

# The HOD Test: An Apple II Programme

Roderick J. Steel, B.Sc.<sup>1</sup>, and Erik T. Paterson, M.B., Ch.B., D. Obst. R.C.O.G.,  
F.B.I.S.<sup>1</sup>,

## Introduction

The Hoffer Osmond Diagnostic Test (Ref. 1) is a simple card sorting test which, despite its "crudity" (Ref. 2), is a reasonably accurate test in the diagnosis of Schizophrenia, and schizophrenia-related illnesses. It is also useful in the following up of the progress of treatment, and making retrospective diagnoses where the patient has partially recovered. And it may be more useful than some other tests (Ref. 3).

In these days of the "Mighty Micro" the HOD Test seems particularly crude to handle in its original form. The cards in their boxes, the templates used for scoring, and the score sheets themselves are relatively bulky and slow to handle compared with a diskette. The scoring process is especially slow. But more and more doctors have desktop computers in their offices, mainly for business purposes. It seemed appropriate to develop a suitable programme to handle the HOD test.

The Apple II computer, and systems compatible with it, are very common. For instance, there are more than a million Apple II computers alone at home and in offices around the world. Some of them are in the offices of doctors.

One of us is — at the time of writing this — a student of Computer Science at St. Andrews University in Scotland, and the other is a practicing General Practitioner in Canada who has recently obtained an Apple II compatible computer. It seemed like a good idea to see if The HOD Test could be computerised for such a small system, knowing that another programme was already available for larger systems (Ref. 4).

However, we were very conscious of the problem of the infringement of the copyright of the authors of the HOD Test. We believe that we have conserved those rights in a very neat manner.

## The Programme

We used a "Circle-200" computer with 48K bytes of memory, a monitor, floppy disk drive, and a printer. But a system with less memory would be ample for the task and cassette storage would be adequate, albeit much slower to load into the computer.

1. P.O. Box 2010,  
Creston, B.C., Canada V0B 1G0

The programme itself (shown in Listing 1.) consists of several sections. One section initialises various registers, sets up arrays, and enters the questions from separate files along with their numbers. Another randomises the questions to avoid a preset biasing from the order in which the questions are given and handles the responses to the questions, including keeping and tallying a count down of the number of questions remaining (so the patient does not feel that he will carry on for ever). The next checks each array to see if the question answered True (T) is included and increments the factor in the appropriate register. Subroutines handle the printing of the test results (either on the monitor or the printer), checks that the Ratio Score is only shown if the Depression Score is not Zero, takes in patient details (and even rechecks them), and handles the introduction.

What is not given is the actual questions and their numbers. To do so would violate the copyright.

Instead, to get the programme working, other files have to be written into the disk (or cassette). There are as follows: —

1. SIT — contains the Short Form numbers in order.
2. PAR — contains the numbers for the Paranoid Score,
3. KEYA — contains the numbers in Key A of the Total Score,
4. KEYB — contains the numbers in Key B,
5. DEP — contains the numbers for the Depression Score,
6. PER — contains the numbers for the Perceptual Score, and
7. QTOT — contains the actual questions without the numbers but given in the order of the numbers on the backs of the cards from 1-145. For this last, we recommend that the questions be written so that all the words are complete on the lines for ease of reading by the patient.

The programme takes approximately 90 seconds to load from disk when the Test is to be administered. After that the patient is guided into answering the prompts to enter the simple personal details to gain ease with handling the computer. Probably the tester should also supervise the first few minutes of the test to make sure that the patient is handling the T and F keys properly. The computer is patient and responds to the patient's answers as fast, or as slow, as the testee reacts to the questions.

When the Test questions are finished the answer is immediately (in human terms) available.

It uses 3118 bytes of memory, with the other files using a similar amount of storage.

The Programme [See the attached Listing]:

Lines 1-8 These carry out the initialising operations.

Line 20 opens the List of Depression Numbers

Lines 22-29 read the numbers into the array and close the file.

Lines 30-89 perform the same functions for the other Scores, and end the process of filling the arrays.

Line 90 takes the programme to the Introduction Code.

Line 100 shows the number of questions answered.

Line 110 selects a number from 1-145 at random.

Line 115 takes the programme to line 3000 if all the questions have been asked.

Line 120 If question selected at line 110 already answered then programme goes to line 200.

Line 130 clears the screen.

Line 140 prints the question.

Line 145 indicates that a question has been used.

Line 148 increments the questions asked.

Line 150 moves the cursor down 20 lines.

Line 160 prints the word "Answer" and the number of questions to go.

Line 165 is merely a spacer line.

Line 170 gets the answer.

Line 175 shows it on the screen.

Lines 176-178 instruct the computer to wait for about half a second to make its speed of response more comfortable to the patient.

Line 180 If the answer is "T" for True the programme goes to line 300.

Lines 182-184 instruct the computer to wait for a second to equalize the wait between True and False answers and avoid biases here.

Line 185 loops the programme back to Line 110 for the next question.  
 Lines 200-300 If the question selected at 110 is already used then this checks if the next question in the array is also used until an unused one is found.  
 Lines 300-1150 check through each array to see if the question answered "T" for True is included. If it is registered then a sum of that factor is incremented appropriately.  
 Lines 1055-1060 allow for different weightings on Key A.  
 Line 2010 goes to the next question.  
 Line 3000 clears the screen since all the information is now in.  
 Line 3001 sends the computer to Line 7000.  
 Line 3005 If a printer is available then the patient's details are printed at the top of the form.  
 Lines 3008-3200 print the Test Results/ Scores.  
 Line 3046 prints the Ratio Score only if the Depression Score is 0 to avoid a division by Zero error. It also limits Ratio Score to 2 decimal places.  
 Line 4000 ends the programme.  
 Lines 5000-5120 take in the patient details, ask if all are correct, and, if not, begin to take them in again.  
 Lines 5200-5310 show the Introduction and instruct the patient to use the Space Bar to continue. [Most keys would do, but the Space Bar is most convenient.]  
 Lines 7000-7200 ask if a printer is available. If so, it sends the results to

the printer. Lines 8000-8900 actually carry out the printing of the patient details at the top of the form.

### Discussion

This programme cannot be used unless the programmer already has purchased the HOD Test kit. Even the manual can only provide the questions. That being said, it takes but a few hours to get the programme operational.

It is also not exclusive to the Apple range of computers but can quickly be adapted to other systems using the BASIC programming language, of which there are many millions. Like many programmes, it can be improved. For instance, it could store the patient details and their scores for later comparisons and show some indication of the trends in the patients' conditions. The speed of the programme could be increased by including a binary search when a question is answered T (True) instead of the present rather lengthy sequential process.

Since the basic algorithm, upon which this programme is based, is simple and applicable to other tests, we are considering developing programmes for these for the small systems in doctors' offices, such as the Experiential World Inventory or the Myers-Briggs Type Indicator.

The publication of this programme puts it into the public domain allowing anyone to use it without considerations of copyright, except the copyright of the original test.

259

## HOD Test: A Programme Listing

```

1 DIM USED(145)
2 DIM QU$(145)
3 DIM DEP(18)
4 DIM PER(53)
5 DIM PAR(15)
6 DIM SIT(17)
7 DIM KA(30)
8 DIM KB(104)
20 PRINT CHR$(4);"OPEN DEP"
22 PRINT CHR$(4);"READ DEP"
24 FOR COUNT= 1 TO 18

26 INPUT DEP(COUNT)
28 NEXT COUNT
29 PRINT CHR$(4); "CLOSE DEP"
30 PRINT CHR$(4); "OPEN PER"
32 PRINT CHR$(4); "READ PER"
34 FOR COUNT = 1 TO 53
36 INPUT PER(COUNT)
38 NEXT COUNT
39 PRINT CHR$(4); "CLOSE PER"
40 PRINT CHR$(4); "OPEN PAR"
42 PRINT CHR$(4); "READ PAR"

```

```

44 FOR COUNT =1 TO 15
46 INPUT PAR (COUNT);
48 NEXT COUNT
49 PRINT CHR$ (4);"CLOSE PAR"
50 PRINT CHR$ (4);"OPEN SIT"
52 PRINT CHR$ (4);"READ SIT"
54 FOR COUNT =1 TO 17
56 INPUT SIT (COUNT)
58 NEXT COUNT
59 PRINT CHR$ (4);"CLOSE SIT"
60 PRINT CHR$ (4);"OPEN KEYA"
62 PRINT CHR$ (4);"READ KEYA"
64 FOR COUNT =1 TO 30
66 INPUT KA(COUNT)
68 NEXT COUNT
69 PRINT CHR$ (4);"CLOSE KEYA"
70 PRINT CHR| (4);"OPEN KEYB"
72 PRINT CHR$ (4);"READ KEYB"
74 FOR COUNT = 1 TO 104
76 INPUT KB(COUNT)
78 NEXT COUNT
79 PRINT CHR$ (4);"CLOSE KEYB"
80 PRINT CHR$ (4);"OPEN QTOT"
82 PRINT CHR$ (4);"READ QTOT"
84 FOR COUNT = 1 TO 145
86 INPUT QUKCOUNT)
88 NEXT COUNT
89 PRINT CHR$ (4);"CLOSE QTOT*"
90 GOSUB5000 100 OUT = 0
110 CARD = INT (RND(I)* 145)+1
115 IF OUT >144 THEN 3000
120 IF USED(CARD) THEN 200
130 CALL —936
140 PRINT QU$(CARD)
145 USED(CARD)=1
148 OUT = OUT+1
150 VTAB20
160 PRINT "ANSWER",146 - OUT
165 PRINT
170 GET ANSI
175 PRINT ANS$
176FORWA=ITO100
177 DU = DU+1
178 NEXT WA
179 CALL - 936
180 IF ANSI = T" THEN 300
182 FORWA=ITO250
183 DU = DU+1
184 NEXTWA
185 GOTO 110
200 IF CARD =145 THEN CARD = CARD-145
210 CARD = CARD+1
220 IF NOT (USED(CARD)) THEN 130
230 GOTO 200
300 FOR COUNT = 1 TO 18
320 IF CARD = DEP(COUNT) THEN GOTO 350
330 NEXT COUNT
340 GOTO 400
350 DCOUNT = DCOUNT +1
400 FOR COUNT = 1 TO 53
410 IF CARD = PER(COUNT) THEN GOTO 450
420 NEXT COUNT
430 GOTO 500
450 PCOUNT = PCOUNT +1
500 FOR COUNT = 1 TO 15
510 DF CARD = PAR(COUNT) THEN GOTO 550
520 NEXT COUNT
530 GOTO 600
550 NCOUNT = NCOUNT + 1
600 FOR COUNT = 1 TO 17
610 IF CARD = ShXCOUNT) THEN GOTO 650
620 NEXT COUNT
630 GOTO 1000
650 SCOUNT = SCOUNT+1
1000 FOR COUNT = 1 TO 30
1010 IF CARD = KA(COUNT) THEN GOTO 1050
1020 NEXT COUNT
1030 GOTO 1100

1050 IF (CARD = 82) OR (CARD = 92) OR (CARD
= 86) OR (CARD = 100) THEN 1060
1055 ACOUNT = ACOUNT + 3
1060 ACOUNT = ACOUNT + 2
1100 FOR COUNT = 1 TO 104
1110 IF CARD = KB(COUNT) THEN GOTO 1150
1120 NEXT COUNT
1130 GOTO 110
1150 BCOUNT = BCOUNT + 1
2010 GOTO 110
3000 CALL —936
3001 GOSUB 7000
3005 IF P| = "Y" THEN GOSUB 8000
3008 HTAB 10
3010 PRINT "PERCEPTUAL SCORE:"; PCOUNT
3014 PRINT
3015 HTAB 10
3020 PRINT "PARANOID SCORE :";NCOUNT
3024 PRINT
3025 HTAB 10
3030 PRINT "DEPRESSION SCORE:"; DCOUNT
3034 PRINT
3035 HTAB 10
3040 PRINT "SHORT FORM :";SCOUNT
3044 PRINT
3045 HTAB 10
3046 IF DCOUNT >0 THEN PRINT " RATIO SCORE:";
INT ((ACOUNT+BCOUNT)/ DCOUNT * 100) / 100: PRINT:
HTAB 10
3050 PRINT "TOTAL SCORE :";ACOUNT +
BCOUNT
3100 VTAB20
3200 PRINT CHR| (4);"PR#0"
4000 END
5000 CALL — 936
5010 PRINT "PATIENT DETAILS"
5020 PRINT "=====

5030 VTAB5
5035 COUNT = COUNT + 1
5040 HTAB 3: INPUT "NAME :";N|
5050 PRINT
5060 HTAB 3: INPUT "SEX:"; S|
5070 PRINT
5080 HTAB 3: INPUT "AGE :";A|
5090 PRINT
5100 HTAB 3: INPUT "DATE:"; D|
5110 PRINT: PRINT: INPUT "ALL CORRECT ?";C|
5120 IF C| = "N" THEN 5000
5200 CALL ___ 936
5220 HTAB 4: PRINT THE HOFFER OSMOND
260

```

## THE HOD TEST

DIAGNOSTIC TEST 5230 HTAB3:PRINT

«\_

```
5240 PRINT : PRINT : PRINT "THIS IS NOT AN
INTELLIGENCE TEST AND THERE ARE NO
RIGHT OR WRONG ANSWERS."
5245 PRINT
5250 PRINT : PRINT "JUST GIVE THE BEST
ANSWER THAT YOU CAN."
5260 PRINT: HTAB 2: PRINT "TRUE (T) FOR YOU
OR FALSE (F) FOR YOU."
5265 PRINT
5270 PRINT: PRINT "WHEN YOU ARE IN DOUBT,
ANSWER FALSE (F)."
```

```
5280 PRINT : PRINT : PRINT "TAKE YOUR TIME
AND RESPOND TO EACH IN TURN."
5285 PRINT
5290 PRINT : HTAB 5: PRINT "PRESS <SPACE
BAR> TO START"
5300 GETZ$
5310 RETURN
7000 VTAB 10: INPUT "IS PRINTER ON AND ON
LINE ?";P$
7100 IF P$ = "Y" THEN PRINT CHR$(4);"PR#1"
7150 CALL — 936
7200 RETURN
8000 PRINT
8010 PRINT
8100 PRINT "NAME:";N$
8200 PRINT
8300 PRINT "SEX:";S$
8400 PRINT
8500 PRINT "AGE:"^$
8600 PRINT
8700 PRINT "DATE:";D$
8800 PRINT: PRINT: PRINT: PRINT
8900 RETURN
```

### References

1. HOFFER, A. and OSMOND, H.: A card sorting test helpful in making psychiatric diagnosis, *J. Neuropsychiatry* 2,306,1961.
2. OSMOND, H.: Notes on the uses of the HOD in clinical and other situations, *J. Ortho. Psych.* 2,190,1973.
3. VON HILSHEIMER, G. et al.: HOD-MMR- a comparison, *J. Ortho, Psych.* 6,8,1977.
4. PECK, R.E. and EVERSON, J.E.: The computerised HOD test, *J. Ortho. Psych.* 1,109,1972.