

The Computerized H.O.D. Test

By Robert E. Peck, M.D., and John E. Everson

The H.O.D. test, since its introduction by Hoffer and Osmond in 1961 (Hoffer¹), has become widely used among psychiatrists as an adjunct to the psychiatric examination and as a technique of monitoring treatment. It is easy to administer, but correcting it is a somewhat different matter. In the form of cards, which are shuffled and then classified into true or false by the subject, there remains the need to enter the number of each true card on a scoring sheet, totaling these for the different categories, checking probabilities for the different scores, and making a division for the ratio score. If adequate clerical help is available there is no problem, but for the average psychiatrist this is likely not true, and if he does not own a number of sets of cards, he is limited in the number of tests he can do without the tedium of scoring the test before the cards can be used again.

Although there are a number of conceivable ways of making the scoring process easier and more efficient, the authors, having a computer at their disposal, decided to computerize the process and have been successful in so doing.

Dr. Peck is a psychiatrist in private practice in Syosset, New York, and Director of Psychiatry at Syosset General Hospital and consultant at Nassau County Medical Center.

Mr. Everson's primary background is in the field of aerospace engineering with great emphasis in computer-aided electronics design. Prior to his association with Megsystems, a time-sharing computer company, he developed a computer-modelling technique for high-frequency power-switching circuits and power-dissipation problems encountered in the near vacuum of space.

It is not necessary to go into much technical detail on the process as most users of the H.O.D. test would hardly be interested. It suffices to say that every step in the scoring process done by the

human is effectively duplicated by the computer.

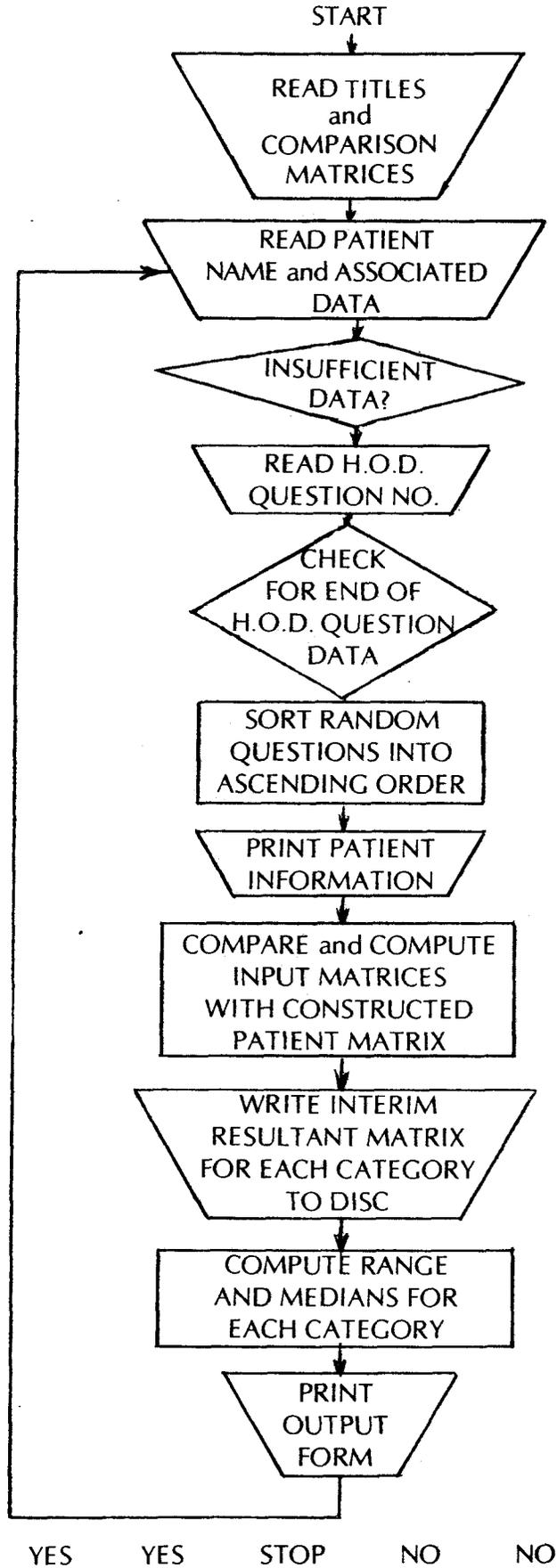
Figure 1 is a flow chart of the steps involved.

Instead of using a box of cards that is shuffled after each use, we "shuffled" the questions by assigning random numbers to them, and the questions are thus presented in random order on a questionnaire, prefaced by blanks for the proper identification of the subject and directions for taking the test. The patient then simply checks the questions that are "true".

The identifying data and the answers checked are then punched on tape and fed into the teletype terminal, and this is transmitted to the computer where it is stored in a memory file.

The program is presently running on a General Electric model 430 computer system. The system is configured with a 32k core (24 bit word size) and an available disc space of 57.6 million words.

The program, which is written in a high level language, uses double precision throughout (48 bit word size). This is required because we make extensive use of matrix operations.



THE COMPUTERIZED H.O.D. TEST

Figure 2 - H.O.D. TEST

Name:	Marital Status: Single
Age: 18	Religion: None
Race: White	Occupation: Student
Sex: Male	Physician: Peck

Date: 5/30/71

Total for Visual Perception.....	6
Total for Auditory Perception.....	1
Total Tactile Perception.....	0
Total Taste Perception	0
Total Time Perception	5
Total Olfactory Perception.....	0
Total Thought	8
Total Feelings	7
H.O.D. Test Total	39
Paranoid Point Total	1
Perceptual Point Total	7
Schizophrenia Probability:	
Range4 to .66
Median.....	6
Visual Classification Point Total	1
Functional Classification Total	8
Consistency.....	7
Depression Point Total	10
Ratio Score	3.9
Anxiety Point Total.....	11
Anxiety Score	(11 of 23) 48%

Two forms of the H.O.D. test are currently being used. One prints out all the questions checked and follows this with a summary of the various scores. The second eliminates the printing of the questions and merely prints the summary which is stapled to the original questionnaire sheet. This is quite adequate and costs less in terms of computer time.

Although it may not be of general interest, it may interest some to know of the approximate steps the computer takes to complete the job. Figure I shows a flow chart for the H.O.D. test program.

The answered questions are fed into a computer file and from this are formed into the correct rank which can then be compared with several other files relevant to the test. One of these is a list of the 145 questions. Another is a matrix which contains the various questions pertinent to a perceptual total, paranoid total, depression total, and anxiety total. Still another determines the category of the perceptual questions and the classificatory questions. As each comparison of the input file is made with the reference files, they are tabulated by the computer and the various scores printed in the summary. A simple calculation by the computer determines the ratio score (Kelm²).

The probabilities of schizophrenia were separately worked out in Hoffer and Osmond's paper on the total score, perceptual score, and paranoid score and this leads to three different probabilities which may differ considerably, and often do. We have chosen to give the range of these and print the median of the three as the fairest

estimate, although one may choose the highest if one wishes. It is immediately evident from the probabilities in Hoffer and Osmond's papers that if any questions at all are answered there can be no median probability less than .3.

Because many of the H.O.D. questions could also be answered by a subject with an anxiety neurosis who is not schizophrenic, we have chosen to select these on an a priori basis for an arbitrary anxiety score. This has not as yet been validated clinically, but may perhaps be suggestive. It is our hope to eventually make a small contribution to the H.O.D. literature by giving the test to a representative group of anxiety neurosis.

Figure 2 shows an actual output on a young drug abuser.*

In conclusion it can be said that the computerized H.O.D. test has proven useful and inexpensive, and has made it possible to do the tests routinely on new patients and at frequent intervals for patients under treatment.

* For those who may be interested, our software is presently implemented and available from Computer Paramedics Inc., 175 Jericho Turnpike, Syosset

REFERENCES

1. HOFFER, A. and OSMOND, H. A card sorting test helpful in making psychiatric diagnosis. *J. of Neuropsychiatry* 2:306, 1961.
2. KELM, H. and HOFFER, A. A revised score for the Hoffer-Osmond Diagnostic Test. *Dis. Nerv. Syst.* 26:790, 1965.