DF



# HumRRO

4231



## U.S. Army Leadership Human Research Unit
**Presidio of Monterey, California**

*Under the Technical Supervision of*

**The George Washington University**
**HUMAN RESOURCES RESEARCH OFFICE**
**operating under contract with**
**THE DEPARTMENT OF THE ARMY**

FIGHTER IV
Study 23

Staff Memorandum

# THE CONSTRUCTION, VALIDATION AND APPLICATION OF A SUBJECTIVE STRESS SCALE

by

Robert H. Kerle
Hilton M. Bialek

Approved:

Francis H. Palmer
Director of Research

for: Allen C. Miller, II
Colonel, Infantry, Chief

U. S. Army Leadership
Human Research Unit
Presidio of Monterey, California
21 February 1958

## BRIEF

In order to obtain a statistically manipulable measure of a subject's affective reaction under field experimental conditions, a scale was constructed based on the Thurstone scaling technique commonly applied to attitudinal measurement. Items were scaled along a dimension of affect which ranged equidistantly in both positive and negative directions from a literal indifferent point.

Reliability was obtained by use of alternate forms. Efforts were made to utilize both contrived and natural situations in order to test application of the scale. Four such situations were utilized for validation and reliability purposes.

The scale detected significant affective changes in those situations which were judged stressful by the experimenters but independent assessment of the situations is still lacking. The rapidity and ease of administration in addition to the interpretative possibilities encourage further applications of the scale.

TABLE OF CONTENTS



APPENDICES



LIST OF TABLES

## I. Introduction

There is a general tendency to minimize, as a critical measure, a subject's expression of his own feeling or attitude toward a given experimental situation. We witness here a typical example of a dilemma faced by most present-day experimenters. On the one hand, the value and richness of such data is appreciated. On the other, the ephemeral, non-behavioristic nature of such data is deplored, since they lack the publicity and apparent direct observability of the more typical overt behavior measures.

In designing experiments for Phase IV of Task FIGHTER, it was felt that an honest effort should be made to resolve this dilemma. Some measure of a subject's own perception of the stressfulness of a situation was desired which would be amenable to quantification and statistical analysis. The outcome of this effort is the Subjective Stress Scale (SSS). The purpose of this paper is to report the construction, validation, and application of this scale.

## II. Construction

### A. Rationale

In approaching our task, we had to consider the conditions under which we wanted to obtain measures of subjective reactions. Since all of our research is of the field study type, and since we wanted to tap the reactions while they were being experienced (or as close to that moment as possible), we needed an instrument which was easily comprehensible and which could be administered not only rapidly but repeatedly to the same subject.

A search of the literature revealed that most of the instruments reported fell short of our needs on one or two counts. Either they were too lengthy (being primarily of the multiple-choice type), or they were limited to a nominal level of scaling, which prevented extensive statistical treatment of the results. This condition, plus the findings in a study by Pearson and Byars,[1] led us to the decision to construct a Thurstone scale checklist. Pearson and Byars, concerned with the dimension of fatigue, assumed that "we may consider the checklist as a type of attitude scale wherein the individual is required to indicate his 'attitude' toward his state of fatigue." Transposing this assumption to the dimension of a state of affect, we proceeded to construct an eleven-point Thurstone scale. It should be

---

[1] Pearson, Richard G. and Byars, George E. The Development and Validation of a Checklist for Measuring Subjective Fatigue. Randolph Air Force Base, Texas: Air University School of Aviation Medicine, 1956.

noted that these types of scales are interval scales which permit the use of all the conventional parametric statistics.

B. Method

The first step involved the gathering of as many words and short phrases as possible which seemed to describe an individual's emotional or affective state. To accomplish this, we used a standard desk dictionary and a thesaurus. Additional phrases were invented during discussions among the members of Task FIGHTER. In all, a list of 210 words and phrases (which may be found in Appendix I) was compiled. In order to facilitate the sorting procedure, approximately 110 words and phrases were eliminated according to the following criteria:

1. An item was eliminated if it was ambiguous or could be interpreted in more than one way.
2. An item was eliminated if it was irrelevant to the psychological object under consideration, i.e., if it was felt that the item was definitely not part of the affective dimension.
3. An item was eliminated if its vocabulary level was thought to be considerably beyond that of the basic trainee. In some cases reference was made to the Thorndike-Lorge word count dictionary.[1]

[1] Thorndike, E.L. and Lorge, I. The Teacher's Word Book of 30,000 Words. New York: Teachers College, Columbia University, 1952.

Table I

FINAL 100 ITEMS OF STRESS CHECKLIST BY NUMBER

| | | | |
|---|---|---|---|
| 1 | Undisturbed | 26 | Restless |
| 2 | Terrified | 27 | Shaky |
| 3 | Wonderful | 28 | Irritated |
| 4 | O.K. | 29 | Dismayed |
| 5 | Timid | 30 | Confident |
| 6 | Unafraid | 31 | Well |
| 7 | Panicky | 32 | Shook-up |
| 8 | Tremendous | 33 | Unruffled |
| 9 | Alright | 34 | Could take it |
| 10 | In agony | 35 | Assured |
| 11 | Content | 36 | Cowardly |
| 12 | Disorganized | 37 | Flustered |
| 13 | Unconcerned | 38 | Loose |
| 14 | Horrified | 39 | Normal |
| 15 | Scared stiff | 40 | Never felt better |
| 16 | Satisfied | 41 | Horror-struck |
| 17 | Carefree | 42 | Terrible |
| 18 | Afraid | 43 | Comfortable |
| 19 | As usual | 44 | Uncomfortable |
| 20 | Keen | 45 | Scared |
| 21 | Uneasy | 46 | No sweat |
| 22 | Alerted | 47 | Cool |
| 23 | Discontented | 48 | Unsatisfied |
| 24 | Insecure | 49 | Pressured |
| 25 | Great | 50 | Troubled |

Table I (continued)

FINAL 100 ITEMS OF STRESS CHECKLIST BY NUMBER

| | | | |
|---|---|---|---|
| 51 | Stable | 76 | Upset |
| 52 | Refreshed | 77 | Calm and collected |
| 53 | Unemotional | 78 | There's nothing to worry about |
| 54 | There's a great deal to worry about | 79 | Strained |
| 55 | Nervous | 80 | Unstable |
| 56 | Safe | 81 | Unsteady |
| 57 | Worried | 82 | Swell |
| 58 | Calm | 83 | Miserable |
| 59 | Stressed | 84 | Frozen with fear |
| 60 | Untroubled | 85 | Annoyed |
| 61 | Terror-struck | 86 | Good |
| 62 | Fine | 87 | Would get hurt |
| 63 | Didn't bother me | 88 | Couldn't take it |
| 64 | In danger | 89 | Helpless |
| 65 | Unmoved | 90 | Unexcited |
| 66 | Unsafe | 91 | Self-controlled |
| 67 | Frightened | 92 | Fidgety |
| 68 | Pleased | 93 | Anxious |
| 69 | Threatened | 94 | At ease |
| 70 | Steady | 95 | Disturbed |
| 71 | Alarmed | 96 | Cool-headed |
| 72 | Afraid of getting killed | 97 | Relaxed |
| 73 | Not the least bit scared | 98 | Secure |
| 74 | Distressed | 99 | Self-confident |
| 75 | Indifferent | 100 | Bothered |

4. An item was eliminated if it was of a regional nature or if it was a colloquialism with no clearly acceptable definition.

The judgments relating to the acceptability and rejection of items were based upon the decisions of the majority of the Task members associated with the construction of the scale.

To facilitate the statistical work involved, the final 100 items (shown in Table 1) were mimeographed on the narrow edge of the blank side of IBM cards. These cards were pre-punched to include the items' identification number together with a number which was to identify the judges. Following the Thurstone judging procedure, we obtained 60 randomly selected basic trainees at Fort Ord with the only restrictions on selection being that they be English-speaking and literate. Appendix II, Instructions to Judges, presents the exact judging procedure followed.

The examiners were instructed to detect, during and at the end of the sorting procedure, those judges who placed 25 or more items in one category, or who did not understand the meaning of 25 or more items (as indicated by cards turned over or an excessive number of cards repeatedly placed on the wrong side of the continuum). This was a means of eliminating judges who obviously did not qualify for the task because their vocabulary level did not equip them for our purposes. Of the 60 judges, called Group 1, nine were eliminated for the above reasons.

Scale or median (S) values, and interquartile or dispersion

(Q) values were computed for each of the 100 items. To check the reliability of the judging group, the judging procedure was replicated with another 60 randomly selected basic trainees, called Group II. Five of these 60 judges were eliminated according to the foregoing procedure, and the S and Q values were computed independently for Group II. In computing the S and Q values for Group I, it was necessary to discount items that were not understood by all judges. We arbitrarily decided to reject any item which was not understood by five or more of the judges. As a result, one item was disqualified for the scale on this basis. The item involved was #92, "Fidgety," which was not understood by five of the 51 judges.

The scale scores ranged from 1.25 for item #3, "Wonderful," to 10.74 for item #41, "Horror-struck." The lowest and highest possible scale values which any item can assume in this scale are 1 and 11, respectively. Q values ranged from .80 for item #75, "Indifferent," to 4.66 for item #8, "Tremendous." A low Q value indicated high agreement among the judges as to where along the 11 interval scale the item belongs; the reverse is true with a high Q value.

With Group II, as with Group I, the N for a few items was not always the maximum possible (in this case 55). Scale values ranged from 1.14 for item #3, "Wonderful," to 10.86 for item #41, "Horror-struck," the same items as with Group I. The Q values showed a slight change in that the lowest was .63 for item #41, "Horror-struck," but the highest was 4.69 for, once again, item #8, "Tremendous." No items were rejected on the basis of incomprehensibility in Group II.

C. Results

The S and Q values for all 100 items for both Group I and Group II judges are presented in Appendix III. S values ranged from 1.14 to 10.86, thus assuring ample representation of items in each of the eleven intervals required. Q values ranged from a low of .63 to a high of 4.69.

To check the stability of the items on both S and Q values for the two judging groups, "t" tests of the difference between S scores and between Q scores were run. For the S values a "t" of 2.11 was found, which indicated a mean difference significant at the .04 level with Group II S values higher. There was no significant difference between Q values, "t" being less than 1.0. For no items was there a Q difference greater than one scale interval. On the assumption that the difference between S values may not have been normally distributed (values were restricted to a range of from 1 to 11), a non-parametric signed-rank test was run with the rejection of the null hypothesis being significant on the same level as had been indicated by the "t" test. These findings indicated that the dispersion of each item was quite stable, but that a significant number of items moved upward in their absolute scale value.

The next step was to examine each of the 100 items and select those which showed little susceptibility to shifting, and, at the same time showed a low dispersion value. Our ultimate objective was to obtain a maximum of between 25 and 35 reliable items which could be employed in the construction of two alternate scale forms. Thirty-one

items were thus selected, and the expected high degree of relationship (r = .99) between the two judging groups on these 31 items assured us of their stability. The data obtained from each judging group were then combined to form a single S and Q value for each item, based on a judging population of 106. The selection of the items for inclusion in the final scale was based on two requirements. First, items had to be as equidistant from each other as possible; and second, each item had to possess as low a Q value as possible in meeting the first requirement.

From the data based on this larger sample of judges, two alternate forms of the Subjective Stress Scale (SSS) were assembled with 15 items in each scale. The items and their respective S and Q values are shown in Tables 2 and 3. Since the major objective of the scale is primarily to measure negative affect, more items appear on the negative side of indifference than on the positive. Excluding item #75, which is considered the neutral point, the former type of item outnumbers the latter by 9 to 5. An attempt was also made to space the positive affect items one scale interval apart, while the negative items are located approximately one-half interval apart.

In the construction of alternate forms, an effort was made to pair items whose S and Q values made them almost identical in terms of the criteria of selection. Each item was plotted for its Q value on the ordinate and the S value on the abscissa; a line was drawn parallel to the abscissa at the Q value of 2.50. Any item falling above this line was not considered for the final selection. We then

Table 2

SUBJECTIVE STRESS SCALE: FORM A

| Scale Interval | Item Number | Item | S Value | Q Value |
|---|---|---|---|---|
| 1 | 25 | Great | 1.28 | 1.34 |
| 2 | 82 | Swell | 1.90 | 1.81 |
| 3 | 52 | Refreshed | 3.11 | 2.14 |
| 4 | 6 | Unafraid | 4.09 | 2.14 |
| 5 | 63 | Didn't bother me | 5.22 | 2.03 |
| 6 | 75 | Indifferent | 6.00 | .96 |
| 7 | 5 | Timid | 6.91 | 1.49 |
| 7.5 | 26 | Restless | 7.54 | 1.50 |
| 8 | 95 | Disturbed | 7.84 | 1.70 |
| 8.5 | 57 | Worried | 8.57 | 1.88 |
| 9 | 69 | Threatened | 8.98 | 2.28 |
| 9.5 | 18 | Afraid | 9.30 | 1.98 |
| 10. | 7 | Panicky | 9.94 | 1.91 |
| 10.5 | 10 | In agony | 10.43 | 1.48 |
| 11 | 2 | Terrified | 10.68 | 1.26 |

Table 3

SUBJECTIVE STRESS SCALE: FORM B

| Scale Interval | Item Number | Item | S Value | Q Value |
|---|---|---|---|---|
| 1 | 3 | Wonderful | 1.18 | .91 |
| 2 | 62 | Fine | 2.06 | 1.91 |
| 3 | 43 | Comfortable | 2.92 | 2.45 |
| 4 | 70 | Steady | 3.93 | 2.10 |
| 5 | 63 | Didn't bother me | 5.22 | 2.03 |
| 6 | 75 | Indifferent | 6.00 | .96 |
| 7 | 5 | Timid | 6.91 | 1.49 |
| 7.5 | 81 | Unsteady | 7.60 | 1.51 |
| 8 | 55 | Nervous | 8.08 | 1.95 |
| 8.5 | 57 | Worried | 8.57 | 1.38 |
| 9 | 66 | Unsafe | 8.82 | 2.14 |
| 9.5 | 67 | Frightened | 9.50 | 2.14 |
| 10 | 42 | Terrible | 9.91 | 2.00 |
| 10.5 | 10 | In agony | 10.43 | 1.48 |
| 11 | 15 | Scared stiff | 10.65 | 1.27 |

proceeded to select the two items which were closest to the midpoint of each of the intervals. Each item of the two selected for each scale interval was randomly assigned to each of the two alternate forms. However, five items in each form are identical, because these particular items were at the midpoints of their intervals, had low Q values, and were not accompanied by other items fulfilling these criteria. A "t" test of significance was performed on the paired items in the alternate forms of the scale and no significant differences were observed for either the S or Q values.

## III. Applications

### A. Camp Desert Rock

1. Introduction. During the time the SSS was being constructed, Task FIGHTER was collecting physiological data at the Atomic Energy Commission's summer test exercises being held at Camp Desert Rock, Nevada. It was felt that administration of the scale to troops exposed to the shot would be of value. Since only the Group I judging data had been collected and analyzed at the time, an eleven-item scale was constructed based on these data alone. This trial form of the scale is presented in Table 4. The criteria of selection was, as previously described, based on equally spaced S values and low Q values.

2. Procedure. Fifteen members of the Post permanent party at Camp Desert Rock who had been randomly selected as subjects for the collection of physiological data were used as subjects for the SSS. During the tests, one subject became ill and was dropped from the group. The subjects were tested at six different times and responded to the checklist within two different frames of reference for all but two administrations of the scale. By two different frames of reference it is meant that each subject was asked to indicate how he felt at particular times in the testing schedule and how he thought his squad felt. The latter was an attempt to capitalize on any ego-projecting which might possibly have been a more valid indication of the way a man felt at any one time than a direct question. The men were asked to circle one word which best described how they, or their squad, felt each time the scale was administered. The testing schedule is shown in Table 5.

Table 4

SSS TRIAL FORM: CAMP DESERT ROCK

| | Item Number | Item | S Value | Q Value |
|---|---|---|---|---|
| 1 | 3 | Wonderful | 1.25 | 1.20 |
| 2 | 62 | Fine | 2.20 | 1.99 |
| 3 | 96 | Cool-headed | 3.60 | 1.96 |
| 4 | 70 | Steady | 3.38 | 1.94 |
| 5 | 63 | Doesn't bother me | 5.30 | 2.05 |
| 6 | 75 | Indifferent | 6.07 | .80 |
| 7 | 5 | Timid | 6.98 | 1.71 |
| 8 | 26 | Restless | 7.96 | 1.58 |
| 9 | 27 | Shaky | 8.73 | 2.19 |
| 10 | 45 | Scared | 9.79 | 1.75 |
| 11 | 2 | Terrified | 10.61 | 1.49 |

Table 5

EXPERIMENTAL DESIGN AT CAMP DESERT ROCK

| Day | Date | Time | Condition | Measure Taken |
|---|---|---|---|---|
| Sun D-5 | 18 Aug | 0145 hrs | Men awakened | 1. How you feel |
| | | 0200 hrs | Before mounting vehicles | 2. How squad feels |
| | | 0230 to 0430 hrs | Sleep | 3. How you feel |
| | | 0430 | Men awakened | 4. How squad feels |
| | | 0530 hrs | Pseudo-shot (Control condition) | |
| | | 0600 hrs | Following pseudo-shot | 5. How you feel |
| Fri D-Day | 23 Aug | 0100 hrs | Men awakened, mount vehicles | 7A. How you feel |
| | | 0230 to 0430 hrs | Sleep | 9. How you feel |
| | | 0430 hrs | D minus 1 hour | 10. How squad feels |
| | | 0530 hrs | SHOT | 11. How you felt at time of shot |
| | | 0600 hrs | D plus 30 min. | 12. How squad felt at time of shot |

Table 6

DESERT ROCK: MEANS AND VARIANCES FOR EACH SSS ADMINISTRATION

| | Administration Number | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 7A | 9 | 10 | 11 | 12 |
| $\bar{X}$ = | 3.90 | 4.75 | 3.42 | 4.18 | 3.64 | 3.72 | 3.26 | 3.72 | 6.71 | 7.51 |
| $\sigma^2$ = | 5.46 | 5.64 | 2.93 | 3.47 | 3.30 | 4.04 | 4.04 | 4.20 | 9.54 | 6.72 |
| N = | 15 | 15 | 14 | 14 | 15 | 14 | 14 | 14 | 14 | 14 |

3. Results. Table 6 presents the means and variances for each administration of the scale at Desert Rock. The means range from 3.26 (between "Cool-headed" and "Fine") on administration nine, to 7.51 (between "Timid" and "Restless") on administration twelve.

To test the magnitude of the response differences between administrations, "t's" were tabulated. These "t" values are presented in Table 7 and may best be summarized in the following manner:

1. There were no significant differences between the third-person and first-person forms of the scale.
2. There were no significant differences among all forms administered up to, but before, the actual atomic blast.

Table 7

"t" VALUES FOR $\bar{X}$ DIFFERENCES IN RESPONSE TO SSS AT DESERT ROCK

| Administrations | "t" | Administrations | "t" |
|---|---|---|---|
| 1 - 3 | <1 | 2 - 4 | 1.71 |
| 1 - 5 | <1 | 2 - 6 | <1 |
| 1 - 7 | <1 | 2 - 8 | <1 |
| 1 - 7A | <1 | 2 - 10 | 1.90 |
| 1 - 9 | <1 | 2 - 12 | 2.37* |
| 1 - 11 | 2.89* | 10 - 12 | 4.23** |
| 9 - 11 | 3.96** | 11 - 12 | 1.06 |
| 1 - 2 | 1.37 | 9 - 10 | 1.06 |

*Sig. .05 level
**Sig. .01 level

3. Responses given to feelings experienced at the time of the blast are all significantly higher (greater negative affect) than any and all other responses given up to that time.

4. Discussion. The experimenter reported that the subjects did not manifest any obvious signs of apprehension before the shot, nor did their behavior, immediately after the blast, appear disrupted. Nevertheless, responses to the scale revealed a significant shift in the direction of negative affect. This finding served as an impetus to further refinements and applications of the scale. It should be noted that although the absolute level of affect rose only to 7.51 (between "Timid" and "Restless"), the group shifted over the indifference point.

That is, while previously a somewhat positive affective state existed, the experience of the atomic shot resulted in the shift to a state of negative affect. Unfortunately, at this time, the concomitant physiological specimens have yet to be analyzed; these would afford much-needed and important corollary information.

Since there was no difference between responses given in the first- or third-persons, we decided to use only the first-person in subsequent administrations. Of course, it is possible that under more extreme or more threatening conditions, differences might become apparent in the sense that an individual might admit discomfort only up to a certain point after which he might be more likely to project it upon his peers.

B. Navy Fire Fighting School, Treasure Island

1. Introduction. The results of the Desert Rock Study led us to search for other situations which might evoke affective reactions from the participants. After constructing two alternate forms of the scale, we contacted the Navy Fire Fighting School at Treasure Island. A few years ago, while engaged in the FIGHTER II study, members of Task FIGHTER had exposed a group of Army recruits to fire control problems at Treasure Island; at that time, the subjects had reported that putting out the fires was a stressful experience. Therefore, we decided to administer the SSS to Navy recruits undergoing fire fighting training on the assumption that such a situation, being potentially threatening, would provide validation of the scale. A further purpose was to investigate the equivalence of the alternate forms.

2. Procedure. Half the subjects, randomly assigned, were exposed to an open tank fire and the other half exposed to an engine room fire. A brief description of these two tasks follows:

> Open Tank Fire. A tank, 15 feet in diameter, half-filled with diesel oil, was ignited with gasoline. After flames completely engulfed the tank, the subjects approached and tried to extinguish the fire by cooling the surface of the oil with water from a 1½" hose fitted with a high pressure fog nozzle. The man at the nozzle was assisted by five or six other men behind him, who helped manipulate the heavy hose. The only protection a man had from the searing flames was the wall of high pressure fog which he kept between himself and the flames.
>
> Engine Room Fire. The space below a simulated destroyer engine room was flooded with oil to within 12 inches of the deck plates. The oil was ignited with gasoline; when the fire blazed throughout the structure, two teams of approximately six men each entered from opposite hatches and worked together to put out the blaze.

These tasks are part of a series of exercises engaged in by seamen attending the Fire Fighting School. The men are thoroughly briefed by experienced Navy Chief Petty Officers as to what to expect and what is expected of them. They are told that, if they do their jobs correctly, there is nothing to be afraid of. The chiefs are always at hand; they accompany the men into the engine room, and right up to the flames and smoke of the open tank fire. A general air of confidence and ease prevades each session.

Of the subjects exposed to the open tank fire, one-half, randomly assigned, were administered Form A of the scale three times: two hours before they were to fight the fire, a minute before, and immediately afterwards. On the last administration they were asked

Table 8

DESIGN OF TREASURE ISLAND STUDY

| | Group I | II | III | IV |
|---|---|---|---|---|
| N | 14 | 13 | 15 | 13 |
| Two Hours Before | Form A | Form B | Form B | Form A |
| Immediately Before Engine Room Open Tank | Form A | Form B | Form B | Form A |
| Immediately After Engine Room Open Tank | Form A | Form B | Form B | Form A |

how they felt while fighting the fire. Form B was administered to the remaining subjects. The same procedure was applied to the subjects who fought the engine room fire. Schematically, the design appears as in Table 8.

3. Results. There were two questions we wished to investigate in the Treasure Island study: first, were the two forms of the scale comparable; and, second, did the scale detect differences in affect between the anticipation and the actual experience of the task. Table 9 presents the means, variances, and significance levels for each form at each administration. Since none of the "t" values was significant we felt justified in assuming that the forms were comparable.

In order to test for inter-administration differences

Table 9

MEANS, VARIANCES, AND SIGNIFICANCE LEVELS
FOR SSS FORMS A AND B:
TREASURE ISLAND FIRE FIGHTING

| | | Form A | Form B | "t" |
|---|---|---|---|---|
| Two Hours Before | $\bar{X}_2$ | 5.21 | 5.32 | .19 |
| | $S^2$ | 3.86 | 5.57 | |
| Immediately Before Engine Room | $\bar{X}_2$ | 4.30 | 5.01 | .97 |
| | $S^2$ | 2.02 | 4.74 | |
| Open Tank | $\bar{X}_2$ | 6.21 | 5.81 | .51 |
| | $S^2$ | 2.84 | 5.63 | |
| Immediately After Engine Room | $\bar{X}_2$ | 4.08 | 5.14 | 1.25 |
| | $S^2$ | 3.87 | 5.49 | |
| Open Tank | $\bar{X}_2$ | 5.42 | 5.25 | .21 |
| | $S^2$ | 1.26 | 7.92 | |

Table 10

INTER-ADMINISTRATION MEANS, VARIANCES,
AND SIGNIFICANCE LEVELS:
TREASURE ISLAND FIRE FIGHTING
(FORMS A AND B COMBINED)

| | Immediately Before | | Immediately After | | "t" |
|---|---|---|---|---|---|
| | $\bar{X}$ | $S^2$ | $\bar{X}$ | $S^2$ | |
| Engine Room Groups | 4.69 | 3.53 | 4.67 | 4.88 | .04 |
| Open Tank Groups | 6.02 | 4.06 | 5.34 | 4.29 | 1.22 |

we combined the data for the two engine room groups and for the two open tank groups at each administration. The "t" values shown in Table 10 indicate that for each situation the actual experience did not differ significantly from anticipation of it. Neither before nor after the tasks, did the subjects experience any degree of negative affect.

4. Discussion. The results of this study provided empirical support for the comparability of the alternate forms of the scale. However, if we are to believe that the fire fighting situations were, in fact, dangerous, we are forced to conclude that our scale was insensitive to this danger as perceived by our subjects. To digress on this point, recall that the fire fighting tasks were selected on the basis of previous experience using Army recruits as subjects. Those subjects had ranked the fire fighting exercise as the most stressful of six activities in which they were required to engage.

The subjects in the present study, however, were Navy recruits all of whom were to receive one week of intensive training in fire fighting. On the day when the SSS was applied, our subjects had already spent three days at the school. Their instructors, Chief Petty Officers, emphasized by word and action the ease with which the fires could be brought under control if the proper precautions were taken. Relations between the instructors and students were very informal. At the time of scale administration, both experimenters commented on the informality and frivolity accompanying the ignition and extinguishing of the fires. It should also be pointed out that

the fires were extinguished by a six to eight man team with only the nozzle man and his helper actually moving very close to the flames. In the engine room, the chiefs preceeded the team and took few of the precautions required of the students. The implication, of course, is that the situations were not, in fact, perceived as particularly dangerous by the subjects. If this unverifiable observation was tenable, then we felt justified in refusing to reject the use of the scale on the grounds of insensitivity to the actual feelings of the subjects.

C. The Rope Bridge at Pilarcitos

1. Introduction. In our quest for situations suitable for validating the SSS, we decided to utilize a rope suspension bridge built in Pilarcitos Canyon, Fort Ord, as part of a field problem for FIGHTER IV. A number of performance measures were being investigated there, and, since we felt the task would evoke some affective change, the SSS was included. Again, as in the two previous studies reported, we used the subjects as their own controls. Having satisfied ourselves that the forms were comparable and that there seemed to be no adverse effects resulting from requiring a subject to respond repeatedly to the same fifteen words, we used only one form (Form B) of the scale.

2. Procedure. The experiment consisted simply of having 30 randomly selected Army recruits individually cross a rope suspension bridge. This bridge is 150 feet long and 50 feet high at its midpoint. Subjects walk on a single rope and have two hand ropes with which to guide themselves. In conformance with Army safety regulations, a

belaying line was attached to each subject. This was done in such a manner as to minimize or disguise the fact that it was indeed a safety line.

Performance measures were administered to the subjects at three points in the experiment. Point A was located approximately 100 yards from the beginning of the bridge and out of sight of the bridge. Subjects tested at this point had no idea as to the nature of the experiment and could not see the suspension bridge. The SSS was not administered at this testing point.[1] Site B was located at the beginning of the bridge. Each subject was led to the edge of the ravine, shown both the instability of the bridge and its height in respect to the bottom of the ravine. He was then told to cross it. The belaying line was attached; after the subject took a few steps on the bridge, he was called back for the first administration of the SSS in which he was asked to indicate "how he felt now" by circling the appropriate word.

The third testing site, point C, was located at the end of the bridge and here subjects were required to respond to three SSS administrations: "How did you feel while you were out on the bridge?" "How do you feel now?" and "How did you feel when you were told to cross the bridge?" The fourth administration was intended as a check on the relationship between how a subject responds to the

---

[1] No reference will be made here to the other measures or results obtained in this sub-experiment. FIGHTER Study 28 will report the Pilarcitos bridge study in detail.

immediate situation and how he recalls he felt at a specified time in the past.

Table 11

MEANS AND VARIANCE AND "t" VALUES FOR DIFFERENCES BETWEEN ADMINISTRATIONS: ROPE BRIDGES AT PILARCITOS

| Administration | $\bar{X}$ | $S^2$ | t | |
|---|---|---|---|---|
| 1 (start) | 6.21 | 4.72 | (1-2) | 1.20 |
| 2 (now-end) | 6.81 | 5.95 | (2-3) | 6.98** |
| 3 (recall during) | 3.62 | 5.72 | (1-3) | 5.07** |
| 4 (recall start) | 6.26 | 6.26 | (1-4) | .48 |

** Sig. .01 level

3. Results. The means, variances and "t" tests of differences between the administrations of the SSS are presented in Table 11. They indicate a significant shift toward the positive affect region upon completion of the bridge crossing as compared to the feeling expressed both at the beginning of, and during, the crossing. The verbal equivalents of the mean values indicate that the group felt "Timid" before crossing the bridge, and while on it, and felt "Safe" or "Cool-headed" after completing the crossing. A comparison of the first and fourth administration of the SSS indicates no significant difference in a subject's expression of how he feels at a given time and how he recalls he felt at that time. Furthermore, there is very little shift or change in the variance over the four administrations of the scale. According to the results of the SSS, the experimental group felt no better or worse while crossing the bridge than they did when they were about to start, or, in other words, their anticipation was closely identical to the experience they felt.

It should be pointed out at this time that one of the thirty subjects refused to cross the bridge. This subject covered approximately 20 or 30 feet, stopped and asked if he could proceed backward to the starting point. Upon arriving back at the starting point he was administered the same battery test as the successful crossers. It is interesting to note that this subject indicated "Unsafe" (8.82) when asked how he felt as he was about to cross the bridge; indicated "Frightened" (9.50) when asked how he felt while on the bridge; and indicated "Scared stiff" (10.65) when tested immediately upon his return to the starting point.

4. Discussion. In this study the SSS detected significant shifts in the affective states of the subjects. It is noteworthy to emphasize that the shift was in the direction of a feeling of relief even though the initial state is best described as indifferent. This significant increase in positive feeling allows for at least two interpretations. One, the actual attainment or overcoming of the perceived threatening situation led to a feeling of relief or exhilaration. It is, so to speak, the realization of mastery of some perceived obstacle. The second interpretation suggests that it is less ego-threatening to admit relief or well-being after overcoming an obstacle, than it is to admit that the anticipation and experience of the obstacle itself were frightening. It might be well in future experiments to consider the extent of relief, or feeling of well-being after the experience to be as indicative of stress as is the direct expression of fear or apprehension.

The findings of the study increased, but, by no means, satisfied, our confidence in the scale. We still seek situations wherein we have independent data which would indicate that the greater proportion of our subjects are experiencing more than mild negative affect. Nevertheless, the bridge at Pilarcitos evoked changes in our subjects' affective states and the SSS adequately detected them.

## IV. Discussion

In constructing the SSS we realized that, in essence, there are two dimensions being measured, or two affective continua represented. One goes from feelings of extreme well-being to a neutral state of indifference, and the other, from feelings of extreme fear to a point of indifference. This was empirically demonstrated by plotting the S scores against their respective Q values. Our plot indicated that items at the extremes of both well-being and fear, and at the neutral point, were the ones which tended always to be the most clearly defined, i.e., they had the lowest Q values. The "M" shaped distribution of Q scores plotted on the ordinate against the S values, or the abscissa, gives credence to our assumption of bi-dimensionality.

Because of the nature of the scale construction, it is possible to state that, at best, the scale represents an attempt at a unidimensional approach to measuring conscious manifestations of affective states. Edwards and Kilpatrick[1] have suggested applying Guttman's scale theory to test for unidimensionality. If we were to do this we would consider the indifferent or neutral point as our origin and test for two separate unidimensional scales: a positive affect scale and a negative affect scale. For our purposes, however, Guttmanizing seems superfluous and hence we have not proceeded in this direction. At the least, we feel confident that we have constructed two non-overlapping

---

[1] Edwards, A.L. and Kilpatrick, F.P. A Technique for the Construction of Attitude Scales. J. Appl. Psychol., 1948, 32, 374-384.

scales whose items represent equally spaced points along the defined continua.

In interpreting the results of the scale it is necessary to acknowledge the difference between absolute and relative shifts in mean response. If a significant shift occurs, we have determined empirically that the standard error of the mean at the indifferent point (6.00) is such that a mean shift of at least two scale points is required for the experimental mean to be significantly different from any control group. Therefore, we would, ideally, require an experimental group mean of at least 8.00 in order for a significant difference from neutrality to exist. However, the interpretation of shifts in response is a function of the particular research problem and is not a critical factor in the application of the scale as a measuring instrument.

A major criticism which could be levied against the findings reported in this study is that, in no instance, was an independent control group employed, but that, rather, subjects were used as their own controls. Circumstances have prevented our use of independent controls, to date, but studies now underway will rectify this valid criticism.[1]

---

[1]Since the writing of this report, preliminary data involving the use of a control group have been collected. In attempting to assess the effects of fatigue and harassment on performance, a resting control group (N = 16) was administered the SSS at the same time a harassed experimental group (N = 16) was responding to the scale. The control group mean (4.39) was significantly lower at the .01 level than the experimental group mean (7.06). Of theoretical interest is the fact that the experimental variance was almost twice as large as the control group variance.

In general we feel our efforts so far encourage further usage an refinement of the SSS. We believe that the scale offers advantages in administration and analysis which are not present in existing instruments. Finally, we know of no previous attempts to scale affective states of an individual. For this reason alone, we believe that our efforts have heuristic value for our own research and for other research where this dimension is critical.

## APPENDIX I

### LIST OF ORIGINAL ITEMS DESCRIBING AFFECTIVE STATES

1 Affected
2 Afraid
3 Afraid of getting killed
4 Afraid of nothing
5 Aghast
6 Agitated
7 Agonized
8 A great deal of stress
9 A great deal to worry about
10 Alarmed
11 Alerted
12 Alright
13 Annoyed
14 Anxious
15 Apathetic
16 Appalled
17 Apprehensive
18 Assured
19 As usual
20 At ease
21 Attentive
22 Aware of trouble
23 Awed
24 Awe-struck
25 Bewildered
26 Bore with it
27 Calm
28 Care-free
29 Cautious
30 Cold-footed
31 Collected
32 Cool
33 Cool-headed
34 Comfortable
35 Composed
36 Confident
37 Content
38 Controlled
39 Convulsed with fear
40 Cowardly
41 Cowering
42 Deranged
43 Diffident
44 Discomposured
45 Disconcerted
46 Discontented
47 Dismayed
48 Disordered
49 Disorganized
50 Disquieted
51 Distressed
52 Doomed
53 Encumbered
54 Endured it
55 Enjoyed it
56 Excited
57 Experienced no change
58 Faint-hearted
59 Fearful
60 Felt lily-livered
61 Felt white-livered
62 Felt unpleasant
63 Fidgety
64 Fine
65 Firm
66 Flustered
67 Frightened
68 Frozen in fear
69 Frozen in horror
70 Full of dread
71 Glad
72 Good
73 Got a kick out of it
74 Gratified
75 Guarded
76 Hampered
77 Handicapped
78 Harassed
79 Hellish
80 Hell-like

31 Helpless
82 Hesitant
83 Hindered
84 Horrified
85 Imperiled
86 Impregnable
87 In a customary way
88 In a dangerous situation
89 In a hazardous situation
90 In danger
91 Indifferent
92 In dire circumstance
93 In good condition
94 In good shape
95 In great horror
96 In great peril
97 Insecure
98 Irritated
99 Keen
100 Like a nightmare
101 Made miserable
102 Made numb by it
103 Menaced
104 Mildly bothered
105 Mindful
106 Murderous
107 Nervous
108 Never felt better
109 Nice
110 No different than any other time
111 No sweat
112 Normal
113 Not the least bit scared
114 Nothing out of the ordinary
115 Nothing to worry about
116 Observant
117 Odd
118 O.K.
119 Overconfident
120 Panicky
121 Perfectly at ease
122 Perfectly relaxed
123 Petrified
124 Petrified with fear
125 Phlegmatic
126 Placid
127 Pleased
128 Pleased with it
129 Pleasureful
130 Pleasure-giving
131 Poise
132 Pressured
133 Protected
134 Put up with it
135 Refreshed
136 Regular
137 Relaxed
138 Reluctant
139 Restful
140 Restless
141 Revolted
142 Rigid
143 Safe
144 Same
145 Satisfactory
146 Scared stiff
147 Scared to death
148 Secure
149 Self-composed
150 Self-controlled
151 Self-possessed
152 Self-sufficient
153 Sensed danged
154 Sensed gravity
155 Shaky
156 Shocked
157 Shook-up
158 Slightly scared
159 Stable
160 Steady
161 Stimulated
162 Stirred
163 Stressed
164 Strong
165 Suffered through it
166 Tense
167 Terrible
168 Terribly afraid
169 Terrified
170 Terror-struck

171 Threatened
172 Thwarted
173 Timid
174 Timorous
175 Tolerated it
176 Tormented
177 Tranquil
178 Tremendous
179 Troubled
180 Trying circumstances
181 Unaffected
182 Unassailable
183 Unbearable
184 Uncomfortable
185 Unconcerned
186 Undisturbed
187 Uneasy
188 Unemotional
189 Unexcited
190 Unexposed
191 Unimpressed
192 Unmoved
193 Unpleasant
194 Unprotected
195 Unruffled
196 Unstable
197 Unsafe
198 Untroubled
199 Unusual
200 Upset
201 Vulnerable
202 Wary
203 Well
204 Wonderful
205 Worried
206 Would be destroyed
207 Would be killed
208 Would go to pieces
209 Would surely get killed

## APPENDIX II

## INSTRUCTIONS TO JUDGES

You have in your possession 100 statements, each on a separate card, which indicate degrees of feeling, either good or bad. You are to sort these statements into 11 piles, ranging in order from 1 to 11. The eleven white cards marked 1-11 that you see in front of you are to serve as a guide as you sort.

On pile 1 place those statements which you believe indicate the greatest degree of feeling good or of well-being.

On pile 11 place those statements which you believe indicate the greatest amount or degree of feeling bad or of stress.

On the middle pile, pile 6, place those statements which you feel express a neutral state of feeling between extreme well-being and extreme stress.

On all the other remaining piles arrange the statements according to the degree of stressfulness or well-being that they represent.

The important thing to remember is that the 11 piles represent gradually increasing steps. This means that when you are finished sorting there should be 11 piles of statements arranged in order of the feeling that each statement represents, from pile 1 representing extreme well-being to pile 11 representing extreme stress.

Before you begin to sort the statements you will have five minutes to read them over so as to become familiar with the general range of feeling that they cover and represent.

It is extremely important that you sort the statements according to the amount of well-being or stress that each statement represents and NOT according to how you feel right now or how you felt yesterday or at any one time.

If you are not sure where a statement should be placed try hard to make the best judgment that you possibly can. If you do not understand the meaning of any statement place it in the pile where you think it might belong but turn the card over.

It is not necessary to put the same number of statements in each pile but be sure that each pile contains at least two statements.

Be very careful in handling the cards. Do not mutilate, fold, mark, or damage them in any way.

After you have sorted all the cards inspect the different piles so as to be sure that you are satisfied with your sorting. At this point make any changes that you feel are necessary. When you are finished leave your cards in the 11 different piles you have just made and raise your hand.

If you do not understand the instructions raise your hand and one of the examiners will be glad to help you.

S & Q VALUES FOR THE 100 ITEMS USED IN THE SUBJECTIVE STRESS SCALE

| Item | S Group I | S Group II | S Group II − S Group I | Q Group I | Q Group II | Q Group II − Q Group I |
|---|---|---|---|---|---|---|
| 1 | 4.50 | 4.55 | .05 | 3.28 | 2.32 | -.96 |
| 2 | 10.61 | 10.77 | .16 | 1.49 | .99 | -.50 |
| 3 | 1.25 | 1.14 | -.11 | 1.20 | .64 | -.56 |
| 4 | 3.80 | 3.95 | .15 | 2.78 | 2.98 | .20 |
| 5 | 6.98 | 6.84 | -.14 | 1.71 | 1.45 | -.26 |
| 6 | 4.02 | 4.10 | .08 | 2.28 | 2.06 | -.22 |
| 7 | 9.89 | 9.97 | .08 | 1.97 | 2.04 | .07 |
| 8 | 1.60 | 1.29 | -.31 | 4.66 | 4.69 | .03 |
| 9 | 4.17 | 3.86 | -.31 | 2.39 | 3.20 | .81 |
| 10 | 10.61 | 10.20 | -.41 | 1.35 | 1.96 | .61 |
| 11 | 3.38 | 2.98 | -.40 | 3.24 | 2.69 | -.55 |
| 12 | 7.97 | 7.86 | -.11 | 2.25 | 2.10 | -.15 |
| 13 | 5.89 | 6.09 | .20 | 1.31 | 2.27 | .96 |
| 14 | 10.59 | 10.83 | .24 | 1.35 | .66 | -.69 |
| 15 | 10.68 | 10.67 | -.01 | 1.26 | 1.20 | -.06 |
| 16 | 3.26 | 3.08 | -.18 | 2.80 | 3.16 | .36 |
| 17 | 3.83 | 4.08 | .25 | 3.37 | 3.18 | -.19 |
| 18 | 9.47 | 9.15 | -.32 | 1.61 | 2.17 | .56 |
| 19 | 5.68 | 5.62 | -.06 | 2.08 | 1.70 | -.38 |
| 20 | 2.55 | 2.50 | -.05 | 2.94 | 3.22 | .28 |
| 21 | 8.05 | 7.26 | -.79 | 1.84 | 1.48 | -.36 |
| 22 | 6.50 | 5.63 | -.87 | 2.91 | 3.54 | .63 |
| 23 | 7.53 | 7.47 | -.06 | 1.35 | 1.90 | .55 |
| 24 | 7.63 | 8.21 | .58 | 1.51 | 2.43 | .92 |
| 25 | 1.29 | 1.27 | -.02 | 1.20 | 1.53 | .33 |
| 26 | 7.96 | 7.27 | -.69 | 1.58 | 1.31 | -.27 |
| 27 | 8.73 | 7.96 | -.77 | 2.19 | 2.12 | -.07 |
| 28 | 8.19 | 7.96 | -.23 | 2.29 | 2.25 | -.04 |
| 29 | 7.30 | 7.26 | -.04 | 1.76 | 2.20 | .44 |
| 30 | 2.83 | 2.83 | 0.00 | 2.69 | 2.80 | .11 |

| Item | S Group I | S Group II | S Group II − S Group I | Q Group I | Q Group II | Q Group II − Q Group I |
|---|---|---|---|---|---|---|
| 31 | 2.38 | 2.81 | .43 | 3.80 | 2.86 | -.94 |
| 32 | 8.46 | 8.50 | .04 | 2.53 | 2.21 | -.32 |
| 33 | 5.26 | 5.64 | .38 | 2.01 | 2.72 | .71 |
| 34 | 4.87 | 4.89 | .02 | 2.44 | 2.78 | .34 |
| 35 | 2.83 | 2.50 | -.33 | 2.65 | 2.75 | .10 |
| 36 | 9.17 | 8.92 | -.25 | 2.81 | 3.30 | .49 |
| 37 | 7.47 | 7.98 | .51 | 2.50 | 1.79 | -.71 |
| 38 | 5.80 | 5.63 | -.17 | 2.85 | 2.69 | -.16 |
| 39 | 5.54 | 5.55 | .01 | 2.24 | 2.90 | .66 |
| 40 | 1.31 | 1.60 | .29 | 1.41 | 1.37 | -.04 |
| 41 | 10.74 | 10.86 | .12 | 1.36 | .63 | -.73 |
| 42 | 9.76 | 10.13 | .37 | 1.89 | 2.00 | .11 |
| 43 | 2.89 | 2.92 | .03 | 2.51 | 2.35 | -.16 |
| 44 | 7.54 | 7.67 | .13 | 1.94 | 2.11 | .17 |
| 45 | 9.79 | 9.70 | -.09 | 1.75 | 2.05 | .30 |
| 46 | 4.39 | 4.90 | .51 | 3.35 | 3.15 | -.20 |
| 47 | 3.67 | 3.69 | .02 | 3.05 | 2.36 | -.69 |
| 48 | 8.10 | 7.32 | -.78 | 2.17 | 1.74 | -.43 |
| 49 | 8.09 | 8.07 | -.02 | 2.53 | 2.29 | -.24 |
| 50 | 8.47 | 8.06 | -.41 | 2.17 | 2.41 | .24 |
| 51 | 3.98 | 3.97 | -.01 | 2.50 | 2.38 | -.12 |
| 52 | 3.31 | 2.96 | -.35 | 2.45 | 2.01 | -.44 |
| 53 | 5.93 | 5.88 | -.05 | 1.26 | 1.94 | .68 |
| 54 | 9.21 | 8.73 | -.48 | 2.38 | 2.16 | -.22 |
| 55 | 8.28 | 7.90 | -.38 | 1.91 | 1.98 | .07 |
| 56 | 2.60 | 2.58 | -.02 | 2.40 | 2.14 | -.26 |
| 57 | 8.42 | 8.71 | .29 | 1.95 | 1.86 | -.09 |
| 58 | 3.83 | 3.62 | -.21 | 2.77 | 2.96 | .19 |
| 59 | 8.59 | 7.76 | -.83 | 2.56 | 1.73 | -.83 |
| 60 | 3.94 | 4.63 | .69 | 3.59 | 2.84 | -.75 |
| 61 | 10.69 | 10.86 | .17 | 1.40 | .63 | -.77 |
| 62 | 2.20 | 1.95 | -.25 | 1.99 | 1.76 | -.23 |
| 63 | 5.30 | 5.14 | -.16 | 2.05 | 2.09 | .04 |

| | S Group I | S Group II | S Group II − S Group I | Q Group I | Q Group II | Q Group II − Q Group I |
|---|---|---|---|---|---|---|
| 64 | 9.74 | 9.31 | -.43 | 2.40 | 1.94 | -.46 |
| 65 | 6.00 | 5.71 | -.29 | 1.51 | 1.99 | .48 |
| 66 | 9.02 | 8.72 | -.30 | 2.32 | 2.04 | -.28 |
| 67 | 9.54 | 9.45 | -.09 | 2.34 | 2.06 | -.28 |
| 68 | 2.26 | 2.94 | .68 | 2.06 | 2.67 | .61 |
| 69 | 8.76 | 9.17 | .41 | 2.59 | 1.87 | -.72 |
| 70 | 3.83 | 4.14 | .31 | 1.94 | 2.32 | .38 |
| 71 | 8.35 | 8.28 | -.07 | 2.26 | 2.74 | .48 |
| 72 | 10.20 | 10.39 | .19 | 2.34 | 2.29 | -.05 |
| 73 | 3.92 | 4.37 | .45 | 2.38 | 2.88 | .50 |
| 74 | 8.00 | 7.79 | -.21 | 2.06 | 2.51 | .45 |
| 75 | 6.07 | 5.92 | -.15 | .80 | 1.54 | .74 |
| 76 | 8.43 | 7.74 | -.69 | 2.10 | 1.77 | -.33 |
| 77 | 3.55 | 3.58 | .03 | 2.31 | 2.38 | .07 |
| 78 | 4.25 | 3.77 | -.48 | 3.59 | 2.45 | -1.14 |
| 79 | 8.65 | 7.98 | -.67 | 2.41 | 1.77 | -.64 |
| 80 | 7.69 | 8.08 | .39 | 2.18 | 2.16 | -.02 |
| 81 | 7.53 | 7.69 | .16 | 1.40 | 1.75 | .35 |
| 82 | 1.96 | 1.79 | -.17 | 1.49 | 2.15 | .66 |
| 83 | 9.63 | 9.60 | -.03 | 2.80 | 2.30 | -.50 |
| 84 | 10.61 | 10.78 | .17 | 1.49 | .94 | -.55 |
| 85 | 7.98 | 7.50 | -.48 | 1.91 | 1.62 | -.29 |
| 86 | 1.95 | 2.36 | .41 | 2.54 | 2.14 | -.40 |
| 87 | 8.17 | 8.73 | .56 | 2.55 | 2.58 | .03 |
| 88 | 9.44 | 8.73 | -.71 | 2.49 | 2.64 | .15 |
| 89 | 9.75 | 9.75 | 0.00 | 2.63 | 2.54 | -.09 |
| 90 | 5.07 | 4.98 | -.09 | 3.11 | 2.16 | -.95 |
| 91 | 4.05 | 4.21 | .16 | 2.28 | 2.35 | .07 |
| 92 | 7.50 | 7.40 | -.10 | 2.12 | 1.47 | -.65 |
| 93 | 4.70 | 4.63 | -.07 | 3.44 | 5.02 | 1.58 |
| 94 | 4.50 | 3.75 | -.75 | 2.21 | 2.32 | .11 |
| 95 | 8.09 | 7.54 | -.55 | 1.55 | 1.68 | .13 |

| Item | S Group I | S Group II | S Group II − S Group I | Q Group I | Q Group II | Q Group II − Q Group I |
|---|---|---|---|---|---|---|
| 96 | 3.60 | 4.20 | .60 | 1.96 | 2.31 | .35 |
| 97 | 3.33 | 2.97 | -.36 | 3.83 | 2.79 | -1.04 |
| 98 | 2.60 | 2.65 | .05 | 2.65 | 2.98 | .33 |
| 99 | 3.25 | 3.25 | 0.00 | 3.26 | 2.78 | -.48 |
| 100 | 8.07 | 7.39 | -.68 | 2.25 | 1.59 | -.66 |