	.57
Change-8	-.09	-.03	.02	.02	.03	**.78**	.09	-.03	.65
Learning-1	**.42**	-.03	.01	.30	.02	.11	.23	-.08	.57
Learning-2	**.47**	.05	.01	.06	.29	.13	.03	-.01	.56
Learning-3	**.53**	-.05	-.01	.17	.13	.19	.13	-.03	.62
Learning-4	**.44**	.06	.02	.19	.08	.13	.19	.03	.65
Learning-5	**.62**	.09	.07	.10	.07	.03	.08	.07	.73
Learning-6	**.67**	.12	.09	-.02	.04	-.04	.01	.13	.69
Learning-7	**.66**	.04	.01	.04	.10	.02	.01	.17	.74
Learning-8	**.62**	.11	.04	.07	.02	.01	.05	.17	.73

Table 4

Principal Component Analysis Pattern Matrix of JAI Criticality Indices

	Factor								
Item	F1	F2	F3	F4	F5	F6	F7	F8	Communality
Interpersonal-1	.08	.14	.09	**.64**	-.11	.00	.09	.02	.63
Interpersonal-2	.02	.15	.08	**.59**	-.08	-.05	.18	.05	.60
Interpersonal-3	.21	.11	.06	**.52**	-.05	.05	-.06	.16	.59
Interpersonal-4	.06	-.01	.08	**.75**	.07	.09	-.11	.00	.67
Interpersonal-5	.06	-.00	.01	**.83**	.03	.07	-.11	.05	.75
Interpersonal-6	-.07	-.05	.00	**.88**	.07	-.02	-.00	.01	.73
Interpersonal-7	.03	.03	-.05	**.70**	.09	.01	.12	.07	.67
Interpersonal-8	-.02	-.00	.03	**.74**	.00	.04	.12	.05	.71
Cultural-1	.04	-.02	**.65**	.22	-.01	.07	.09	-.10	.63
Cultural-2	.04	-.02	**.76**	.06	-.01	.04	.12	-.12	.64
Cultural-3	.03	-.01	**.88**	-.01	-.02	.05	.05	-.02	.81
Cultural-4	.00	.03	**.90**	-.05	-.03	.00	.01	.04	.83
Cultural-5	-.02	.07	**.84**	-.06	.04	-.03	-.02	.08	.79
Cultural-6	-.07	-.03	**.86**	.09	.01	-.05	-.03	.06	.77
Cultural-7	-.07	.05	**.71**	.03	.02	.08	-.01	.04	.64
Cultural-8	-.02	.01	**.83**	-.02	.06	-.00	-.04	.09	.79
Cultural-9	.09	.05	**.61**	-.12	.19	-.01	-.08	.07	.58
Physical-1	-.02	.11	-.02	.06	**.76**	.03	.02	-.04	.68
Physical-2	-.00	.06	.11	.07	**.72**	.07	-.06	-.02	.72
Physical-3	.04	.04	.11	.04	**.74**	.08	-.06	-.01	.75
Physical-4	.08	.06	.07	-.02	**.80**	.03	-.02	.00	.80
Physical-5	.05	.06	.03	-.04	**.81**	.02	-.02	.05	.80

Table 4

Principal Component Analysis Pattern Matrix of JAI Criticality Indices

	Factor								
Item	F1	F2	F3	F4	F5	F6	F7	F8	Communality
Physical-6	.07	-.01	.03	.02	**.76**	.05	.06	.00	.69
Physical-7	.07	-.02	.04	.01	**.79**	-.07	.05	.05	.70
Physical-8	-.04	.02	-.04	-.02	**.93**	-.05	.03	.04	.83
Physical-9	-.07	-.00	-.04	-.01	**.93**	-.04	.04	.04	.81
Percent of Variance	40	10	5	4	4	3	3	2	
Eigenvalue	27.2	7.0	3.1	3.0	2.4	2.1	1.9	1.4	

Note. N = 1619. F1 = Learning Work Tasks, Technologies, and Procedures; F2 = Handling Emergencies or Crisis Situations; F3= Displaying Cultural Adaptability; F4= Demonstrating Interpersonal Adaptability; F5 = Demonstrating Physically Oriented Adaptability; F6= Dealing Effectively with Unpredictable or Changing Work Situations; and F7 = Handling Work Stress; and F8 = Solving Problems Creatively.

Table 5

Correlations between Factors from Exploratory and Confirmatory Analyses

	Correlations							
Adaptive Performance Dimension	A	B	C	D	E	F	G	H
A. Handling Emergencies		.15	.41	.32	.38	.26	.47	.59
B. Handling Work Stress	.32		.38	.45	.38	.49	.28	.09
C. Solving Problems Creatively	.50	.67		.50	.51	.34	.46	.36
D. Dealing with Changing Situations	.40	.70	.68		.38	.44	.41	.30
E. Learning	.53	.69	.72	.62		.38	.33	.34
F. Interpersonal Adaptability	.40	.70	.56	.58	.66		.40	.17
G. Cultural Adaptability	.49	.47	.56	.51	.49	.54		.47
H. Physically Oriented Adaptability	.65	.29	.49	.40	.52	.33	.53	

Note. Correlations below the diagonal are from the confirmatory analysis; correlations above the diagonal are from the exploratory analysis.

Table 6

Fit Statistics for Alternative Models

Model	$\chi 2$	df	RMR	RMSEA	GFI	AGFI	CFI
Univariate Model	22045	252	.13	.23	.43	.32	.50
Two-Factor Model	5447	251	.10	.11	.40	.36	.59
Eight-Factor Model	1122	224	.03	.05	.95	.93	.98

Note. N = 1715. RMR = Root Mean Square Residual; RMSEA = Root Mean Square Error of Estimate; GFI = Goodness of Fit Index; AGFI = Adjusted Goodness of Fit Index; CFI = Comparative Fit Index.

Table 7

Criticality Indices Means and Standard Deviations for Nine Job Families

		Adaptive Performance Dimensions							
Job	N	A	B	C	D	E	F	G	H
$F_{(8,1299)}$		85.31	25.87	31.44	14.75	56.17	11.41	32.73	179.68
h^2		.34	.14	.16	.08	.26	.07	.17	.53
Accounting	337	.77 (1.22)	2.92 (1.06)	1.63 (1.18)	2.52 (1.09)	1.84 (1.05)	2.12 (1.08)	.91 (1.04)	.58 (.93)
Engineer Support	345	.81 (1.19)	3.34 (.85)	1.69 (1.13)	2.85 (1.03)	1.92 (1.06)	2.34 (.99)	1.19 (1.08)	.46 (.74)
Sales/Marketing	115	1.65 (1.32)	2.46 (1.15)	1.76 (1.28)	2.67 (1.02)	1.94 (1.05)	1.98 (1.06)	1.06 (1.23)	1.14 (1.11)
Craft A	331	2.03 (1.42)	2.68 (.96)	1.88 (1.18)	2.64 (.98)	1.96 (1.01)	2.13 (1.05)	1.28 (1.16)	2.16 (1.14)
Special Forces	17	2.87 (1.02)	3.52 (.81)	3.35 (.95)	3.25 (.80)	3.41 (.76)	2.71 (.80)	3.34 (1.46)	2.72 (1.13)
Combat NCOs	99	3.54 (1.13)	3.72 (.72)	3.26 (.99)	3.59 (.82)	3.78 (.78)	2.76 (.89)	2.40 (1.16)	3.47 (.92)
Admin Specialist	22	1.22 (1.41)	2.76 (1.02)	1.91 (1.35)	2.67 (1.00)	2.45 (.96)	2.03 (.96)	1.14 (1.02)	2.26 (1.41)
Military Police	29	3.74 (.77)	3.65 (.58)	2.81 (1.05)	3.53 (1.01)	3.61 (.65)	3.12 (.79)	2.70 (1.07)	3.45 (.88)
Research Science	13	.30 (.69)	3.81 (.92)	3.65 (.90)	3.11 (.71)	3.45 (.84)	3.13 (.67)	.71 (.85)	.20 (.28)

Note. All *F*-values were significant at $p<.001$. A = Handling Emergencies or Crisis Situations; B = Handling Work Stress; C = Solving Problems Creatively; D = Dealing with Uncertain/Unpredictable Work Situations; E = Learning Work Tasks, Technologies, and Procedures; F = Demonstrating Interpersonal Adaptability; G =Demonstrating Cultural Adaptability; H = Demonstrating Physically Oriented Adaptability.