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A SHORTENED FORM OF BETTS' QUESTIONNAIRE UPON MENTAL IMAGERY*

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PROBLEM

Research has raised considerable speculation about the role imagery plays in the processes of cognition in periods of normalcy [1], under prolonged sensory deprivation [4] and under drug administration [2], but no adequate measure of imagery has been developed. In 1909, Betts developed an 150-item questionnaire to measure mental imagery [3] which remains the most comprehensive test of imagery available, but which in its original form was prohibitively long. This study reports the development of a short form of this test which predicts a subject's capacity to image as accurately as the original long version of the test and which measures a general ability to image in a variety of sensory modalities.

*This study was conducted at the University of Sydney, Australia, as part of a doctoral program for research on visual imagery. It was supported by the U. S. Public Health Service, NIMH Grant M. 3950, principal investigator, Dr. J. P. Sutcliffe. The author wishes to thank Dr. M. T. Orne for his helpful comments whilst the paper was in preparation.

METHOD

Subjects. One hundred and forty males and 140 females were drawn as volunteers from undergraduate classes in Psychology at the University of Sydney. The range of *Ss*' ages was from 16 to 40 years with a mean age of 23 years.

Procedure. The original form of Betts' Questionnaire Upon Mental Imagery (QMI) was administered by *E* in group sessions of not more than 25 or fewer than 4 *Ss*. The scale investigated imagery in seven major sensory modalities: Visual, auditory, cutaneous, kinaesthetic, gustatory, olfactory, and organic. Forty items pertained to the visual modality and 20 items to each of the other six modalities except the organic modality which contained 10 items. In the visual (auditory) modality, for example, *Ss* were asked to think of seeing (hearing) "the sun sinking below the horizon" ("the sound of escaping steam") and to consider carefully the image which came to their mind's eye (ear). Instructions were adapted to suit different modalities. Stimulus items suggested in other modalities were "the prick of a pin" (cutaneous); "running upstairs" (kinaesthetic); "oranges" (gustatory); "cooking cabbage" (olfactory); and "drowsiness" (organic). *Ss* evoked images of objects suggested by the items and rated the vividness of their imagery on the Betts seven-point rating scale which ranged from "no image present at all"(7) to "perfectly clear and vivid" (1).

A copy of the 7-point rating scale was given to each *S* with a 30-page booklet for recording ratings. Each item number was listed on the answer sheet next to a bracket in which *S* recorded his rating. Five items were limited to a page to minimize halo effects from *S*'s observation of previous ratings. *Ss* were instructed to rate images to the suggested items according to the rating scale They were given time to familiarize themselves with the different categories of the scale and were asked to refer to it when judging each image. The time taken for administration of the test was approximately 55 minutes.

RESULTS

The findings of Betts' original study were confirmed. Few *Ss* lacked the ability to evoke images when required and there were considerable individual differences in the degree of clearness and vividness of *Ss*' images. Table 1 reports the means and standard deviations for each modality. Females typically reported more vivid imagery than males for items of a given modality, but these differences were not as large as some inter-modality differences. The data provided no support for the notion of imagery types (visual, auditory, etc.). *Ss*' imagery was not exclusive to particular modalities.

TABLE 1. MEAN VIVIDNESS RATINGS AND STANDARD DEVIATIONS ACROSS ITEMS IN SEVEN SENSORY MODALITIES FOR 140 MALES AND FEMALES.*

Groups		Visual	Auditory	Cutaneous	Kinaesthetic	Gustatory	Olfactory	Organic
Male	M	2.68	3.02	2.89	2.85	3.07	3.52	2.89
	SD	1.39	1.54	1.38	1.39	1.44	1.67	1.40
Female	M	2.47	2.98	2.65	2.87	2.94	3.38	2.75
	SD	1.30	1.52	1.36	1.50	1.61	1.73	1.46

*$p > .05$ for all modality differences between sexes.

Items were classed as variables, and item intercorrelations calculated for each modality for the sexes, separately. The resulting 14 correlation matrices were factorized individually by the method of principal components with unit entries in the main diagonals. Results indicated that a single factor (or component) was largely responsible for the variance of scores within each modality. These data were used

to select a small sample of "pure" items which could be analyzed to examine differences between modalities.

Five items were selected from each modality which (a) loaded highly on the main component for each modality (selected items had an average loading of 0.69 and 0.70 for males and females, respectively); (b) showed similar means and standard deviations; and (c) showed no appreciable differences in correlation for the two sexes. These 35 items selected for the shortened form are listed in Table 2. They are numbered as in the original questionnaire[3].

TABLE 2. ITEMS SELECTED FOR THE SHORTENED FORM OF THE BETTS *QMI*

Visual	Auditory	Cutaneous	Kinaesthetic	Gustatory	Olfactory	Organic
9	50	64	81	101	123	142
10	53	68	82	103	126	143
11	54	69	83	105	130	144
14	55	73	87	107	133	146
35	56	74	95	112	139	150

Inter-modality analysis and cross validation. The QMI was administered to an independent sample of 32 female and 28 male volunteer students under controlled supervision as described above. An analysis was carried out for the selected items to examine the factorial structure of the new scale as a whole and to establish that it measured a general ability to image.

Ratings to each of the 35 items were obtained together with average modality scores and a total rating score across all items. The 43 variables were intercorrelated and the resulting matrix analyzed by the method of principal components. Analysis yielded one major eigenvalue of 16.79 and six minor eigenvalues of 2.74, 2.41, 19.4, 1.89, 1.50 and 1.35. The total score over all items loaded +1.00 on the major component. The remaining components were specific to modalities; items which tended to load highly on subsidiary components were items in the same modality. An obtained correlation of .92 between the total scores based on the complete scale and the shortened form showed that the new form predicted *S*'s overall imagery score essentially as well as the complete questionnaire. The finding was replicated by further analysis of available data for a sample of teacher's college students ($r = .98$).[1]

DISCUSSION

Results established that the shortened form measures a general ability to image in a variety of sensory modalities. Analysis of the scale indicated that when 43 components were extracted, one single component accounted for as much as 39% of the total variance of scores on the test. All 35 items in the scale loaded highly on the factor, with an average loading of .57. The validity of the new scale was indicated by the high correlation between scores on the short form and original form for an independent sample of *S*s. The correlation of the two total scores was spuriously high because the same items were included in both tests, but the relationship demonstrates that, for all practical purposes, the short test can predict *S*'s ability to image as well as the original questionnaire.

The derived test takes approximately 10 minutes to administer and is a convenient and useful tool for research into imagery. In experiments[5] where it has been used, it has reliably differentiated *S*s in their capacity to image. Its validity

[1]Factorial loadings for each of the 43 variables on the first 24 factors extracted together with a copy of the shortened form of the Betts *QMI*, have been deposited as Document 9147 with the ADI Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington, D. C. 20540. Send $2.50 for photoprints or $1.75 for 35 mm. microfilm, making checks payable to: Chief, Photoduplication Service, Library of Congress.

has repeatedly been demonstrated by high correlations obtained between scores on the test and the direct evocation of imagery in a wide variety of experimental settings.

Summary

Two hundred and eighty *Ss* rated images to 150 suggested items on Betts' original imagery questionnaire. Results were analyzed for modalities separately, and five items were selected from each of seven modalities which were relatively pure measures of the imagery component accounting for the major part of the variance of scores in each modality. The complete scale was then administered to an independent sample of 60 *Ss* and ratings among modalities analyzed to establish that the shortened form measured a general ability to image. Cross validation of the test indicated the predictive value of the new scale. Results indicate that the new test is a potentially useful tool for measuring mental imagery in both clinical and experimental situations.

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GROUP PERSONALITY PROJECTIVE TEST FAKABILITY: A RE-EXAMINATION*

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Problem

This study investigated the fakability of the Group Personality Projective Test (GPPT) which has 90 items, each containing a stick-figure drawing with a paucity of detail, and five multiple-choice alternatives based on factorial validity. Seven scores may be derived: Tension Reduction Quotient, Nurturance, Withdrawal, Neuroticism, Affiliation and Psychosexual Needs, Succorance, and Total Score. Total Score is considered to be indicative of the general state of mental health, and discriminates significantly between normals and neuropsychiatric patients, and between normals and delinquency-prone youths[5, 7].

Cassel and Brauchle[4] investigated the fakability of the GPPT using 50 high school seniors as *Ss*. All underwent three administrations of the test. The first administration employed regular (non-faking) instructions. For the second administration, *Ss* were to fake a poor and highly disturbed personality pattern, and for the third administration, *Ss* were to fake a good personality pattern with a minimum of disturbance present. The results indicated that the GPPT could be faked in a direction indicating a poor personality pattern. Thus, "fake-poor" scores were significantly different from regular administration scores in showing higher Tension

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