Effects of Immediate Feedback on ESP Performance Over Short Time Periods

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ABSTRACT: One of the authors (C.T.T.) has hypothesized earlier that immediate feedback of results in ESP studies will allow talented percipients to increase their scoring rate. The internal processes involved in gaining conscious control of ESP functioning are like taking "mental snapshots" of internal processes involved in reaching a response decision, storing such mental snapshots in memory along with the feedback knowledge of the success or failure of each response, and then examining these stored data to see which internal events constitute a guide to a useful ESP-guessing strategy. This process involves heavy reliance on memory function; thus we predict that in the initial stages of feedback training, learning to respond more accurately will occur more readily over short, homogeneous time periods. The learning theory application also predicts that the magnitude of this short-term learning will be positively related to pre-training ESP talent level. Both these predictions were significantly confirmed in an analysis of first half versus second half run scores in the first of two training studies, but not in the second, where percipients with much less initial ESP talent were used. The combined results of the two studies support the second prediction.

INTRODUCTION

Some years ago, one of us (Tart, 1966) hypothesized that the provision of immediate feedback in repeated-guessing ESP experiments will stabilize psi performance for many talented percipients and allow some of them, especially the more talented ones, to learn. In a recent expansion of this learning theory application (Tart, 1977), internal psychological factors that might influence the learning process were examined. The learning process was conceived of as being like taking "mental snapshots" of one's internal state just before each ESP response, and eventually, through examination of these "snapshots," discovering experiential factors which correlated with successful ESP performance.

Such a task clearly involves a heavy reliance on memory of internal states associated with each response in order for the comparison to be effective. This poses a considerable burden on memory, especially at the beginning of the learning process, so that a

specific prediction added to the learning theory application was that, for percipients motivated to learn to use ESP and having some initial talent, "the early stages of training will be characterized by learning over short, homogeneous time periods such as the run, with decrements associated with interruptions of training such as breaks between runs or sessions, interpolated activities that interfere with memory consolidation, and the like" (Tart, 1977, p. 405). Interference with the necessary memory processes would generally be least strong during a relatively short, homogeneous period of training such as the uninterrupted single run. This paper presents the initial empirical tests of this prediction.

The data used in testing the prediction were drawn from two major studies of the effects of immediate feedback on ESP performance (Tart, 1975, 1976; Tart, Palmer, and Redington, 1979). Since the detailed procedures followed in these studies are thus already presented elsewhere, only a brief recapitulation of them will be given here.

Method

Both studies of the effects of immediate feedback on ESP performance consisted of three sequential phases: the Selection Study (SS), the Confirmation Study (CS), and the Training Study (TS). Although there were minor differences among these phases, the basic procedures will be considered as essentially the same for our present purposes.

The SS phase consisted of group card-guessing tests carried out on a large scale in classes at the University of California at Davis by (student) experimenters trained by us. Students in the classes who obtained individually significant scores were invited to participate in the second phase, the CS, where they did two runs on a 10-choice ESP training machine[1] with immediate feedback; two runs on a four-choice ESP training machine (the Aquarius Model 1000), also with immediate feedback; and two more runs on whichever of the two machines they preferred to continue working with. Their CS scores determined whether they would be invited to participate in the major phase of the study, the TS, and also served as an approximate measure of their level of ESP talent prior to entering this final phase.

Percipients who went on into the TS carried out 500 trials, in 25-trial runs, on one of the two training machines, the choice being the percipient's. The number of runs within a single experimental

[1] The TCT in the first study; the ADEPT, an improved version of the TCT, in the second study.

session varied from one to five, depending upon whether the experimenter could reserve the laboratory for only an hour or for more than an hour, the speed at which the percipient worked, and his preference. The intervals between sessions were determined by various factors often beyond the experimenters' control, such as when their schedules could match up with the percipients' for a subsequent session, so there was a wide variation in between-sessions intervals. Breaks of variable lengths were often taken between runs within a sessions, but since ordinarily a 25-trial run itself was not interrupted, this was the psychologically homogeneous time period chosen for analysis.

In both TSs, total hit scores per run were automatically recorded on both the TCT and ADEPT, and on the Aquarius. In the first TS, individual trial data (targets and responses) were manually recorded by the experimenters using the TCT, but not recorded at all for the Aquarius. In the second TS, individual trial data were automatically recorded for ADEPT and manually recorded for the Aquarius. While manual recording of individual trial data might allow for occasional errors, we would expect such errors to be random as far as relationships to time are concerned since the experimenters were not aware of any hypotheses about effects within the run.

Results

The First Training Study

In order to test for possible learning within the individual runs, we decided to examine scores in the first 12 trials and the last 12 trials, dropping the thirteenth trial in order to equalize the two units of analysis.

The TCT. The results of this analysis for the 10 percipients using the TCT in the first TS are shown in Table 1. The grand mean across percipients for the first 12 trials is 1.62, which does not differ significantly from the expected mean of 1.25. The mean of the last 12 trials is 1.87, which is significantly above chance (t = 2.66, 9 *df*; $p < .025$, one-tailed).[2] The difference between the two means is significant (t = 2.68, 9 *df*; $p < .025$, one-tailed), indicating a significant increase in scoring from the first to second half of the

[2] Note that in using a t-test here we are examining consistency of effect across percipients, not the presence or absence of ESP *per se*. The excess of hits above chance expectation (which is reflected in the CR given for each percipient individually for total trials) is quite significant in both the first and second halves of the runs, but as hitting was not uniformly distributed across percipients, the variance used in calculating t is very high.

Table 1

FIRST TRAINING STUDY, WITHIN-RUN EFFECTS, TEN-CHOICE TRAINER

Experimenter/ Percipient	N	Overall CR[a]	Trials 1–12	Trials 14–25	Difference (2nd–1st)	Mean TCT CS Score
E1–P3	479	10.98	2.90	3.10	.20	6.00
E1–P5	478	8.11	2.20	2.85	.65*	5.25
E1–P4	480	4.56	1.70	2.20	.50	5.25
E1–P2	479	4.58	1.60	2.30	.70*	6.00
E1–P1	479	3.98	1.85	1.85	.00	4.75
E13–P17	480	1.07	1.25	1.50	.25	—
E5–P14	480	1.07	1.35	1.40	.05	2.50
E2–P7	480	.46	1.20	1.35	.15	5.00
E11–P32	479	−.14	1.10	1.25	.15	—
E4–P11	480	−1.52	1.05	.85	−.20	3.50
		Means:	1.62	1.87	.25	

[a] These CR values are slightly different than those given in the original publications (Tart, 1975, 1976) because of the deletion of hits and changes in N caused by omitting the middle (13th) trial of each run.

* Difference between first and second half scores significant by t-test ($p<.05$).

run across percipients. Table 1 also reveals that eight of the 10 percipients showed increases within the run, and the increases of P2 and P5 were independently significant. This consistency is further documented by a Spearman-Brown split-half reliability of +.96. This figure is a function of the correlation between individual mean scores on the first and the last 12 trials. It indicates that the best scorers in the first half of the run continued to be the best scorers in the second half of the run, and that the scoring increases of individual percipients tended to be similar in magnitude.

Further analyses of the within-run effects were undertaken by computer-aided graphing of the mean hits per trial for the standard 25-trial runs of each percipient. Experimenters occasionally ran a few trials over 25 in a run, especially if a percipient seemed to be doing well, but our standard operating rule, formulated prior to any data analyses and used in all analyses to date of the first TS data, was that no data beyond 25 complete trials would be scored. We continued to follow this rule in the present analyses. In occasional cases of "Passes" or missing data, the data of the next trial were shifted back one trial position to fill in the gap. For example, if there were no data for the 23rd trial of a particular run, the data of the 24th trial were used for the 23rd, those of the 25th for the 24th, etc. If there happened to have been a 26th trial, its data became the 25th, and any further trial data were dropped.

This graphical analysis of trial-by-trial performance indicates that the within-run increases are largely due to rises in ESP hitting near

the end of the runs, as would be expected from the learning theory application. Figure 1 shows the individual performance curves of the five percipients who showed individually significant hitting.[3] The heavy line in each graph is the actual mean hitting performance for each trial, averaged over 20 runs per percipient. The frequently high variability from one trial to the next obscures possible underlying trends, so a moving average of each curve is also plotted as a light line in each graph. The span of the moving average is five.

As the performance curves in Figure 1 show, there is frequent high scoring on the 23rd, 24th, and 25th trials, as well as variability from percipient to percipient. This is clear in the sixth graph, which averages the performance of these five ESP hitters. For these percipients, mean chance expectancy on any given trial is a total of 10 hits, but the 23rd trial shows 21 hits (CR = 3.67), the 24th trial 28 hits (CR = 6.00), and the 25th trial 44 hits (CR = 11.33).[4]

While these results are consistent with those expected from the learning theory application, an alternative approach might partially credit them to some kind of terminal salience effect. This seems unlikely to be terminal salience on the percipients' part, however, because they were not given feedback as to trial number, and it is doubtful that they were mentally keeping close track of it. Further, 14 of the 58 hits on the 25th complete trials were not hits on the *last* trial of the run because one to five additional trials were run by the experimenter/agent (although, as noted above, these additional trials were not counted). Since the significant within-run effects were largely from one experimenter's (E1, Gaines Thomas) percipients, there may have been some terminal salience (telepathically mediated?) on the experimenter's part. Further research would be helpful in disentangling the effects of possible short-term learning from possible terminal salience, perhaps utilizing a procedure in which runs are randomly ended by a decision-making technique outside of both the experimenter's and the percipient's control.

The Aquarius. The Aquarius four-choice trainer was used by 15 percipients, but analysis of within-run effects was not possible because, as mentioned above, only total hit scores per run were recorded on this machine in the first study.

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[3] The curves of the five percipients who did not show individually significant ESP hitting are essentially flat and so are omitted to save space.

[4] This increased performance toward the end of the runs is still quite significant if the data of the five percipients who did not score significantly are added in. Compared to a chance expectancy of 20 hits on any given trial, the 23rd trial shows 28 hits (CR = 1.89), the 24th trial 37 hits (CR = 4.01), and the 25th trial 58 hits (CR = 8.96).

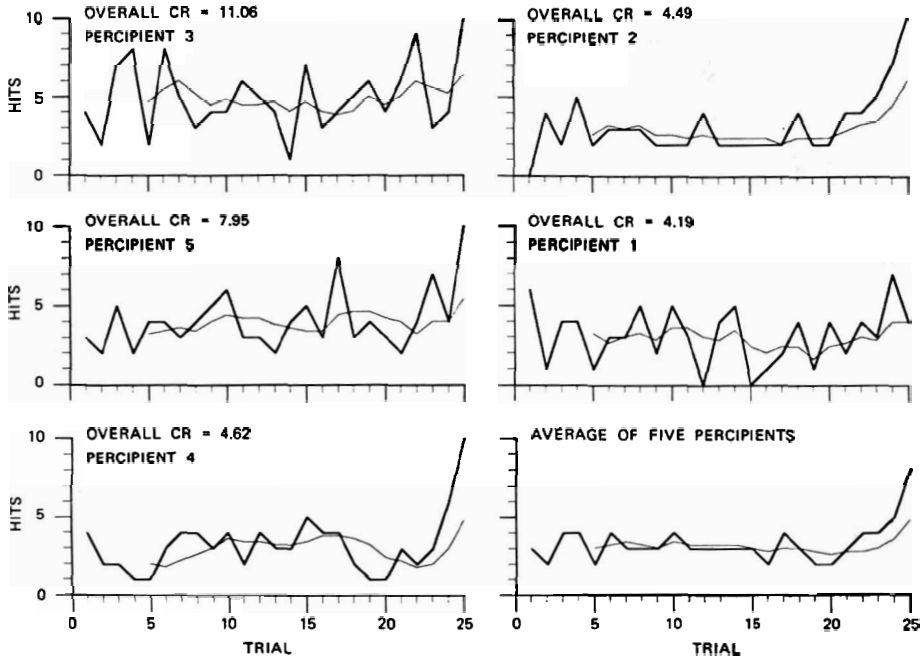

Fig. 1. Mean number of hits per trial for the five ESP-hitting percipients and a summary performance graph for these percipients. The heavy lines are the mean hits per trial averaged over 20 runs per percipient, over 100 runs for the summary performance graph. The light lines are a moving average, span five, of each graph, constructed as follows: (a) plot mean of first five trials at trial five position; (b) drop data from trial one, add data from trial six, plot mean at position six; etc.

The Second Training Study

The ADEPT. Analysis of the data of the seven percipients using ADEPT in the second TS showed no increase in scoring from the first to the second half of the run. The grand means for both the first half (1.29) and the second half (1.24) of the run are close to chance (1.25) and almost identical. The split-half reliability of the run scores was again positive (+.62), indicating some consistency of scoring within the run, but not as much as there was in the first TS. The failure to find evidence of learning within the run in the second TS, while disappointing, is not inconsistent with the theory because it does not predict learning given a relatively low talent level such as that of the percipients in the second TS.

The Aquarius. Individual trial data on the Aquarius were recorded by the experimenters in the second TS, where three percipients completed their training on this machine. They showed first to second half run differences of −.25, +.40, and +.55 respectively; however, this is too small a sample for reliable analysis of gains or losses from the first to the second half of the run.

Initial ESP Talent in Relation to Learning

The original learning theory application (Tart, 1966) predicted that the more initial ESP talent percipients brought to a feedback training procedure, the more they would profit from it; i.e., that there would be a positive correlation between initial ESP talent level (measured here by performance in the CS) and learning. To test this, we originally compared talent level with overall slope (over all 20 runs) of the performance curves in the TSs (for percipients using the 10-choice machines) and found positive results, but the prediction also applies to performance within the psychologically more homogeneous period of the run.

In the first study, despite the low variability of the within-run increase scores in the TS, these scores were positively and significantly correlated with mean scores from the CS ($r = +.65, p < .05$, one-tailed). It is also noteworthy that there was a positive correlation (+.35) between scores on the first half-run and the increase in scoring from the first to the second half-run. Although not significant, this correlation is opposite in direction to the negative correlation one would expect under null conditions because of statistical regression. The data from which these correlations were computed are given above in Table 1.

In the second study, the correlation between individual CS mean scores and within-run increases in the TS was −.33, which is

nonsignificant and in the opposite direction from that predicted. Likewise, the first-half mean run scores and the mean within-run increases were uncorrelated ($r = +.02$). The failure of these correlations to replicate those of the first study again may be attributed to the restricted and much lower range of ESP talent among percipients in the second study. (Data from the three percipients who used the Aquarius were not included in these correlations because of the small sample size.)

Despite the reversal in the second study, the correlation between CS scores and TS within-run increase scores is significantly positive when the results of the two studies are pooled ($r = +.50, p < .05$, one-tailed). This correlation is so high because the grand means of *both* the CS scores and TS increase scores were substantially higher in the first than in the second study, thereby producing a positive between-study correlation. The results of the second study in effect filled out the bottom half of the scatterplot, the top half of which was taken up by the results of the first study. This pattern is illustrated in Figure 2.These results indicate that the most talented percipients, as defined by their performance in the CS, not only showed the most improvement over the 20 runs, as reported elsewhere (Tart, Palmer, and Redington, 1979), but also within the run. As a whole, the findings with the 10-choice machines support the concept of a positive relationship between initial ESP talent level and the effects of feedback.

Discussion

In the extended version of the learning theory application (Tart, 1977), the internal psychological process of learning to use ESP is modeled as one of learning to pick out subtle internal experiences associated with the operation of ESP, keeping track in memory of successes and failures and their associated internal states, and eventually evolving a relevant strategy for optimally "tuning" these internal states. This requires highly skilled and complex introspective processes heavily dependent upon memory. Anything interfering with memory, such as breaks between runs or sessions, would thus be likely to interfere with learning, especially in its earlier stages. To test this prediction, we compared the scoring rate in the first half of the run with that in the second half in the training phase of both studies. In the first study we found that some individual percipients and the percipients as a group showed a statistically significant increase in scoring in the second half of the run. Also as predicted, the degree of this increase was positively and significantly related to the degree of ESP talent brought into the

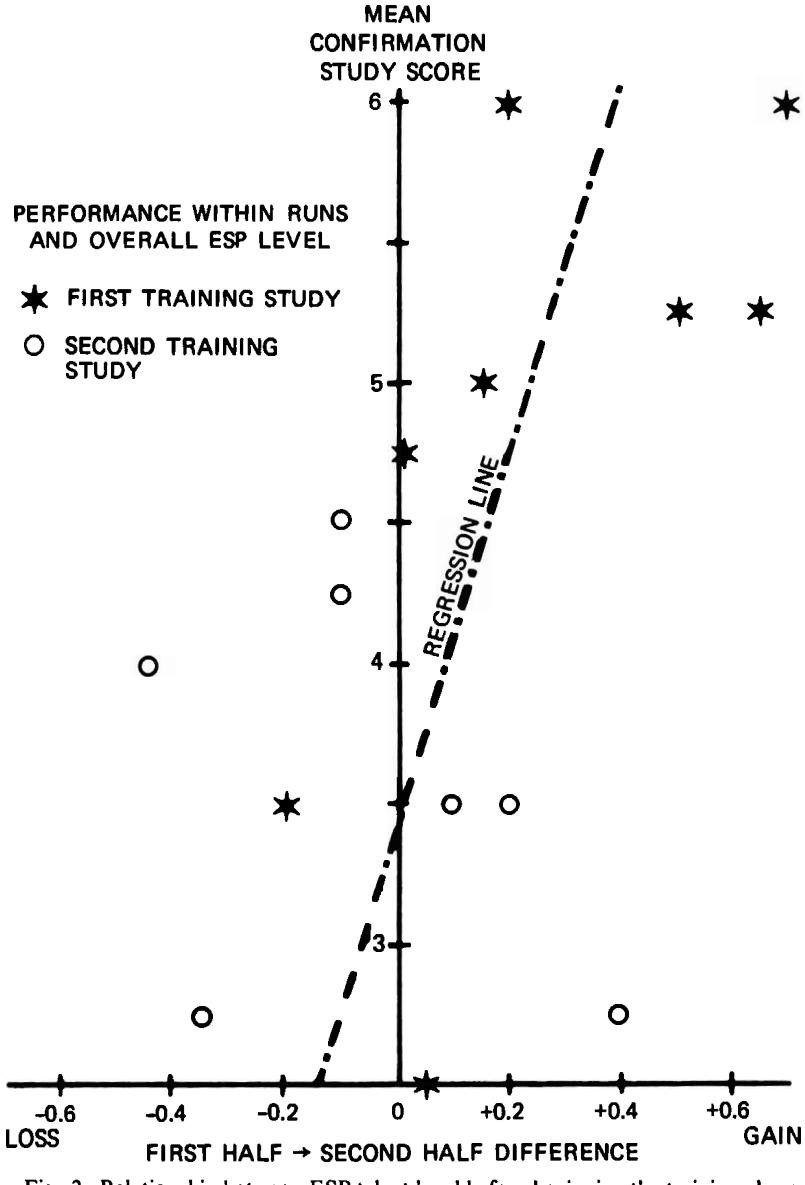

Fig. 2. Relationship between ESP talent level before beginning the training phase (as given by mean hit score in the confirmation phase) and degree of gain or loss in hit rate from first to second halves of the run. Stars indicate data points of percipients from the first training study, circles those of percipients from the second training study. The broken line is the fitted mathematical linear regression line. Only data from the 10-choice machines are included.

training. These results were not independently confirmed in the second study, but the correlation of within-run increase or decrease scores with initial talent was significant for the two studies combined, as shown above in Figure 2.

Figure 2 deserves further study. There is a general trend for percipients who had an initial ESP level where they used ESP approximately 8% of the time or less to show about an equal proportion of gainers and losers in the short-term learning analysis. Above approximately 8% ESP, there tends to be a steady, but mostly inclining ESP performance. This 8% figure matches closely the earlier estimate (Tart, 1975, 1976) of a "psi-coefficient" (Timm, 1973) of .1 (corresponding to 10% ESP) as the talent threshold above which learning should predominate over the extinction inherent in any repeated-guessing task. As discussed elsewhere (Tart, 1966, 1975, 1976, 1977), even with feedback a certain amount of confusion is caused by chance-produced hits, so percipients with only a little ESP ability will probably extinguish eventually.

We are currently carrying out a third study in which we will further examine the relationships discussed above. Insofar as the conceptualization that learning to use ESP relies heavily on memory function is true, it is regrettable that in the first two training studies practical problems encountered in carrying out the work forced long and variable delays between sessions which may have decreased learning. Future research on the effects of feedback on ESP should systematically vary the degree of homogeneity within runs, within sessions, and between sessions to find the optimal parameters for feedback training of ESP performance.

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