

AN EXAMINATION OF JAPANESE CHILDREN'S PERFORMANCE ON THE DRAW-A-PERSON: A QUANTITATIVE SCORING SYSTEM*

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The purpose of the study was to investigate Japanese children's performance on a test of non-verbal ability, namely, the *Draw-a-Person: Quantitative Scoring System*—DAP (Naglieri, 1988). The construct validity and concurrent validity of the DAP were examined and Japanese children's performance ($n = 400$) was compared with the American normative group. The relationship between student performance on the DAP and school achievement was also investigated. Results of the study indicated that a general developmental trend (a measure of construct validity) was apparent for both Japanese boys and girls. Although younger Japanese children performed better than their American counterparts, a leveling effect was noted for older Japanese children. Concurrent validity estimates were based on the correlation between the DAP and the *Matrix Analogies Test-Short Form*; correlation coefficients were higher than those reported in the DAP test manual. Generally, school achievement (based on teacher ratings) was not related to student performance on the DAP.

Historically, human figure drawings have been used to provide an estimate of children's developmental status. Harris (1963) pinpoints the 1880's as the initial period in which children's drawings were related to developmental stages. Since then, numerous attempts have been made to standardize the scoring and interpretation of children's drawings in an effort to gauge intellectual development. For example, standardization procedures used in the Goodenough's *Draw-a-Man Test* (1926) included a normative group of nearly 4,000 children (Kamphaus & Pleiss, 1991). In 1963, Harris revised Goodenough's test in order to include both a wider age range and drawings of woman and self. Koppitz (1968) also developed a scoring system which included two types of objective scoring methods: developmental items (relating to age and maturational level) and emotional indicators (relating to attitudes and concerns).

In an effort to provide current norms and lend greater clarity to the scoring and developmental interpretation of children's drawings, Naglieri (1988) designed the *Draw-a-Person: Quantitative Scoring System* (DAP). According to Naglieri (1988), the

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DAP is a nonverbal test which "can provide reliable information about intellectual status to supplement other intelligence test data" (p. 2). The DAP was normed on a sample of 2,622 American children ages 5 to 17 years. The test is easily administered; children are provided with paper and pencil and are requested to draw a man, a woman, and a picture of themselves. It is amenable to rapid scoring; 64 scoring items are included. Standard scores can be obtained for the drawings of the man, woman, self, as well as the total score.

Naglieri (1988) reports both reliability (internal consistency and test-retest) and validity (concurrent) coefficients in the test manual. Since the publication of the DAP, several studies have been conducted to further examine the concurrent validity of the DAP and other nonverbal measures of intelligence (e.g., *Matrix Analogies Test-Short Form* MAT-SF). Prewett, Bardos and Naglieri (1988) examined the relationship between the DAP and MAT-SF with children with and without learning disabilities. A significant correlation between the DAP and MAT-SF was obtained with both the groups of children. The DAP, however, correlated less well with an achievement measure (i.e., *Kaufman Test of Educational Achievement*) than the MAT-SF in both groups. The study was replicated with students with mental handicaps (Prewett, Bardos & Naglieri, 1989). Research results indicate that all DAP scores correlated significantly with the MAT-SF for the group without mental handicaps but only the DAP man score correlated significantly with the MAT-SF scores of the group with mental handicaps. The DAP was also not as effective as the MAT-SF in screening the group with mental handicaps. Haddad and Juliano (1991) examined the relationship between the MAT-SF and the DAP with low socio-economic American children. A moderate correlation was found between the two nonverbal measures; correlations were also computed for the MAT-SF, DAP, and *Iowa Tests of Basic Skills*. The MAT-SF was found to have a stronger relationship to achievement than the DAP. The relationship between the DAP and the MAT-SF, *Raven's (1965) Colored Progressive Matrices* (RCPM), and the *Stanford-Binet Intelligence Scale: Fourth Edition (Short Form)* was examined by Saklofske and Braun (1992). Statistically significant correlations were obtained between the DAP and the MAT-SF ($r=0.29, p<.05$) and the DAP and the RCPM ($r=0.34, p<.05$). However, the correlation between the DAP and the *Stanford-Binet Intelligence Scale: Fourth Edition (Short Form)* was almost zero. Saklofske and Braun (1992) concluded that "the DAP may serve as a quick and easily administered test of nonverbal ability and level of 'developmental maturity' [but] there does not appear to be support for its use as a measure of general intellectual and cognitive ability" (p. 114).

Cross-cultural comparisons of student performance on the DAP have been made by Naglieri (cited in Kamphaus & Pleiss, 1991) and Saklofske and Braun (1992). Saklofske and Braun (1992) found that their sample of Canadian children performed similarly to the American normative group. Some small differences were noted for both males and females at particular age levels (e.g., 7 and 8 year olds).

No cross-cultural studies on the DAP have been conducted with Japanese children to date; however, their performance on cognitive and intelligence tests (e.g.,

WISC-R; MAT-SF) has been well documented (c.f. Lynn, Hampson & Bingham, 1987; Tamaoka, Saklofske & Ide, 1993). These studies yield consistent findings: Japanese children perform better than North American normative groups on all ability tests. The current research study was conducted in order to further explore Japanese children's performance on tests of non-verbal ability. The psychometric properties of the DAP were also investigated.

The research study was guided by four questions: (1) What is the construct validity of the DAP? (2) What is the concurrent validity of the DAP and MAT-SF with a group of Japanese children? (3) How do Japanese children's performance on the DAP compare with the North American standardization sample? and (4) Is there a relationship between Japanese children's performance on the DAP and their achievement at school?

METHOD

Subjects:

A group of Japanese children (211 girls and 189 boys) from an elementary school associated with Ehime University in the city of Matsuyama participated in the study. All subjects were enrolled in grades one to six and were between the ages of 6 to 12 years. Most children's familial backgrounds were middle to upper middle class.

Measures:

The DAP and MAT-SF were administered to all students. As discussed in the previous section, both the DAP and the MAT-SF purport to measure nonverbal aspects of intelligence. On the DAP, children are required to draw a picture of a man, a woman, and themselves. Standard scores (mean = 100; standard deviation = 15) can be computed for each drawing as well as a total score for all three drawings; normative data are provided for children ages 5 to 17 years. The MAT-SF (Naglieri, 1985) is suitable for administration to children ages 5 to 17 years and contains 34 multiple choice items. Four item types are included: pattern completion, reasoning by analogy, serial reasoning, and spatial visualization. Examinees are required to indicate which one of six options will complete each abstract design. Percentile ranks are reported based on total raw scores.

A brief achievement rating scale was completed for each student by the classroom teacher. Teachers rated students on a three point scale defined as high, average, or low achieving.

RESULTS

Japanese students' performance on the DAP was analyzed to determine the DAP's psychometric properties; that is, its construct and criterion-related (concurrent) validity.

Construct validity may be determined through differentiation of abilities by age (Anastasi, 1988). General developmental trends were observed in the performances of both males and females; older children obtained higher raw scores than younger children. One exception was noted; a lower mean score was obtained by the group of 11 year old girls than both groups of 9 and 10 year old girls. This may be due to sampling error; however, it is clear from an inspection of Table 1 and Figs. 1 and 2 that there was a significant leveling effect for both Japanese boys and girls. Although the general developmental trends found in the study are similar to the construct validity data reported in the DAP manual (1988), they are less pronounced for older

Japanese children.

Some gender differences in general performance were found. Analysis of variance revealed that Japanese girls obtained significantly higher mean scores than Japanese boys on the total score ($F[1,398]=11.56, p=.0007$) and the individual drawings of the man ($F[1,398]=5.01, p=.03$) and woman ($F[1,398]=29.59, p=.0001$). There were no significant differences between boys and girls on the drawings of self.

Moderate correlations among the individual drawings (e.g., 0.73 to 0.74 for individual drawings) and a high correlation with the total score (0.90 to 0.91) were obtained.

A factor analysis was conducted in order to determine the factor structure of the DAP. Two factors accounted for 84% of the variance. The two factor constructs were Facial Features (e.g., eyes, nose) and Upper Body and Clothing (e.g., trunk, arms, neck).

Concurrent validity estimates of the DAP are based on the correlation coefficients of the DAP and MAT-SF standard scores. See Table 1 for the results. The correlation coefficients obtained in this study are higher than those found in the DAP test manual. Naglieri (1988) reported coefficients that ranged from .28 (DAP Woman) to .31 (DAP Total) for a subsample (K to Grade 3 children) of the standardization group.

Japanese students' DAP standard scores were also compared with those of the

Table 1. Correlation Coefficients Between the DAP and MAT-SF

	DAP Man	DAP Woman	DAP Self	DAP Total Score
MAT-SF	0.52	0.47	0.53	0.56

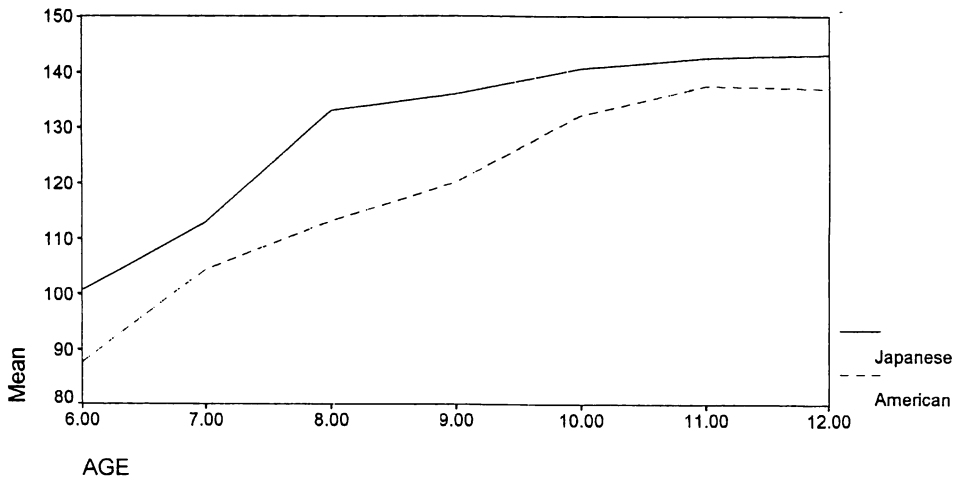


Fig. 1. Raw total score comparisons: Japanese and American males.

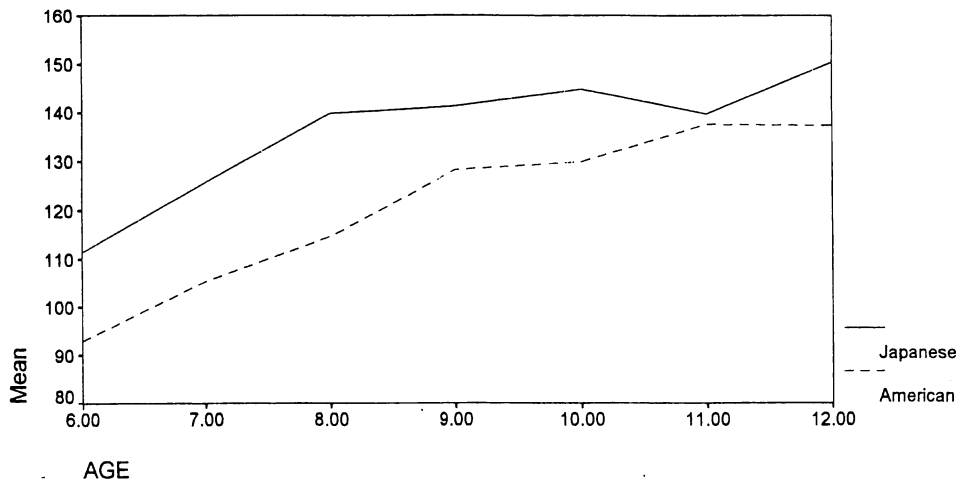


Fig. 2. Raw total score comparisons: Japanese and American females.

Table 2.

Age- Years	Japanese						American					
	Males			Females			Males			Females		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD
6	23	100.7	16.6	19	111.4	17.2	91	87.7	23.3	86	92.8	23.2
7	31	113.0	23.7	39	125.7	14.8	94	104.5	24.0	105	105.3	24.5
8	25	133.2	16.9	33	139.9	13.0	150	113.3	25.0	117	114.7	23.4
9	41	136.2	15.5	34	141.3	11.4	119	120.3	22.0	128	128.3	21.5
10	31	140.7	13.9	45	144.8	15.6	117	132.3	21.1	104	129.9	21.7
11	25	142.6	15.2	30	139.8	14.9	119	137.6	19.8	125	137.6	18.4

DAP standardization sample. Figs. 1 and 2 provide summaries of the comparisons of mean raw scores of Japanese and American samples of males and females. Generally, both Japanese males and females at all age levels performed better than the American standardization sample. Table 2 contains means and standard deviations of total raw scores for both groups.

Finally, teacher ratings were used to sort the Japanese sample of children into three achievement groups: high achievers, average achievers, and low achievers. An analysis of variance was conducted to determine whether there were differences between high achieving, average, or low achieving groups of Japanese children on the DAP. No statistically significant differences were found among the three groups on their drawings of the man, woman, or total score. Differences were found between groups on the drawing of self ($F[2,397]=3.50, p=0.03$).

DISCUSSION

The purpose of the current study was to investigate the psychometric properties of the *Draw a Person: A Quantitative Scoring System* (Naglieri, 1988) and compare Japanese children's performance on the DAP with the American standardization sample.

The construct validity of the DAP was investigated through an examination of developmental trends and factor analysis. Similar to the American standardization sample, general developmental trends were noted in Japanese children's performance. Overall, older children obtained higher mean raw scores than younger children on all drawings (Man, Woman, Self) and the total score. Japanese girls performed significantly better than Japanese boys on the individual drawings of the Man and Woman and the Total Score. According to the DAP manual (Naglieri, 1988), girls performed significantly better than boys on a matched pairs subsample of students selected from the American standardization sample. Naglieri (1988) reports that these gender differences were small and not practically significant. The moderate correlations between individual drawings and the high correlation between the individual drawings and total score indicate that although the total score is the best estimate of student performance, individual drawings may also provide a reasonable estimate. Two primary factor constructs account for much of the variance on the DAP: Facial Features and Upper Body and Clothing. Achievement (as measured by teacher ratings) was not related to student performance on the DAP.

Concurrent validity estimates, based on the correlation between the DAP and MAT-SF, are somewhat higher than those reported in the DAP manual and are consistent with previous studies of the DAP and MAT-SF (e.g., Prewett, Bardos & Naglieri, 1989).

Japanese children's total raw scores (ages 6 to 11 years) were compared with the American standardization sample. Japanese children, males and females, performed somewhat better across all ages than the American group. Of interest was the observation that younger Japanese children scored higher than their American counterparts. However, a leveling trend was noted for older Japanese children which contrasted with the more linear trend portrayed by American children. Caution must be exercised in the interpretation of these comparative results as the Japanese sample is relatively small for some age groups and may not be representative of its population. However, on another measure of non-verbal reasoning, namely, the MAT-SF, Japanese children also performed better than American children (Tamaoka, Saklofske & Ide, 1993).

The DAP appears to have adequate psychometric properties; however, differences in performance between cultural and linguistic groups need to be considered when administering and interpreting the test.

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