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A Comparison of Measures of Finger Recognition

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A Comparison of Measures of Finger Recognition[1]

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Abstract. The relationship between the Benton tests of finger localization and the Kinsbourne-Warrington tests of finger differentiation and order was investigated. Kinsbourne and Warington have stated that "finger sense" as tested by their tests and "finger localization" as tested by Benton's tests "cannot be closely compared." This hypothesis was tested by giving both tests to 31 mentally retarded subjects. There was a high significant correlation between the two tests. The findings do not support Kinsbourne and Warrington's hypothesis and suggest that it is not necessary to distinguish between "finger sense" and "finger localization."

In 1924 Gerstmann described a patient who was unable to name her fingers or to point them out when named by an examiner. Gerstmann called this deficit "finger agnosia." The concept of finger agnosia became of considerable theoretical and clinical interest in 1927 when Gerstmann suggested that finger agnosia, right-left disorientation, acalculia, and agraphia form a syndrome related to a cerebral lesion with a specific locus.

Strauss and Werner (1938) and Benton (1955; 1959) developed objective tests to measure the deficit Gerstmann described clinically. Both of these test batteries include a number of different kinds of performances. Benton's battery consists of: identification of single fingers touched (hand visible), identification of single fingers touched (hand behind screen), and identification of pairs of fingers touched simultaneously (hand behind screen). The subject is given a diagram of a hand with the fingers numbered and is allowed to respond by name, number, or pointing.

In a series of papers Kinsbourne and Warrington have raised a number of issues about the deficit of finger agnosia and methods of testing for it. They stated that "Finger agnosia . . . implies the existence of a normal function which, when disordered, leaves behind a deficit specifically related to the fingers. This hypothetical function may conveniently be called finger sense" (Kinsbourne & Warrington, 1962, p. 47). Kinsbourne and Warrington then proposed a hypothesis as to the nature of finger agnosia. They suggested that finger agnosia is due to "a specific difficulty in relating the fingers to each other in correct spatial sequence" (Kinsbourne & Warrington, 1962, p. 56). These workers then described a new series of clinical tests which were said

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to be specific for the loss of "finger sense." These tests are somewhat different from the tests previously developed by Strauss and Werner (1938) and Benton (1955). In one of Kinsbourne and Warrington's tests the subject is asked to state how many fingers there are between two fingers being touched by the examiner. In another the subject is asked to state whether a single finger is being touched in two places or two fingers are being touched. In a third test the subject's hand is moulded around a block and he is asked to pick out a similar block without looking at the test block.

In a later paper Kinsbourne and Warrington stated that "Finger sense, as here defined, cannot be closely compared to 'finger localization,' as tested for by Struss and Werner (1939) and Benton (1955)" (Kinsbourne & Warrington, 1963, p. 136). No data were offered to support this statement. The present study was undertaken to test the hypothesis that "finger sense" and "finger localization" are unrelated.

Method

Kinsbourne and Warrington's hypothesis was tested by giving Benton's tests of "finger localization" and their tests of "finger sense" to a group of mentally retarded subjects. The finding of a nonsignificant or low correlation between the two test performances would support the hypothesis of Kinsbourne and Warrington. The finding of a high significant correlation would not support their hypothesis.

Subjects

The original sample for this study consisted of 40 individuals drawn from a population of young mentally retarded subjects at the Woodward State Hospital and School, Woodward, Iowa. Testing was not continued on subjects who could not understand the task. Nine of the 40 were eliminated for this reason leaving a sample of 31 mentally retarded subjects (16 males, 15 females).

The mean age of the group was 16.2 years (SD 4.0) and the mean IQ was 56.2 (SD 10.0). The mean mental age was 8.2 years (SD 1.6). The IQs were obtained from the most recently given individual intelligence test on file in the case record.

Tests and Procedure

Each subject was given a standardized Kinsbourne-Warrington test and the Benton finger localization test. The standardized Kinsbourne-Warrington test was developed from the clinical test described in Kinsbourne and Warrington (1962) by establishing a standard procedure and a standard set of instructions. A complete description of this test is given by Brewer (1966).

The Benton tests of finger localization were modified slightly as described by Brewer (1966). The usual procedure with the Benton tests is to give the subject the option of responding by name, number, or pointing. Thus the verbal component varies depending on the response option chosen by the subject. It was felt that this source of variability should be eliminated, and so the option was removed and the subject was required to give a verbal response. Kinsbourne and Warrington have stated that one of the differences between their tests of finger sense and Benton's tests of finger localization is that the Kinsbourne-Warrington tests are nonverbal whereas Benton's tests are verbal. Thus requiring a verbal response on Benton's test should emphasize the difference between the two tests and reduce the probability of finding a significant correlation between the two tests.

Results

The correlations among mental age, standardized Kinsbourne-Warrington and modified Benton tests are given in Table 1. It can be seen that the correlation between the total scores on the Benton and Kinsbourne-Warrington tests is fairly high (.85). It can also be noted that there is a moderate relationship with mental age for both tests. When the effects of mental age on the correlations were removed through the use of the partial correlation technique, there was a modest reduction in the size of the correlation, the partial correlation being .78.

Table 1. Correlations between the finger recognition total scores.

Product-Moment Correlation Coefficients	1	2	3
1. Kinsbourne-Warrington	..	.85	.54
2. Benton		..	.57
3. Mental Age			..

Note — All correlation coefficients in this table are significant at the .01 level.

Table 2. Correlations Within the Finger Recognition Tests

Kinsbourne-Warrington	1	2	3	4
1. In-Between Test	..	.67	.54	.96
2. Finger Block Test		..	.46	.76
3. Two-Point Finger Test			..	.74
4. Total 1-3				..
Benton	**1**	**2**	**3**	**4**
1. Identification—Hand Visible	..	.80	.74	.88
2. Identification—Hand Not Visible		..	.82	.93
3. Double Touch			.	.95
4. Total 1-3				..

The intercorrelations within the subtests of the Kinsbourne-Warrington and Benton tests, as well as the correlation of each with total score, are given in Table 2. The intercorrelations of

the Kinsbourne-Warrington subtests range from .46 to .67; those of the Benton, from .74 to .82.

The intercorrelations of the subtests and totals of the two tests with each other are given in Table 3. These correlations range from .49 to .86.

Table 3. Correlations between the finger recognition subtests.

Kinsbourne-Warrington	Benton Ident. Hand Visible	Ident. Hand Not Visible	Double Touch	Total
In Between	.49	.76	.73	.73
Finger Block	.60	.65	.66	.69
Two-Point Finger	.71	.79	.70	.79
Total	.64	.86	.82	.85

Discussion

The high significant correlation between the Benton and Kinsbourne-Warrington tests indicates that the two test batteries measure the same constellation of abilities in a mentally retarded population. The correlation suggests that it is not meaningful to make a distinction between "finger sense" and "finger localization." This point is further supported by the findings that the last two subtests of the Benton tests correlate more highly with the Kinsbourne-Warrington subtests than do the Kinsbourne-Warrington subtests with themselves.

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Literature Cited

Benton, A. L. Child Developm., 1955, 26, 225-230.
Benton, A. L. Right-left discrimination and finger localization. New York: Hoeber, 1959.
Brewer, W. F. Finger localization and reading disability. M.A. Thesis, University of Iowa, 1966.
Gerstmann, J. Wien. klin. Wchnschr., 1924, *37*, 1010-1012.
Gerstmann, J. Ztschr. Neurol. Psychiat., 1927, *108*, 152-177.
Kinsbourne, M. & Warrington, Elizabeth K. Brain, 1962, 85, 47-66.
Kinsbourne, M. & Warrington, Elizabeth K. Quart. J. exp. Psychol., 1963, 15, 132-137.
Strauss, A., & Werner, H. Amer. J. Orthopsychiat., 1938, 8, 719-725.
Strauss, A. & Werner, H. Amer. J. Psychiat., 1939, 95, 1215-1225.