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ESP TESTING AND TRAINING WITH THE HP-41C

Extrasensory perception (ESP) is defined as the ability to gather information without the use of any currently known senses or physical energies. Knowing what someone else is thinking is popularly called telepathy, directly knowing the state of matter, even though no one else knows it at the time, is called clairvoyance, and predicting the future when it can't be logically inferred or controlled is precognition. Although a representative survey showed that a majority of the American population believe they've personally experienced some kind of ESP (see C. Tart, Psi: Scientific Studies of the Psychic Realm, Dutton, 1977), the question of its existence is still controversial in scientific circles, partly because it's difficult to reliably demonstrate ESP on demand. This article describes a program for your HP41C or CV that turns it into an ESP testing and training device, so you may be able to discover how much ESP you have, and have an opportunity to improve your ESP. We'll sketch the program operation first and come back to the testing and training part later.

When you execute "ESP" (conveniently assigned to some key in the USER mode), the program asks you for the date (NR MN? for number of month, NR DY? for number of day, and YEAR?), so you'll have a permanent record if you're using a printer. If you're not going to use a printer, program lines 08-13 can be deleted. Then it wants the number of target choices (CHOICES?) you'll be calling. If you enter 5 and R/S, e.g., number keys 0, 1, 2, 3, and 4 will then represent the five targets of the test. It then prompts you for run length (RN LN?): a run is a preset number of trials, after which your results can be formally evaluated. Next the program asks you for the time, to the nearest second (e.g., 914.32): this is not only for record purposes, it is a way of getting a seed for the pseudo-random number generator (PRNG) subroutine in a way which is largely out of your control and so fairly random. The PRNG subroutine (LBL 05) then takes the absolute value of the natural log of the time, adds pi to it, raises the result to the fifth power, takes the fractional part of that result, multiplies it by your number of choices, and takes the integer portion of the result to get a target number within your choice range. This number is stored on the X-register but is not displayed because the HP41C is displaying an alpha prompt. We are indebted to Ed May for this generator routine. When you're changing the seed value on every run, as we do, it's a quite adequate random generator.

You can, or course, cheat at this point by viewing the X-register by turning the power off and back on, or by entering any number twice to be sure the X- and Y-registers are the same, but this is a program for testing/training yourself, not others, so why cheat yourself? Also, if you can do the PRNG subroutine above in your head, to 10 places, accurately, you can get the result rationally, without ESP, but if you can, that's as incredible as ESP!

The program now prompts you with the two tones and a "READY" in the display (lines 38-41). Now it's your turn to use clairvoyance to tell what the undisplayed target number in the X-register is, enter it on the keyboard, and press R/S. This is the hard part!

If your response matches the target, a subroutine (LBL 06) gives you a musical beep, displays "CORRECT" for feedback and reinforcement, increments the hits (register 04) and trials (register 03) counters by one, and selects a new target with the PRNG subroutine. If your response was incorrect, the program informs you with a low tone and a display as to what the target number actually was (LBL 01), increments the trials counter by one, and reactivates the PRNG to select the next target.

There may be occasional trials when you don't want to bet, i.e., you have no feeling at all for the target and would like to have a new trial without having to just guess and so chance a miss that will lower your overall score. If the "PASS" subroutine is assigned to a convenient key you can pass anytime. This gives you feedback (LBL 01) and reactivates the PRNG to choose a new target without it counting as a trial.

When you've done enough trials to complete your run, the "RESULTS" subroutine sounds a new double-tone sequence and automatically displays the results (number of passes, hits, trials, and percent hits). We've included a double PSE after each result to give you time to copy them down if you're not letting your printer (in NORM mode) do it for you. If you assign the "RESULTS" subroutine to a convenient key you can also review results to date before the end of a run and then continue with the run.

At the end of a run ("END OF RUN" displayed), if you want to do another run with the same number of choices and run length, just press R/S. The program will ask you for the time again, and then you're off. If you want to change the parameters of number of choices or run length, re-execute the entire ESP program.

How do you know if your results are indicative of ESP? The standard procedure is that if your proportion of hits is improbable (odds of less than 1 in 20 is the usual scientific convention), you may be using ESP. The more improbable your

results, the more likely that they are due to ESP. Improbability can come from obviously spectacular scores in a small number of trials, or from small deviations above chance that continue over large numbers of trials. If p is the probability of a hit on a single trial by chance alone (where p is one divided by the number of choices), and N is the number of trials, then we expect about Np hits per run of N trials with small fluctuations above and below this mean by chance. To assess the statistical significance of a given result, you can use the formula

$$Z = \frac{H - Np}{\sqrt{Npq}}$$

where $q = 1 - p$ and Z is the standard normal deviate, a value that can be looked up in any statistics book to give you a probability of your getting a score as high or higher than you obtained by chance alone. A word of warning, though. The Z formula is the normal approximation to the exact binomial distribution, and the product Npq should be greater than 9, preferably a lot greater, for the approximation to be good. By the time you've done several hundred trials with 5-choices, say, the formula is fine. For smaller series or individual runs, you need to do an exact binomial calculation, but we can't get into that routine here. For your convenience, we've tabled the minimum number of hits you must get for your results to be significant (probability less than .05) for 5 different run lengths over four popular choice ranges. Those of you who are very interested in the statistical foundations of this kind of testing should see Burdick and Kelly's chapter in B. Wolman et al's Handbook of Parapsychology (Van Nostrand/Reinhold, 1977).

Here are some psychological suggestions on testing. Do it when you're relaxed and in a good mood. Bad moods have been known to lead to scores significantly below chance expectation, as the ESP process gets "reversed in polarity." Don't run yourself into the ground: run lengths of 25 trials are plenty, and a break between runs may be useful. Most ESP testing has been done with 5 choices. If you go down to 2 choices you'll get lots of correct beeps, since chance expectancy is 50%, but most of those have nothing to do with using ESP and so won't help with possible learning, for reasons discussed below--too much noise in with the signal. We like 10 choices (0 to 9) for trying to improve your ESP, but your chance baseline reinforcement rate is only 10%, so don't get discouraged. Try taking the first impressions that come to mind, see how it works. Try a variety of strategies, but be playful. Be prepared for a lot of variation in how well you do. Challenge yourself and your friends, keep the atmosphere game-like. Make notes beforehand on your mood or other things that you think might affect your performance, keep your records, and see how such factors work for you. And don't hesitate to ignore all these suggestions if you find another way that works better for you!

If you have even small indications of ESP, the more interesting question is can you improve it? Now we deal with the training aspect of the ESP program. Some years ago one of us (C.T.T.), as well as a colleague, Russell Targ, noted that the standard number/card guessing ESP tests were done in a way in which feedback about results on individual trials was very delayed or non-existent. This is what psychologists call an "extinction paradigm," a way to confuse and eventually eliminate any kind of skilled performance. Sure enough, a review of the experimental parapsychology literature showed that practically all people who had been tested a long time without feedback, eventually lost their ESP abilities. You may have a potential for ESP, but you have to learn what actually makes it work for you. We learn things by trying all sorts of strategies, seeing the results through feedback, discarding the unsuccessful strategies, and refining the more successful ones. With the ESP program you can try different kinds of mental strategies and see what works and doesn't work for you, or you can take mental pictures of your state of mind before each trial and see what mental conditions are associated with success and which with failure. The full theory and initial positive results can be read about in C. Tart, Learning to Use Extrasensory Perception, University of Chicago Press, 1976, in the Journal of the American Society for Psychological Research, 1977, 71, 375-408, and in R. Targ and H. Puthoff, Mind-Reach, Delacorte/Friede, 1977. Keep records of your results, and if you find yourself improving, drop us a line. Be prepared for a lot of ups, downs, and plateaus, but give it a good try. See if you start having ESP-like experiences in other areas of your life as you learn on the HP41C program. If some of us can learn to use ESP strongly and reliably, there's going to be a revolution in a lot of scientific fields.

We would also like to hear from anyone who can figure out how to make either of two significant improvements in this program. First, we'd like to use a true random number generator instead of the current pseudo-random one. If someone could figure out how to count the number of clock pulses between consecutive keyboard entries, and use just the last digit or two of it, we could have an electronic roulette wheel type generator: the clock runs so fast in comparison to controllable human reaction time in pushing keyboard buttons that the digits from the hundredths of a second level on down toward microseconds are truly random. Second, can anyone figure out a version of this program that makes cheating harder or impossible, so it could be used to test people who might not be as honest with us as we are with ourselves?

Our main purpose in writing this article is to encourage bright people to test and develop their own ESP abilities. If you get consistently good results, please write and tell us about it. (Tart, Psychology, UCD, Davis, CA 95616; Puthoff, SRI International, 333 Ravenswood Ave., Menlo Park, CA 94025).
 Charles T. Tart (7268)
 Hal Puthoff

Run Length

	<u>20</u>	<u>40</u>	<u>60</u>	<u>80</u>	<u>100</u>
2-Choice	15	26	37	48	59
4-Choice	9	16	21	28	33
5-Choice	8	13	18	23	28
10-Choice	5	8	11	13	16

Table of Significance. The values in the body of the table are the number of hits you must reach or exceed for your ESP results to be statistically significant at a probability of .05 or less, one-tailed. E.g., if you had completed 60 trials with a five choice test procedure, getting 18 or more hits would occur by chance less than 5 in a 100 times, and so suggest that ESP was operating.

```

01 LBL "ESP"
02 FIX 0
03 0
04 STO 00
05 STO 03
06 STO 04
07 STO 05
08 "NR MN?"
09 PROMPT
10 "NR DY?"
11 PROMPT
12 "YEAR?"
13 PROMPT
14 "CHOICES=?"
15 PROMPT
16 STO 01
17 "RN LN?"
18 PROMPT
19 STO 00

20 LBL 04
21 "TIME=?"
22 PROMPT
23 LN
24 ABS
25 STO 02

26 LBL 05
27 PI
28 RCL 02
29 +
30 5
31 Y↑X
32 FRC
33 STO 02
34 RCL 01
35 *
36 INT
37 STO 06
38 "READY"
39 TONE 6
40 TONE 6
41 PROMPT
42 X=Y?
43 GTO 06
44 TONE 0
45 XEQ 01

46 LBL 07
47 1
48 ST+ 03
49 RCL 03
50 RCL 00
51 X=Y?
52 GTO "RESULTS"
53 GTO 05

54 LBL 06
55 SF 12
56 BEEP
57 " CORRECT"
  
```

Initialize data storage registers at 0

Prompt for date (month, day, year) and run (choices, length) data

Prompt for current time, transform for PRNG seed value

Pseudo-random number generator, fractional output (PRNG)

Store new PRNG seed

Scale PRNG output to desired number of choices

Prompt user for response

Test: is response a hit?

Target identity feedback subroutine if response was a miss

Increment trials counter register

Test for end of run

Hit feedback

```

58 AVIEW
59 CF 12
60 PSE
61 1
62 ST+ 04
63 GTO 07
64 LBL "PASS"
65 XEQ 01
66 1
67 ST+ 05
68 GTO 05
69 LBL "RESULTS"
70 TONE 3
71 TONE 2
72 RCL 05
73 "NR PASSES="
74 ARCL X
75 AVIEW
76 PSE
77 PSE
78 RCL 04
79 "NR HITS="
80 ARCL X
81 AVIEW
82 PSE
83 PSE
84 RCL 03
85 "NR TRIALS="
86 ARCL X
87 AVIEW
88 PSE
89 PSE
90 RCL 04
91 RCL 03
92 /
93 100
94 *
95 "HITS="
96 ARCL X
97 AVIEW
98 PSE
99 PSE
100 CLA
101 AVIEW
102 RCL 03
103 RCL 00
104 X=Y?
105 GTO 04
106 GTO 05
107 LBL 01
108 "TARGET WAS "
109 ARCL 06
110 AVIEW
111 PSE
112 RTN
113 LBL 04
114 "END OF RUN"
115 AVIEW
116 STOP
117 0
118 STO 03
119 STO 04
120 STO 05
121 GTO 04
122 ADV
123 END
  
```

Increment hit counter register

Pass subroutine

Increment pass counter register

Results presentation subroutine

Test for end of run after reviewing results

Target identity feedback subroutine

End of run display subroutine

Subroutine for setting up new run with same number of choices and same run length

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Charles T. Tart (7268)

Hal Puthoff

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Ø1	LBL "ESP"	
Ø2	FIX Ø	
Ø3	Ø	
Ø4	STO ØØ	Initialize data storage registers at Ø
Ø5	STO Ø3	
Ø6	STO Ø4	
Ø7	STO Ø5	
Ø8	"NR MN?"	
Ø9	PROMPT	
1Ø	"NR DY?"	
11	PROMPT	
12	"YEAR?"	Prompt for date (month, day, year) and run (choices, length) data
13	PROMPT	
14	"CHOICES=?"	
15	PROMPT	
16	STO Ø1	
17	"RN LN?"	
18	PROMPT	
19	STO ØØ	
2Ø	LBL Ø4	
21	"TIME=?"	
22	PROMPT	Prompt for current time, transform for PRNG seed value
23	LN	
24	ABS	
25	STO Ø2	
26	LBL Ø5	
27	PI	
28	RCL Ø2	Psuedo-random number generator, fractional output (PRNG)
29	+	
3Ø	5	
31	Y↑X	
32	FRC	
33	STO Ø2	Store new PRNG seed
34	RCL Ø1	
35	*	Scale PRNG output to desired num- ber of choices
36	INT	
37	STO Ø6	
38	"READY"	
39	TONE 6	Prompt user for response
4Ø	TONE 6	
41	PROMPT	
42	X=Y?	
43	GTO Ø6	Test: is response a hit?
44	TONE Ø	Target identity feedback subrou- tine if response was a miss
45	XEQ Ø1	

```

46 LBL Ø7
47 1 Increment trials counter register
48 ST+ Ø3
49 RCL Ø3
50 RCL ØØ
51 X=Y? Test for end of run
52 GTO "RESULTS"
53 GTO Ø5

54 LBL Ø6
55 SF 12
56 BEEP
57 " CORRECT" Hit feedback
58 AVIEW
59 CF 12
60 PSE
61 1
62 ST+ Ø4 Increment hit counter register
63 GTO Ø7

64 LBL "PASS" Pass subroutine
65 XEQ Ø1
66 1
67 ST+ Ø5 Increment pass counter register
68 GTO Ø5

69 LBL "RESULTS"
70 TONE 3
71 TONE 2
72 RCL Ø5
73 "NR PASSES="
74 ARCL X
75 AVIEW
76 PSE
77 PSE
78 RCL Ø4
79 "NR HITS="
80 ARCL X
81 AVIEW
82 PSE
83 PSE
84 RCL Ø3 Results presentation subroutine
85 "NR TRIALS="
86 ARCL X
87 AVIEW
88 PSE
89 PSE
90 RCL Ø4
91 RCL Ø3
92 /
93 1ØØ
94 *
95 "%HITS="
96 ARCL X
97 AVIEW
98 PSE
99 PSE

```

100	CLA	
101	AVIEW	
102	RCL 03	
103	RCL 00	
104	X=Y?	Test for end of run after reviewing results
105	GTO 04	
106	GTO 05	
107	LBL 01	
108	"TARGET WAS "	
109	ARCL 06	Target identity feedback subroutine
110	AVIEW	
111	PSE	
112	RTN	
113	LBL 04	
114	"END OF RUN"	End of run display subroutine
115	AVIEW	
116	STOP	
117	0	
118	STO 03	
119	STO 04	
120	STO 05	Subroutine for setting up new run with same number of choices and same run length
121	GTO 04	
122	ADV	
123	END	