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SOME STUDIES OF PSYCHOKINESIS WITH A SPINNING SILVER COIN

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THIS paper will report on three studies of psychokinesis (PK), with a new test apparatus and procedure, and discuss possible advantages of using a spinning silver coin as a PK test object.

BACKGROUND

In the summer of 1957, while Mr Tart (CT) was employed as a research assistant at the Round Table Foundation in Glen Cove, Maine, he assisted in the assessment of the ostensible PK powers of a Mr William Cantor (WC), of Richmond, Virginia. WC claimed to be able significantly to influence to which side a silver dollar, spinning on a table-top, would fall. A number of informal tests with WC had been quite impressive.

The most well-controlled test, carried out just before WC had to leave the Foundation, was performed with an *a priori* agreement that there would be 100 trials (spins of the coin), and that WC would try to influence the coin to fall heads on all of these. No trial was to be counted unless the coin spun for at least five seconds. It was spun by holding it vertically upright between index finger and table-top, and flicking it on edge rapidly with the index finger of the opposite hand. The test was carried out in a small copper shielded room (a Faraday cage) with WC, Dr Andrija Puharich (AP) and CT, sitting around three sides of a small, glass-topped coffee table. WC did not touch the table or the silver dollar used at any time during the test. AP spun the coin, while CT kept a record of the number of trials and the outcome of each trial, with AP checking CT's record of outcomes as it was made. WC was in perfect view at all times, and could not surreptitiously touch the table, blow on the coin, or otherwise influence it in any known, physical manner.

The outcome of this test was 100 heads, the chosen target, in 100 trials. The odds against this happening by chance alone are astronomical.[1]

[1] The precise probability figures can only be approximated here for the following reasons. AP's records of this particular experiment have been misplaced, so the data depend only on CT's memory of the test.

The question of whether a coin can be deliberately biased by tilting it in some fashion before spinning it naturally arises. In observing WC's performance before the test described above, CT was convinced that some such 'trick' lay behind WC's apparent ability to influence the coin. Try as he might, CT could find no way to trick the coin. WC watched CT's attempts to do this, and his mounting frustration, for over an hour, and then 'confided' to CT that one had to tilt the coin away from the side one wanted to come up before spinning it. Elated that he knew the trick, CT found that he could then get about 75 per cent of whichever side he chose for the next ten minutes. Then he suddenly realised that the physics of the situation was such that, given a hard spin, the coin would always straighten up perfectly, no matter how it had been tilted at first. His new-found PK ability vanished immediately and the coin went back to being a 50–50 coin! WC then admitted to CT that he used this psychological trick on many people to bring out their latent PK abilities!

THEORETICAL ADVANTAGES OF COIN SPINNING TESTS OF PK

Psychologically, attempting to exercise PK on a spinning silver dollar is attractive for a variety of reasons. The shiny silver dollar, spinning against a dark background, tends to be visually captivating. Indeed, it acts as a sort of miniature strobe light as it spins. While spinning, it takes on a rather ethereal appearance, which can suggest the use of PK abilities not normally employed by the subject.

As the silver dollar starts to lose momentum and slow down, there is a 'lazy' wobbling effect (precession) before it is ready to fall, and this feels like a particularly opportune time to attempt to 'push' with one's mind. There is a whirring sound as the coin spins which further captivates the attention. Further, the overt and covert psychological symbolism of money and gambling can further intrigue the subject.

CT recalls clearly that his mother (visiting at that time) was given the silver dollar used in the experiment and conducted several hundred trials for coin bias, trials that showed the bias of the coin to be about ·55 in favour of heads, rather than a perfect ·50. Some data published by AP, however, indicate that the bias may have been as high as ·72 (Puharich, 1962, p. 269). Using the latter figure as the more conservative estimate of bias, the performance of 100 heads in 100 trials is still exceptionally significant, the critical ratio (unit normal deviation) being greater than 6·2, and the associated probability figure being less than about 10^{-9}.

On a more theoretical level, it is easy to conceptualize the subject's PK task as requiring only a single 'push' as the coin reaches its 'lazy' state and is ready to fall. This seems much simpler than a test in which one tries to make certain faces of a die come up, for here, as will be analysed elsewhere (Tart, 1966a) one must clairvoyantly perceive the linear and rotational velocities of the falling die in all three spatial dimensions and (nonconsciously) do some fantastically rapid mental calculations as to just *how hard* to push just *where* just *when* in order to *interact* properly with the table surface to produce the right outcome.

Further, according to a theory developed elsewhere (Tart, 1966b), if any subject has a fair amount of PK to begin with, the spinning coin test, by virtue of giving immediate feedback of results, should allow learning to take place rather than extinction. In the studies describes in this paper, however, subjects were not prescreened for PK ability or run long enough to look for a learning effect.

The present paper describes an apparatus to spin automatically a silver dollar, totally eliminating chances of manual biasing, which could be modified to handle other sorts of coins; and presents the results of the first experiments done with this apparatus.

COIN SPINNING APPARATUS

Figure 1 (overleaf) presents a diagrammatic view of the coin spinning apparatus, and Figure 2 is a photograph of an experimenter (left) and subject using the device. It may best be described by noting the actual sequence of use operations.[1]

At the end of a trial, the coin comes to rest on the table. The table is round, approximately two feet in diameter and formed of black formica to increase the contrast between the shiny coin and the dull table-top. The table-top is dished down very slightly in the centre to reduce the possibilities that the spinning coin will go off the edge of the table.

The experimenter picks up the coin from where it has fallen. He wears a glove to keep the oil from his fingerprints from smudging the table. The coin is inserted vertically into the top of a slightly inclined chute. This point is marked 'coin insertion point' in Figure 1. The coin cannot roll down yet, because a small arm from a solenoid blocks its path.

[1] I wish to thank the late Mrs Eileen J. Garrett, President of the Parapsychological Foundation, for general grant support which helped to make the construction of this apparatus feasible.

At the time of the next trial, the experimenter presses the trigger switch. This switch is connected to the apparatus by a long, flexible cord, so that he cannot accidentally exert any force on the apparatus by pulling the cord. This trigger switch also has a pneumatic time delay built into it, such that it is always electrically closed for a half second, regardless of how rapidly the experimenter closes or releases it.

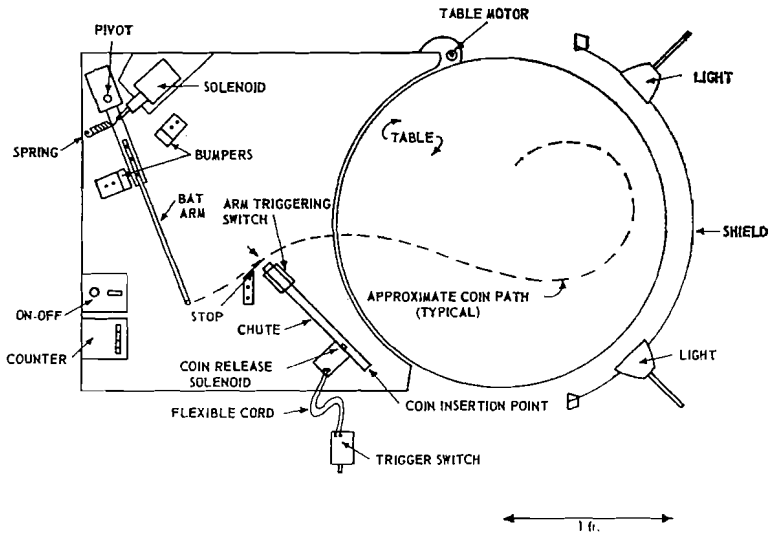

FIG. 1

As the trigger switch is depressed, the arm blocking the coin is pulled back by the coin release solenoid, and the coin rolls down the chute. Immediately after the coin rolls out of the chute, the upper edge of the coin strikes the bat arm-triggering switch. This is a microswitch with a roller-arm on it, and it takes very little pressure from the coin to activate it. A stop immediately behind the switch holds the coin in position.

As the bat-triggering switch is activated, a large solenoid swings the bat-arm. This is a long metal arm with a neoprene tip. It swings forward rapidly and the tip hits the leading edge of the coin, spinning it rapidly, and it spins out onto the table. This releases the bat-triggering switch, and a spring returns the bat to its inactive position. Large rubber bumpers absorb both the firing and return momentum of the bat.

A counter is connected to the coin-release solenoid, and indicates that a trial has occurred.

FIG. 2

The round table rotates very slowly (about one revolution per hour) by means of a roller and motor at its edge. This was designed to prevent uneven table wear that might affect the operation of the coin.

Two small, high intensity lamps illuminate the spinning coin from the right-hand side of the machine. The subject sits or stands between these two lamps. A shield, about four inches higher than the top of the round table and extending to the floor, is between the subject and the apparatus. This shield is supported directly by the floor and has no physical connection with the apparatus. The subject is told not to touch the shield; but if he does accidentally bump it he will still not physically affect the apparatus.

The entire apparatus is shock-mounted, to eliminate vibrations transmitted through the floor, in the following way. A large automobile tyre is laid flat on the floor, a piece of plywood is on top of it and several concrete blocks are placed on it. Then another automobile tyre is placed on top of that, and the apparatus is on top of this. This inexpensive method of shock-mounting is extremely effective in eliminating vibration and movement transfer.[1] Some lead bricks are slid back and forth on the underside of the apparatus proper to level it; they also add additional mass on top of the tyres for further isolation from floor-transmitted shocks.

The subject also holds a clear plastic deflecting mask over his nose and mouth, as shown in Figure 2. This allows him full physical view of the spinning coin, with no intervening materials, but prevents any kind of effects due to the exhalation of the breath. During experiments, the coin was never fired unless the subject was holding the mask over his mouth and nose.

The solenoid which fires the bat is powered through a variable transformer, rectifier, and large filter capacitors. With the proper setting of the transformer, the bat will reliably spin the coin for at least ten seconds every time, but not spin it so hard that the coin tends to go off the far edge of the rotating table.

In summary, there is no human intervention in the spinning of the coin, except for the experimenter needing to pick the coin up from the table and re-insert it in the chute.

[1] I wish to thank Russel Targ, of Sylvania Research Laboratories, Mountain View, California, who devised this exceptionally effective shock mounting system for his research with lasers.

SELECTING AN UNBIASED COIN

Bias will be here used to mean any significant departure from a 50–50 distribution of heads and tails, resulting from the combined action of a given coin and/or the mechanics of the apparatus. It was necessary to find at least one silver dollar which did not show any significant bias for the present studies.

Eight silver dollars were tested for bias. All were in fairly new condition, albeit not mint condition. Five were 1922 silver dollars (the tails side shows an eagle with folded wings) and three were 1921 silver dollars (the eagle on the tails side has spread wings).

Each coin was spun in the apparatus 100 times. Mr Boisen (MB) conducted all these bias trials. He sat alone with the apparatus, reading a book that was of sufficient interest to keep his mind off the coin. To start, MB inserted a given coin, heads facing to the rear of the slot, pushed the trigger switch, and returned to reading. When he became passively aware of lack of sound from the coin spinning, he finished the paragraph he was reading, recorded the outcome, and repeated the sequence. During bias testing and later experiments, the determination of which part of the coin was to be at the top for inserting it in the apparatus was always done by selecting the edge nearest to the experimenter as he reached straight across the table to pick it up.

Using the normal approximation to the binomial distribution, the standard deviation for 100 trials is five, so any coin which showed more than 55 or less than 45 heads in 100 trials was eliminated as possibly biased. Three 1922 coins and one 1921 coin were unbiased by this criterion. However, visual inspection of the *spinning* coins indicated that, while it was relatively easy to clearly see the heads side of all coins, the tails side of the 1922 coins was difficult to distinguish. All further studies were done with the remaining 1921 silver dollar. It had shown 52 heads in the 100 bias trials.

In addition to these procedures to eliminate bias mechanically, both heads and tails were used as target faces an equal number of times in all actual experiments, as a further control.

EXPERIMENT NUMBER ONE

The experimenter for Experiment Number One was MB.

Subject Selection

MB and CT decided, before beginning the experiment, that 20 subjects would be run with 60 trials each.

A few subjects were obtained by means of an advertisement on a bulletin board or an advertisement in the student newspaper, but most were obtained by personal contact with the experimenter. All subjects were involved in some way with the University of California, whether working staff, teaching staff, or students.

The experimenter asked each prospective subject whether he believed in such things as PK and whether he believed that he might be able to demonstrate PK himself, regardless of whether he had ever done so before. Only subjects answering yes to both questions were used. Eleven males and nine females were selected by this procedure, ranging in age from 18 to 33.

Instructions to Subjects

The subjects, run individually, were told that the purpose of the experiment was to see if they could mentally influence the fall of the spinning silver dollar. This influence was to occur in a sequence determined by one of eight predetermined schedules to be drawn blindly from an envelope by the subject. The schedules had runs (single face targets) of at least ten in a row to allow the subject to build up 'psychological momentum'. The experimenter announced the end of each sequence of ten trials, in case the subject did not happen to check the digital counter.

The subject was told that if any coin misfired in the machine, or spun off the table, that trial would be repeated. This never happened throughout Experiment Number One.

The subject was also told that a prize of ten dollars was available if he should get 50 hits out of the 60 trials.

The subject was told that he could sit, stand or whatever, as long as he remained within the 90 degree area between the lights (see Figure 1) and held up the breath mask. The breath mask served as a signal device: if the subject wanted to pause during the trials, he could merely lower the mask and the experimenter would cease firing the coin until the subject again raised it.

The experimenter also said he would not initiate any conversation during the trials, but would respond if the subject wanted to talk.

The platform was wiped clean of dust, the room lights were turned off, a few practice trials were run (but not counted), and the experiment was begun. The experiment lasted from 40 to 60 minutes, and the subject had the option of taking a few minutes break when 30 of the 60 trials were completed. The subject gave the experimenter his schedule at the end, and an immediate check was made to see how many hits were scored.

Controlling for Experimenter Effects

In order to control for possible systematic recording errors on the experimenter's part, the subject blindly drew one of eight possible schedules from an envelope, without the experimenter knowing which schedule had been drawn. Thus any errors of recording on the experimenter's part would be random with respect to the chosen target phase.

It has been pointed out elsewhere (Tart, in preparation) that once one accepts the possibility of ESP, one must abandon the classical model of the experimenter being detached from or independent of the experimental process. It was thus conceivable that the experimenter's own PK abilities might have affected the outcome of this experiment. This was the reason why MB read a book while conducting the bias trials: he would not *consciously* develop expectations about outcomes that would be met by nonconscious PK intervention.

In the actual experiment, the experimenter could not know what the target of the subject's schedule was, on any given trial, unless he (nonconsciously) used clairvoyant or telepathic abilities himself and so could not affect results unless he then used his PK abilities to influence the spinning coin. This complex action may or may not be 'unlikely', but will be assumed unlikely here.

Results

For all 20 subjects there were 1200 trials, and we would expect 600 hits by chance. Six hundred and nineteen hits were observed. Using the normal approximation to the binomial distribution, the standard deviation is 17·32, and this result is not significant (CR = 1·096, $p = \cdot 14$, one-tailed).

Using the standard technique to assess a decline in the result (Humphrey, 1953), we find that there were 328 hits in the first 30 trials and 291 hits in the second 30 trials. This difference is significant (CR = 2·14, $p = \cdot 02$, one-tailed).

Looking at the results of individual subjects, one subject made 39 hits ($p = \cdot 008$, one-tailed), and two subjects made 36 hits each ($p = \cdot 05$, one-tailed). Two of these people, husband and wife, were personal acquaintances of the experimenter, and the third person (who scored 39) was a young lady who was employed part-time by CT.

EXPERIMENT NUMBER TWO

The experimenter for this study was Mr Lopez (VL). Subjects were tested in the fall of 1969.

This study was identical in procedure to Experiment Number One except for four major details. First, the second question asked of potential subjects was 'Would you be willing to test your PK powers by trying to influence a spinning coin?' This is somewhat different from asking whether subject thought he *could influence the coin*. Second, 30 trials were done by each of 15 subjects, rather than 60 trials each by 20 subjects, as 60 trials at one sitting was too fatiguing. Third, there were ten schedules that the subject might draw from, rather than eight. Fourth, and perhaps most important, the apparatus had to be moved into a different room for this and Experiment Number Three, due to changes in room assignments. This new room was considerably more barren and unpleasant than the original room, and there were also more distractions from people passing by in the hallway and noises from a parking lot right outside a large glaring window. Both the experimenters and some subjects in this and the third experiment complained about these features of the room.

Results

In this study there were 229 hits for 450 trials, where chance expectation is 225. This is not significantly different from chance. No individual subject scored significantly above chance, although one subject almost scored significantly below chance (10 hits, CR = 1·83, $p = \cdot 07$, two-tailed). Looking for decline effects, there were 115 hits in the first half of the trials and 114 in the second half, a nonsignificant effect.

EXPERIMENT NUMBER THREE

The experimenter for the study was Mr Maddock (RM). This study was also carried out in the fall of 1969.

This study also used 15 subjects for 30 trials each, but the questions used for selecting subjects were the same as those in Experiment Number One. Otherwise the procedure was identical to that used in Experiment Number Two.

For the 450 trials, there were 206 hits, less than the 225 which would be expected by chance but not significantly so (CR = 1·79, $p = \cdot 07$, two-tailed). As in Experiment Number Two, no individual subject scored significantly above chance, and one subject almost scored significantly below chance (10 hits, CR = 1·83, $p = \cdot 07$, two-tailed).

A decline effect similar to that of Experiment Number One was found, with 109 hits in the first half of the trials and 97 hits in the second half of the trials. The effect does not reach an acceptable level of statistical significance, however (CR = 1·13, $p = \cdot 13$, one-tailed).

COMBINED RESULTS

Combining the results of all three experiments, we find that there were 1054 hits when 1050 would be expected by chance, an insignificant result. Looking at the overall decline effect, there were 552 hits in the first halves[1] of the three experiments and 502 hits in the second halves, a significant difference (CR=2·182, p=·01).

GENERAL DISCUSSION AND CONCLUSIONS

The most rewarding study of the series was Experiment Number One, with a statistically significant decline effect and three individual subjects reaching significant levels of scoring.

Experiments Two and Three were not statistically significant, although the decline effect of Experiment Number One was almost significantly replicated in Experiment Number Three, and the overall decline effect is significant.

The differences between the three experiments may have resulted from three factors. First, in Experiment Number One, MB was not only the experimenter, he had actually constructed the apparatus in conjunction with CT, and thus had much more psychological investment in making it work well than either VL or RM, who simply used the apparatus. Second, the more unpleasant experimental environment in the second and third experiments may have made it more difficult for subjects to concentrate effectively. Third, the longer sessions in Experiment Number One (60 trials rather than 30) were clearly much more fatiguing to the subjects (by their own report), so reducing this fatigue in the later experiments may have reduced the decline effect.

It was clear that the task of influencing a spinning silver coin did indeed captivate subjects. Many of them volunteered the information that they were personally convinced that they had paranormally influenced the coin on some trials because they observed erratic motions of the spinning coin that correlated with their mental effort, especially during the 'lazy' phase of the spin just before the fall.

Many subjects would have been glad to come back for further

[1] Because the halves of the three experiments were not of the same length (30 trials for Experiment Number One, 15 for Experiments Two and Three), it is not quite psychologically legitimate to combine them, even if it is statistically legitimate, because of very real differences in the amount of fatigue experienced.

experimentation, although time limitations in the three planned experiments did not allow for this.

Although the immediate feedback from seeing erratic behaviour of the coin and/or seeing how the coin falls should allow for learning to use PK in *talented* subjects, as discussed elsewhere (Tart, 1966, in preparation), the sessions in these studies were far too short to expect any such learning effects. This could be a very profitable line of research in future PK work.

Reports of subjects indicated a further improvement that could be made to the apparatus. The tail side of the coin turned out to be harder to distinguish when it was spinning than the heads side. Possibly a type of coin with more discernable faces could be used, and/or improvement in the apparatus lighting would make them more discernible. Stroboscopic lighting offers interesting possibilities here.

These are encouraging results with normal subjects, and further research is warranted along these lines.

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