A Test to Differentiate between Organic Brain Disorder, Nonorganic Brain Disorder, and Schizophrenia, Part II

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The Hoffman Test for Organicity (HTO; Hoffman, 1975) has continued to be refined and redeveloped. Continued testing of clinical patients resulted in the establishment of the original HTO. It was believed that "A dysfunction in any of the bodily rhythmic activities (i.e., breathing, walking, talking, etc.) may lead to disability in one's daily lifestyle. Rhythm is an integral part of the entire life process. It exists in every human being since they breathe in rhythm and walk in rhythm. Their entire circulatory system functions rhythmically" (Hoffman, 1974, p. 26). Furthermore, such rhythmic disorders frequently result from organic brain impairment (Hoffman, 1974). Although Freud explicitly called attention to the importance of rhythmicity nearly sixty years ago, it remained one of the most neglected aspects of infant activity in psychoanalytic research (Hoffman, 1974).

HTO was first described in *Hear the Music! A New Approach to Mental Health* (Hoffman, 1974). This article details that study, which served as the predecessor of the Hoffman Organicity Test (HOT). This article will also help readers understand why the assessment was produced, the tools necessary to conduct the test, and the administration and results of the product. Additionally, readers will learn of the validity and reliability of the study as well as what has come from this body of work.

Description of Subjects

The subjects for HTO consisted of 221 individuals who were matched by age, IQ, and by their ability to cooperate and understand testing procedures instructions. Sixty-three organics, fifty schizophrenics, and 108 nonorganic subjects were chosen. All subjects in the schizophrenic and organic group had at least two diagnoses by a psychiatrist, psychologist, and/or neurologist confirming their disorder. The nonorganic group consisted of selected individuals who had no known neurological or psychiatric disability. Subjects of the organic group had definite diagnoses of organic brain syndrome or chronic brain syndrome. All members of the schizophrenic group had diagnoses of schizophrenia (chronic undifferentiated type or paranoid type) with no indication of organic involvement.

Test Materials

Test materials consisted of a rhythmic apparatus—drum, cymbal, woodblock, cowbell—scoring sheet, a ten-minute cassette recording, and a cassette recorder. The instruments were chosen for their unfamiliarity to the subjects as well as their distinct diversification of sound.

Administering the HTO

The subjects were seated in an armless chair, in a sound-conditioned room, approximately 8 x 10 feet. The subjects' names, dates of birth, and ages were taken, and handedness and date and place of testing were noted.

Results of the HTO 1975

Table 1 shows the mean scores and standard deviations of the test. The organic group scored "organic" on an average of 25.87, whereas schizophrenics averaged 1.38. The nonorganic group scored an average of 0.9.

Table 2 shows the t values and their level of significance. On the t test comparing the differences in means scores for the schizophrenic and organic groups, the t value was found to be significant at 0.001, schizophrenic and the nonorganic group were inconsequential, and the organic and nonorganic groups were significant at 0.001. As seen in Figure 1, the schizophrenic group showed a significantly closer relationship to that of the nonorganic group with a mean score of 1.38 than did the organic group with a mean score of 25.87. The findings of the HTO evidenced that the most accurate predication were found between 10.6 and fifty-nine years of age.

Table 1. Mean scores and standard deviations of the groups tested

	Number	Mean	Standard Deviation
Schizophrenic	50	1.38	3.27
Organic	63	25.87	13.17
Nonorganic	108	0.9	2.1

Note: The mean scores are the means of number of mistakes made by subjects.

Table 2. *t* values and their significance levels comparing the differences in mean scores for the groups tested

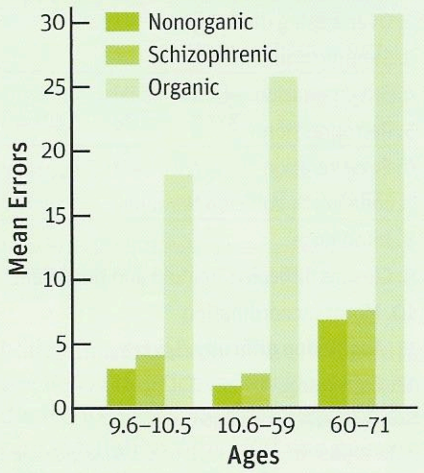
	t Value	Level of Significance
Schizophrenic vs. Organic	14.16	p< .001
Schizophrenic vs. Nonorganic	0.94	ns
Organic vs. Nonorganic	14.78	p< .001

Hoffman Organicity Test

Description of Subjects

The subjects for the Hoffman Organicity Test (HOT) research consisted of forty-four individuals who were matched by their age and their ability to cooperate and understand testing procedures and instructions. Subjects were tested on an outpatient basis. Twenty-five nonorganics and nineteen organic individuals were chosen. The nonorganic group consisted of selected individuals who were medically clear of any known neurological or psychiatric disability. Members of the organic group were

Figure 1. Mean scores on the relationships of the organic, nonorganic, and schizophrenic groups



Note: The schizophrenic and the nonorganic group showed a closer relationship than the schizophrenic and the organic group.

chosen with a definite diagnosis of organic brain syndrome. These subjects were selected from several private practices in Broward County, Florida.

Table 3 shows the cutting scores and the number of subjects in each group falling within the cut-offs.

In order to assess the stability of the HTO over time (i.e., test-retest reliability) fifty-eight subjects were administered the test on two different occasions. The time interval between the first and second administration averaged two weeks. A Pearson product-moment correlation

Table 3. Cutting scores of each group

Errors	0–6	7–20	21–68
Nonorganic N=108	103	5	0
Nonorganic N=50	47	3	0
Organic N=6	4	17	42

Note: The mean scores are the means of number of mistakes made by subjects.

was used to calculate the respective relationships between scores obtained from the two administrations. The test-retest correlation coefficient was 0.92 for part I and 0.96 for part II of the HTO. With respect to the reliability of the classification of test subjects, fifty-seven of the fifty-eight subjects (98 percent) were classified the same according to the results of the second administration.

Validation Study

This study compares the HTO results of three groups: twenty-five nonorganics, twenty-eight schizophrenics, and twenty-five organics. Subjects in the schizophrenic and organic groups had at least two diagnoses by a psychiatrist or psychologist. The diagnoses of the organic and nonorganic group was not known by the examiner before administering and scoring the test. The nonorganic group consisted of randomly selected individuals who had no known neurologic or psychotic disabilities. The nonorganic group was screened with the Elizur Test of Psycho-Organicity (Elizur, 1993) to rule out organic involvement. The nonorganic group was screened with a mental status examination to determine the presence of schizophrenia or a psychotic disorder. They denied any history or evidenced any current symptoms of schizophrenia or psychosis. The nonorganic and schizophrenic groups were matched by sex, age, and average intelligence. The organic group was matched by sex and age only. It was not possible to match the organic group by intelligence due to intellectual deficits inherent in the organic population.

The HTO diagnosed twenty-five out of the twenty-five nonorganic subjects correctly, 100 percent correct diagnoses; twenty-six out of twenty-eight schizophrenics as being nonorganics, and twenty-five organics were diagnosed correctly. This validates that 92 percent of the schizophrenics were found to be nonorganic, and 100 percent of the organics were diagnosed correctly.

Methodology

The HTO was a short, inexpensive, easily administered test with a high degree of predictability. Unfortunately, its administration was limited to music therapists. Psychologists, psychiatrists, and other mental health professionals complained that the test was difficult to administer in their practices. The major complaints focused on the noise and the bulky size of the unit.

Another aspect of revising the HTO came from the results of the original study. Part I of the test was found to have no level of significance in determining the presence of an organic brain disorder. Part I was therefore omitted from the test protocol. The practice examples were shortened due to the number of complaints from the normal subjects. Complaints focused on the simplistic repetitions in the practice examples.

The revision of the Hoffman Test for Organicity (HTO), which is currently entitled the Hoffman Organicity Test (HOT), was designed to fit the testing needs of the mental health professional. It is easily administered by not only a music therapist, but all mental health professionals. It is shorter, more adaptable to the professional's private practice and less expensive. The HOT eliminates the necessity to produce a bulky and noisy testing apparatus.

No individuals were chosen if they were taking medication. This was done to avoid test results being affected due to medication side effects. In order to test the clarity of directions, three organic and three nonorganic individuals were chosen at random. Those chosen were not utilized for the testing procedure. They were given the test-taped instructions to determine if they were clear and succinct. Each subject was tested additionally with the Bender Visual Motor Gestalt Test (BGT; Bender, 1938, 2003) for a comparative study along with the HOT. The BGT was used also as a screening device to rule out organicity for the nonorganic group. The BGT and the HOT were randomly rotated to avoid test contagion. Before the test was administered, each subject was asked to sign a statement of consent to insure that they were informed of the nature of the research and the risks as a subject.

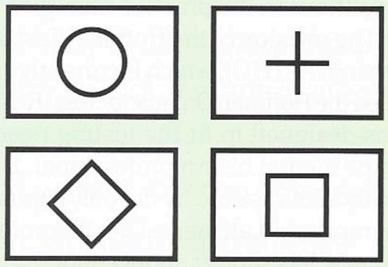
Test Materials

Test materials consisted of a scoring sheet, four separate geometric drawings (cross, circle, square, diamond), a cassette recorder, and a five-minute cassette recording. The geometric drawings were chosen only for their unique differences, attempting to eliminate confusion to the subject. The geometric drawings can be seen in Figure 2.

Administering the HOT

The subject was seated in an armless chair, in a room approximately 8 x 10 feet. The subject was then asked his or her name and date of birth, which was noted on the score sheet along with the date, sex, and place of testing.

Figure 2. Geometric designs



The tester was seated behind the subject to avoid shaping behavior. Therefore, the subject was not able to see the tester scoring the test. The same tester tested all subjects in this study. There was a short introductory practice portion administered by the tester. This was accomplished to determine if the subject had an auditory perceptual difficulty. The practice rhythmic patterns were not related to the actual test rhythmic patterns. If the subject was unable to understand the instructions, the test was terminated and no score was recorded, and the subject's score was eliminated from the study. If the subject understood the practice instructions, the test was administered.

The tester instructed the subject to listen to the instructions on the tape recorder. The instructions detailed the pairing of the two separate rhythmic patterns to the selected drawings. The subject was asked to point—with his or her preferred index finger of either the right or left hand—to the appropriate drawing when the rhythm was sounded. The subject is then shown the final two drawings with their respective rhythmic patterns. The subject was asked to point to the appropriate item when the rhythm was sounded. When this was accomplished, the subject was told to begin the test.

Statistical Analysis

The Spearman Rank-Order Correlation Coefficient (Spearman's Correlation) was used to determine a relationship between the HOT and the BGT for the nonorganic and organic groups, and to determine a relationship between the HOT and nonorganic and organic groups. Also, there were to have been fifty subjects in the study, though due to difficulty in procuring sufficient subjects in the organic group, only nineteen in the organic group and twenty-five in the nonorganic group were tested.

The Mann-Whitney U Test was used to determine significant differences between the nonorganic group and the organic group score upon administration of the HOT and the BGT. Spearman's Correlation was used to determine a correlation between the HOT and the BGT between the nonorganic and organic groups. Spearman's Correlation was also used to determine a relationship between the HOT and nonorganic and organic groups.

The nonorganic and organic groups were matched according to their age and their ability to cooperate and understand testing procedures and instructions. In order to assess the stability of the HOT over time (i.e., test-retest reliability) the same forty-four subjects were administered the two tests on two different occasions. The time interval between the first and second administration was two to three weeks. Because the Hutt-Briskin scoring system is currently suggested as the most favorable scoring method with the highest diagnostic accuracy to determine the presence of organicity (Lacks & Newport, 1980), their system of scoring was chosen for the HOT study. Figure 3 shows Hutt-Briskin's twelve essential discriminators of organic dysfunction to be measured. Table 4 shows the diagnostic accuracy of the four leading scoring approaches to the BGT. The results clearly indicate that the Hutt-Briskin system can be used with high diagnostic efficiency to discriminate organic psychiatric patients from patients with mixed nonorganic psychiatric disorders.

Figure 3. Hutt-Briskin's twelve essential discriminators of organic dysfunction

1. Rotation: severe
2. Overlapping difficulty
3. Simplification
4. Fragmentation
5. Retrogression
6. Perseveration
7. Collision or collision tendency
8. Impotence
9. Closure difficulty: marked and persistent
10. Motor incoordination
11. Angulation difficulty: severe
12. Cohesion

Source: Hutt & Briskin (1960).

Note: Reprinted from Lacks, P. (1984). *Bender-Gestalt screening for brain dysfunction* (p. 51). New York, NY: Wiley & Sons.

Table 4. Diagnostic accuracy (percent correctly diagnosed) for four scoring approaches to the BGT

Scoring approach	Non-organic Dx.	Organic Dx.	Total
Hutt-Briskin	80	87	84
Pauker	79	80	79
Hain	75	72	71
Rotations	45	70	63

Note: Since a standard cutoff is not available for the Pauker system, optimal cutoffs for all approaches were used: Hain (14 and above), Hutt-Briskin (5 and above), Pauker (9 and above), rotations (1 and above). Optimal and standard cutoffs were identical in this study for the Hutt-Briskin and rotations. Three different scorers scored a sample of 50 neuropsychiatric inpatients for each approach (Lacks & Newport, 1980).

Results

The HOT and the BGT were administered to two groups of subjects; an organic group, comprised of patients clinically diagnosed with organic lesions and a nonorganic group with no clinical diagnosis of brain damage. In addition, the HOT was readministered to both groups two to three weeks after the initial testing. The means and standard deviations of each group for each test are presented in Table 5. As Table 5 shows, the means for the control group were very close to zero for the BGT as well as both administrations of the HOT.

The low means reflect floor effects which were obtained on all tests with this group. In contrast, the means and standard deviations for the organic group reflect a wider distribution of scores, which turns out to be comparable for

Table 5. Means and standard deviation of scores on HOT, HOT retest, and BGT for organic and nonorganic groups

		HOT1	HOT2	BGT
Organic (n=19)	Mean	11.105	10.105	5.053
	SD	3.178	3.281	1.545
Nonorganic (n=25)	Mean	0.6	0.12	0.08
	SD	0.764	0.332	0.277

Note: HOT1 and HOT2 indicate first and second administration of the HOT, respectively.

both administrations of the HOT and for the BGT. Statistical analyses were conducted to assess the reliability and empirical validity of the HOT as a measure of organic dysfunction. These analyses are described in the following two sections of this article.

Reliability

Test-retest reliability of the HOT was established by administering the instrument of both the organic and the nonorganic groups and then retesting them after two to three weeks. Because the nature of the distribution of HOT scores is unknown for either population in this study, the distribution-free Spearman's Correlation between both administrations of the HOT was used as a reliability index. The coefficient of stability collapsed across both groups was extremely high ($r = +0.932$ [$p < .01$]).

Because the HOT is designed specifically to organic dysfunction, identical measures of reliability were calculated separately for the nonorganic and organic groups. In doing so, test-retest reliability could be determined for the organic group. The coefficient of stability was exceedingly high for the organic group ($r = +0.913$ [$p < .01$]), but not as great for the nonorganic ($r = +0.496$ [$p < .05$]).

Validity

The validity of the HOT as a measure of organic dysfunction was established in two ways. First, comparing HOT scores obtained from the two groups to an accepted measure of organic disorder (the Hutt-Briskin scoring system for the BGT) yielded an index of concurrent validity. Second, construct validity was assessed by examining group differences on both the HOT and the BGT.

Concurrent Validity

Concurrent validity was assessed by calculating the Spearman's Correlation between scores on the HOT and scores on the BGT. Because the BGT is a well-established diagnostic of organic disorder (see the first article in this series in the October 2017 issue of *Counselor*), a significant correlation between scores on two tests should support the validity of the HOT as a measure of organicity. Indeed, the correlation between the two tests was quite high for the organic group ($r = +0.873$ [$<.01$]), though not for the nonorganics ($r = +0.114$ [nonsignificant]).

Construct Validity

The validity of rhythmic memory and associative integration as a construct for indicating organic dysfunction was determined by comparing group differences in performance between the clinically diagnosed organic group and the nonorganic group. If significant differences exist between the performances of the organic group relative to the performance of nonorganics, then the empirical validity of the HOT test as an index of organicity should be established.

The Mann-Whitney U Test was used to assess the significance of group separation for a number of reasons. First, the Mann-Whitney U Test is a distribution-free statistic and requires few assumptions to be met regarding the population distribution. Second, because floor effects were obtained on both HOT and BGT scores for the nonorganic group, it was particularly important that assumptions regarding the variances of the scores not be violated. The Mann-Whitney U Test requires no such assumptions.

Comparisons were made between both the nonorganic and the organic groups on the HOT and the BGT scores. The Mann-Whitney U Test was significant for the HOT ($U = 0.0$, [$p < .001$]). The same test conducted over BGT scores between the two groups was also significant ($U = 0.0$, [$p < .001$]). For the HOT, the chi-square approximation to the U Test (for ordinal data) was 32.912 with one degree of freedom. For the BGT, the chi-square approximation was 37.066 with one degree of freedom. These tests all suggest significant group differences in performance between patients suffering from organic lesions and nonorganic individuals on both the BGT and the HOT. Thus, the HOT appears to be a valid index of organic dysfunction, at least in terms of its ability to detect differences in performance between organic and nonorganic subjects.

Discussion

The lack of literature in the area of rhythmic memory, associative integration, and its relationship to organic brain disorder, made it difficult to find appropriate resources for review. Throughout the years, many claims, but virtually no research, has led to the premise that there is a connection between the brain-impaired individual and dysfunctional rhythmic ability (Nordoff & Robbins, 1965). These observations were mainly seen by music therapists in neurological wards of state mental hospitals. However, virtually no research has come from these claims or observations.

It is unclear whether the data of this study assesses rhythmic dysfunction, rhythmic memory functions or other memory/rhythmic functions, but there seems to be sufficient data to support the conclusion that the HOT can be used as an assessment tool to determine the presence of organic brain disorder. The pairing of rhythmic patterns and common geometric designs, as measured by the HOT, is a valid construct as a measure of organic brain disorder.

The data show that the HOT permits a reliable and valid assessment of the presence of organic brain dysfunction. The significant correlations between the two administrations of the HOT—both within the organic group and collapsed across the two groups examined in the study—suggest that the conditions measured by the HOT are stable across time, at least for the interval between testing in this study. The correlations between the HOT and the BGT affirm that the HOT established concurrent validity. Further, the analysis of group differences between clinically diagnosed organic patients and a nonorganic group provide support that rhythmic memory and associative integration, as measured by the HOT, is a valid construct as a measure of organicity. The findings in this study suggest that the HOT may serve as an easily administered screening tool in the assessment of brain damage.

Localization

More research is needed, however, to further specify the nature and the localization of the dysfunction measured by the HOT. For example, a discriminant analytical procedure to rely on test scores for predicting the nature and the site of the lesion, as well as its presence, may be possible with the implementation of the HOT. It may be possible to develop an impairment index that could allow diagnostic predictions to determine the area of impairment in the brain. Any scores that exceed the established cutting scores might discriminate the lobe damage to the individual. Prediction about the site and of the lesion and its nature (e.g., diffuse or focal, static or changing) could be based on statistically identified relationships between test scores.

Trauma, the leading cause of death in the United States in youth and early middle age, also leaves thousands of surviving victims who must face many years of life with impaired neuropsychological functions. Brain injury due to head trauma has become a problem of national concern and neuropsychologists are being called upon to identify, rehabilitate, and testify in court on behalf of brain-injured people. A short, easily administered test with a high hit rate would be of enormous value in the development of early treatment planning.

An Assessment Tool

The HOT could also be a useful neuropsychological assessment tool that could accurately identify nonorganic patients in nursing homes. In the geriatric community, aging patients, in spite of the ability to function normally, may be forgotten, be misdiagnosed or have fallen between the cracks in the bureaucratic shuffle of human despair. In the assumption that these aging patients are "brain damaged," independent and productive performance is rarely expected. The HOT could be a useful tool to discriminate between organic and nonorganic nursing home patients. Furthermore, the HOT may be able to determine the level of the impairment, thus, enabling nursing home staff to identify and recognize, not only the limitations of patients, but the abilities that otherwise may have been overlooked.

Additionally, the HOT could be further researched as a neuropsychological assessment method that could accurately identify the variable deficits of the brain-injured child. These deficits must be evaluated and recognized to develop and provide rehabilitation and brain retraining programs which are appropriate and suitable for the child.

No concern should have higher national priority than that of providing the fullest opportunity for physical and intellectual development for every child. Those designated as suffering from attention deficit disorder, hyperactivity learning disability, and other neurodevelopmental irregularities (of sufficient severity to require special help), could benefit from speedy and early detection (APA, 1987). These children need all the assistance possible for their disabilities and inefficiencies in learning. The goals of identification, remediation, and treatment are to increase their chances for productive and self-fulfilling adult lives and to prevent the development of emotional and psychiatric maladjustments.

Continued research of the HOT may help in the search for a neuropsychological assessment package specific to children with learning and behavior deviations due to brain dysfunctions. It is also hopeful that future HOT research may help isolate areas of impaired function which may be corrected by specific training methods.

Summary and Conclusion

There is a definite lack of research literature on how rhythm and rhythmic memory effects the human organism and its subsequent behavioral manifestations. For example, is there any relationship to neurodevelopmental disorders and dysrhythmia? Is there a relationship between antisocial behavior and rhythmic dysfunction or rhythmic memory? The suggested use of the HOT, at this stage of development, is primarily as a screening tool for the possible existence of organicity. With replication studies and larger samples it may prove itself useful as a diagnostic testing instrument to determine the presence of organic brain disorder.

The HOT appears to be a useful neuropsychological assessment instrument that can provide mental health professionals with an easily administered valid screening tool to differentiate between organics and nonorganics. It is hopeful that through research in the area of early childhood learning and behavior deviations, the HOT may be useful as a neuropsychological assessment instrument in detecting such deviations, and localizing and isolating the area of impairment.

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References

American Psychiatric Association (APA). (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., revised). Washington, DC: Author.

Bender, L. (1938). *A visual-motor Gestalt Test and its clinical use.* New York, NY: American Orthopsychiatric Association.

Bender, L. (2003). *Bender Visual-Motor Gestalt Test* (2nd ed.). San Antonio, TX: The Psychological Corporation.

Elizur, A. (1993). *Elizur Test of Psycho-Organicity.* Los Angeles, CA: Western Psychological Services.

Hoffman, N. E. (1974). *Hear the music! A new approach to mental health.* Boynton Beach, FL: Star Publishing.

Hoffman, N. E. (1975). *Hoffman test for organicity.* West Palm Beach, FL: Proof Press.

Lacks, P. B., & Newport, K. A. (1980). A comparison of scoring systems and level of scorer experience on the Bender-Gestalt Test. *Journal of Personality Assessment, 44*(4), 351–7.

Nordoff, P., & Robbins, C. (1965). *Music therapy for handicapped children: Investigations and experiences.* East Sussex, England: R. Steiner Publications.