

Assessing Mood with Affect-Sensitive Tasks

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Abstract: It is hypothesized that when an individual experiences a change in mood there are concomitant changes in performance at cognitive and psychomotor tasks. The present study attempts to identify tasks which are mood-sensitive. The nature of affect-sensitive tasks will yield information about how mood influences behavior. Further, to the extent that relationships between mood and affect-sensitive tasks are found, clients may be motivated to change their mood by a knowledge of expectable improvements in performance. Ten tasks and a mood-adjective checklist were administered to 106 subjects. Four of the tasks showed statistically significant relationships with self-reported mood. Results were promising for further investigations of affect-sensitive tasks.

When an individual experiences a change in mood, there will be a concomitant change in the way he or she thinks about the world (e.g., Bower, 1981; Clark & Fiske, 1982). Such a change in thinking will be reflected in a person's performance at various cognitive and psychomotor tasks. The following reports a preliminary study, the purpose of which was to develop a set of performance measures that reflect changes in mood. To the extent that such mood-sensitive tasks can be identified, knowledge of the functional concomitants of mood can be developed. This knowledge, in turn, can be used in selected counseling situations to motivate a client's mood change through the promise to that client of enhanced performance at valued tasks.

The identification of a set of mood-sensitive tasks was assisted by several recent theoretical developments in the area of cognition and affect (e.g., Bower, 1981; Hamilton, 1983; Zajonc, 1980). For instance, Bower (1981) predicts that when an individual experiences a mood, concepts associated with the mood in memory become easier to retrieve. Thus, the more closely the affective content of a stimulus (e.g., a word or concept) corresponds to a person's present mood, the more the stimulus' associations should be retrievable. Based on this theory, individuals in a good mood should rate pleasant words higher in imagery than unpleasant words (Mayer, 1983), be

able to retrieve pleasant members of a category (e.g., "types of physical contact") more readily than unpleasant members, and rate the probability of pleasant events as higher than unpleasant events (e.g., Tversky & Johnson, 1983). Activation of happy or sad concepts in memory can be thought of as defining a "pleasantness" dimension of mood. In addition to the pleasantness dimension, an arousal dimension of mood may also be present, reflected by changes in perceptual/motor performance such as letter search, letter cancellation, and similar tasks (Johnson, 1937; Velten, 1967).

In the present study, several memory tasks hypothesized to indicate pleasantness of mood were combined with several motor tasks hypothesized to reflect arousal. A mood adjective checklist (Russell, 1979) which includes both the "pleasantness" and "arousal" adjectives was used as the primary dependent measure of affect. While self-report of mood on the adjective checklist and affect-sensitive tasks are not identical, they will be expected to intercorrelate moderately, to the degree that they both reflect underlying mood.

Method

Participants

Participants were 106 native-English speaking students (34 women, 72 men) in introductory psychology classes at Case Western Reserve University who

took part in the experiment for course credit.

Psychomotor tasks

Unless otherwise indicated, participants were instructed on each of the psychomotor tasks to "Work as quickly as you can," during an 80-second time period. Students were also to mark their protocols at the time of an announcement made every 20 seconds. The marks made at 20-second intervals provided a method of dividing the tasks for the examination of reliability. There were five such tasks:

Number listing, forward. Subjects were asked to list the numbers forward from 103 by 1s.

Number listing, backward. Subjects were asked to list the numbers backward from 200 by 3s.

Time estimation. (Did not use above instructions.) Subjects were instructed to count to themselves by thousands in order to estimate four time intervals of 45, 15, 60, and 30 seconds each.

Letter cancellation, all letters. Subjects were asked to put an individual, vertical line through each letter in a column of letters (6 columns \times 37 rows) as quickly as they could.

Letter search, letter "o". Same as the task above, except only the letter "o" was to be cancelled.

Memory/Judgment Tasks

The memory/judgment tasks were developed in order to measure the "pleasantness" component of mood.

Category exemplars. Subjects were asked to list members of 10 pleasant and unpleasant categories, and allotted 30 seconds for each category. Instructions followed Battig and Montague (1969). Categories were of four types: pleasant ("games," "luxuries"), unpleasant ("crimes," "diseases"), mixed ("emotions," "types of physical contact," where responses were scored individually for emotional content), and neutral ("a college or university," "a type of fuel," "a unit of distance," and "a country").

Word associations. Subjects were asked to list the words which came to

mind in response to a pleasant and unpleasant "key" word, in 45 seconds. Words were selected according to pleasantness ratings (Toglia & Battig, 1978) in which emotion-content was defined as a rating greater than 2.2 standard deviations from the mean and neutral words were within .25 standard deviations of the mean. Association instructions followed Noble (1952). The key words were, in order: "flower," "death," "murder," "butterfly," "bloom," "shame," "corpse," "joy," "grief," and "dove."

Imagery ratings. Subjects were asked to rate the imagery of 20 pleasant, 20 unpleasant, and 20 neutral words, with emotional content defined as in the word association task above. Imagery instructions followed Paivio, Yuille, & Madigan (1968).

Probability estimation. Stimuli were five pleasant and six unpleasant political, health-related, and life events. Subjects expressed their estimates of the likelihood of each event as a percentage.

Affect-Assessment and Control Variables

Adjective checklist. Russell's (1979) mood-adjective checklist, used with the Meddis (1972) response format comprised the principal dependent measure. Adjectives were random ordered.

WAIS-R vocabulary. The vocabulary items were given in a group administration so as to examine the relationship between intelligence and mood in the sample.

Other measures. The Positive and Negative Affect Scale (PNAS) (Warr, Barter, & Brownbridge, 1983) was used as an exploratory measure of longer-term affect; however, its reliability was low and so results from the scale will not be reported here.

Procedure

Subjects were tested in groups ranging in size from about 1-25. Total testing time was one hour. A single booklet was distributed containing response sheets for all the tasks; task order followed that of the discussion above. Subjects were timed as a group through the word-as-

Table 1
Means and Standard Deviations of the Principal Tasks,
and Their Correlations with the Pleasant-Arousal Scale ($n = 106$).

Performance Task	<i>M</i>	<i>SD</i>	Correlation	Partial Correlation ^a
Speed Tasks				
Numbers Forward	63.8	6.8	.28***	.28***
Numbers Backward	124.0	30.5	.04	.08
Estimation	127.6	35.4	-.07	-.05
Letter Cancel.	234.3	35.3	.29***	.28***
Letter Search	1006.9	219.8	.26***	.23**
Speed Composite	—	—	.34***	.32***
Memory/Judgment Tasks ^b				
Category Listing	7.4	1.0	.10	.11
Keywords	8.7	2.3	-.06	-.01
Imagery	5.8	.9	.15	.09
Probability	44.8	11.3	.21*	.22*

^aRaw vocabulary scores partialled out.

^bCorrelations are with difference scores; see text for discussion of means.

* $p < .05$; ** $p < .01$; *** $p < .005$, significance levels, one-tailed test.

sociation task, and worked at their own pace through the remaining sections. The instructions for the remaining sections were included in the booklet.

Results

Distributions, compound scores, and reliabilities. Means and standard deviations for each of the tasks are reported in Table 1. For the four memory/judgment tasks, there are reported the number of words listed per category, the number of words associated to each key word, the average imagery rating across words, and the average likelihood estimate of each event. Subjects' difference scores were computed for each of the memory/judgment tasks. First, the performance on the pleasant and unpleasant portions of the task was standardized. Then, the unpleasant portion of the task was subtracted from the pleasant portion. The reliabilities of the speeded tasks for the full group ranged from between $r(106) = .63$ to $.98$, with four out of five reliabilities $r(106) = .79$ or higher. The reliabilities for the difference scores on the memory/judgment tasks ranged from low $r(106) = .23$ (word association) to moderate $r(106) =$

.69 (imagery task).

Dependent measures. An unrotated principal components analysis of the 58 adjective checklist items was conducted. The first principal component was bipolar, and the three highest loadings on each end of the scale defined a "pleasant arousal-unpleasant tiredness" dimension ("energetic," "lively," "happy," "discontent," "inactive," "blue"). Adjectives representing arousal such as "wide awake" and "sleepy" also had high loadings on the first principal component. While it was possible to arrive at an orthogonal rotation where arousal and pleasantness adjectives loaded primarily on different components, the two sets of adjectives could never be adequately separated without sacrificing orthogonality or the validity of the factor scales in measuring the factors (e.g., Heermann, 1963). This makes sense when one considers that sleepiness is indeed usually an unpleasant state during the middle of a school or work day. Thus, the unrotated first component yields a reasonable representation of the present data.

The second component was also bipolar, and the three highest loadings at each end of the scale defined an intense-

relaxed dimension ("fearful," "stirred up," and "awed," vs. "calm," "quiet," "satisfied").

"Pleasant-arousal" and affect-sensitive tasks. The first, "pleasant-arousal" component incorporated both the pleasantness and arousal dimensions of mood that were predicted to correlate with task performance. Correlations for the motor-speed variables are reported in the upper portion of Table 1. The "numbers forward" task and the two letter cancellation tasks correlated with the pleasant-arousal component scores at statistically significant levels. Preliminary regression analyses suggested that these motor-speed tasks were explaining overlapping portions of the variance of the mood scale. For that reason, the within-group z scores for the three tasks with significant correlations were summed together to form a variable hereafter called "Speed," which also appears in Table 1.

The lower portion of Table 1 shows the relationship between the pleasant arousal scores and the difference scores on each of the memory/judgment tasks. Pleasant-arousal attained marginal significance with imagery, $r(106) = .15, p < .06$, and significance with probability estimation $r(106) = .21, p < .05$.

The pleasant-arousal scale of the mood adjective checklist was regressed against the four memory/judgment task difference scores and the speed composite. The result was a multiple $r(106) = .43, p < .001$. As hypothesized, these combined psychomotor and cognitive tasks were moderately predictive of pleasant-arousal.

Mood intensity and affect-sensitive tasks. The second component of the mood scale, reflecting intensity, showed statistically significant relationships with two tasks, letter search $r(106) = .17, p < .05$ and the difference score for imagery $r(106) = .21, p < .02$. While the difference between multiple r s did not reach statistical significance, that half of the group showing more intense emotion (as measured by the intensity scale) showed stronger relationships between

the task performance and "pleasant-arousal" ($r(53) = .52$ for the high intensity group vs. $r(53) = .38$ for the low intensity group).

Influence of intelligence. Intelligence, as assessed by the WAIS-R vocabulary scores, showed a low relationship with pleasant-arousal component scores, $r(106) = -.18, p < .01$. Vocabulary was partialled out of the correlations and the result is reported in Table 1, column 4. As can be seen, vocabulary does not account for the relationship between mood and task performance.

Discussion and Conclusion

The major hypothesis of this study was that individuals' self-report of mood and performance at a set of carefully selected tasks would have a moderate correlation. Combined together in multiple regressions, 18% of the variance of pleasant-arousal in mood was reflected in performance on cognitive and motor tasks for the group. We suspect that correlations between performance measures and self-report may not increase substantially beyond a ceiling of perhaps .50 since they are somewhat different phenomena. First, the processing of affective and nonaffective aspects of stimuli may be performed by different processing systems (e.g., Zajonc, 1980) with incomplete communication between them. Therefore, portions of feeling states may be inaccessible to largely nonaffective, conscious introspective processes. Second, the veracity of self-report of mood will be influenced adversely by those aspects of socialization having to do with the suppression and denial of emotions. Nonetheless, the construction of a scale of affect-sensitive tasks will tell us more about how feelings influence performance; furthermore, expectance of performance changes may motivate some clients to change their mood. Further investigations appear promising and warranted.

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