

DOES PRECOGNITION FORESEE THE FUTURE? A POSTAL EXPERIMENT TO ASSESS THE POSSIBILITY OF TRUE PRECOGNITION

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ABSTRACT: There has been a long-standing controversy in parapsychology as to whether true precognition is possible. A number of people have argued that what appears to be precognitively gained information could be due to real-time psi alternatives instead (see e.g., Morris, 1982; Griffin, 1993). The experiment reported here tried to rule out real-time alternatives to precognitive ESP by using stock-market figures to determine the precognitive target. It was conducted as a free-response precognition study. Each participant completed two trials. Unknown to participants, one trial was in the "clairvoyance" condition. Here, the target had already been selected by computer at the time of their guess, but nobody knew which item the computer had selected. The other trial was a "precognition" one. For this condition an algorithm was used on a specific stock's closing price and world city's temperature on a prespecified future date to determine the target. Here it is unlikely that the participant could correctly guess the target by any means other than true precognition. Overall results were at chance, $N = 149$, $p = .22$. Using the sum of ranks (SOR), the clairvoyance condition revealed that participants ranked the target significantly more favorably than the other pictures, $N = 74$, $SOR = 168$, $p = .04$, whereas results in the precognition condition were at chance, $N = 75$, $SOR = 194.5$, $p = .5$. The difference between the two conditions was significant, $N = 71$, $t = -2.03$, $p = .03$. Overall, the results appear to indicate that true precognition may not be possible.

There has been a long-standing controversy in parapsychology as to whether true precognition is possible. A number of people have argued that what appears to be precognitively gained information could be due to real-time psi alternatives instead (see e.g., Morris, 1982; Griffin, 1993). For example, a person who foresees a plane crash may not have looked directly into the future at all. Instead, the so-called precognizer may have clairvoyantly seen a fault in the plane, unconsciously calculated when the fault would manifest itself, and the shocking answer to these thoughts

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may have resulted in the person having the apparent premonition of the crash (see e.g., Mundle, 1978). Others argue that people may simply cause what they foresee to come true by using their PK (e.g., Tanagras, 1949; Eisenbud, 1982)—in the example above, then, the person would apparently foresee a plane crash, but in truth he or she would make the plane malfunction by using PK in order to make the prediction come true.

Although spontaneous cases of precognition are notoriously hard to assess—whether in terms of their veridicality or in terms of the underlying process involved—one might expect experimental tests of precognition to be easier to assess. Nevertheless, it is rarely the case that precognition experiments successfully rule out real-time alternatives. Indeed, Morris (1982) describes a number of ways in which experiments putatively testing for precognition may still allow real-time psi alternatives to play a role in producing the experimental results. For instance, he notes that if the precognitive target is to be decided by later performing a determinate set of calculations with predetermined numbers, and then cutting an existing pack of cards according to the outcome of that calculation, the participant could use real-time ESP rather than precognition to guess the target correctly. That is, the participant could know clairvoyantly which numbers to calculate to discover which card would later be selected and then psychically look at the appropriate place in the deck of cards. Alternatively, if the future target is determined by the outcome of a physical system of some kind, Morris argues, participants can always later use PK to make the target conform to their choice. Thus, if temperature figures in a particular city on a future date are used to select the target, participants could use PK on the temperature in that city in the time between their guess and the time the target is chosen in order to make the temperature conform to their choice. Lastly, Morris takes the example of target selection in which the experimenter, though ostensibly blind to the participant's guess, makes some kind of decision in order to determine the precognitive target. Morris takes as illustration an experiment in which the experimenter randomly chooses a telephone number in a telephone book and uses the last digit of that number in order to determine what the precognitive target will be. Here, the experimenter could use real-time psi to discover what item in the pool the participant had chosen and then psychically select an accordingly advantageous place in the telephone book.

The difficulty in determining what form of psi is operating in any given experiment was recognized early on in psi research. Rhine, Smith and Woodruff's (1938) "psychic shuffle" experiment was a turning point in developing the testing methodology for precognition. In a preliminary experiment (Rhine, 1938) participants were asked to predict the order in which a deck of ESP cards would be after it had been shuffled (participants made their guesses before anyone shuffled the deck). The results from this study were significant, but Rhine recognized that

the ESP act might enter in at the time of shuffling the cards. Rhine et al.'s, (1938) "psychic shuffle" experiment was then conducted, and it did indeed reveal that a person could shuffle a deck of cards to match a series of pre-existing guesses or another pack of cards more closely than would be expected by chance. Thus, the ESP act could come about at the time of shuffling the cards and not at the time of the participants' initial guesses.

Subsequent to this finding experimenters used mechanical card shufflers with a predetermined number of turns to rule out the use of real-time ESP in precognition experiments, although a PK effect by the person using the shuffler was still theoretically possible.

Precognition methodology was further refined in 1955 when Mangan developed a complex procedure to determine the future entry point into a random number table and Morris (1982) reports having used the following procedure, typical of Mangan-type methods of target selection:

... take a 12-sided die (10 faces plus two rounded ends) and throw it 12 times, thus producing 4 three-digit numbers; multiply these 4 sets of numbers together; multiply that product by itself backwards; take the last 10 numbers on the right of the result and extract the square root to 6 digits; convert the first digit to 1 or 0 and the fifth to 1 or 5 on an odd-even basis; use the resultant six-digit number to enter a random number table; and use the numbers following the entry point to determine the precognitive target order, using a standard conversion formula (e.g., 1 and 6 equals circle, 2 and 7 equals cross, and so on). (p. 327)

Here, then, if an experimenter used his or her PK on the die to make it conform to the participant's guess, the experimenter will have to work back through a very complex set of calculations to arrive at an advantageous die-throw. As a result, the use of real-time psi in such instances appears to be rather implausible.

Morris (1982) reviewed 27 studies using a Mangan-type entry point selection method. He found that seven of them produced significant results and fifteen produced significant prehypoththesized internal effects. Morris's (1982) finding was further upheld by Honorton and Ferrari's (1989) meta-analysis of forced-choice precognition experiments which indicated that studies using Mangan's complex calculation procedure did not fare significantly worse than studies using simpler procedures to determine the future entry point, $N=46$, $p=.37$, two-tailed. These results suggest that true precognition may indeed be possible. A further meta-analysis by Steinkamp, Milton and Morris (1998) revealed little difference between clairvoyance and precognition effect sizes in forced-choice experiments designed to compare the two procedures. This meta-analysis thus also seemed to support the true precognition hypothesis, for if so-called precognition is due to real-time psi, the extra

calculational steps necessary for success in the precognition studies should normally introduce an additional source of potential error (and should thus decrease the mean precognition effect size accordingly). The effect sizes indicated, however, that additional sources of error did not appear to be present.

Nevertheless, Morris (1968) tested a participant who could successfully call out numbers that would eventually produce an advantageous entry point using the Mangan-type procedure cited above. This finding indicates that calculations might actually pose no problem for real-time psi. If the operation of psi also includes the capacity to undertake apparently infallible deductive reasoning, and similar deductive abilities have been ascribed to some of those with autism (Happe, 1994), then the use of real-time psi in precognition studies may be possible after all. It thus remains an open question as to whether the findings from the reviews in the paragraph above suggest that true precognition is possible or whether they all just indicate that additional calculational steps are absolutely no hindrance to real-time psi.

Morris (1982) noted that a number of experiments using stockmarket figures to determine the precognitive target have produced nonsignificant results. Because stock market figures are of huge financial interest and importance to a large number of people, it is unlikely that an experimenter or participant manipulation of the stock market through PK could be responsible for the selection of a favorable target. Other people would have far greater incentive to use their PK for this purpose. Moreover, stock market figures are very unpredictable—at least in part because of the very large number of human decisions involved every second. Real-time ESP and deduction is therefore similarly unlikely to be possible in this situation. The implication of these results is that true precognition may not be possible after all, because only when the calculational step is purely deductive (albeit complex) do findings generally appear to be significant. When experiments use more chaotic systems to determine the precognitive entry point—such as human decisions—results appear to be less impressive.

In sum, despite the many years of psi research, there is still no clear-cut answer to the question of whether true precognition is possible. The experiment presented in this paper aimed to address this question.

THE EXPERIMENT

Basic Outline

This study used a free-response methodology and it was conducted through the post. Participants had to gain some kind of imagery about a

picture they would later receive through the mail. They then had to rate the four target possibilities (i.e., pictures) that I had sent them, to indicate which of the four pictures most closely matched their mentation. Participants mailed the ratings back to me in a prepaid envelope. The picture they rated highest would be the one they thought I would later return to them through the post. Full procedural details are given below.

The Participants

All participants had previously taken part in a survey of precognitive experiences conducted by the author (Steinkamp, *submitted*) in which they had indicated that they would be interested in taking part in a postal experiment. Therefore, all participants had previously had written contact with the experimenter, and they all believed that they had had a precognitive experience at least once in their life. It can be assumed, therefore, that the participants believed that precognition was possible. It was hoped that because of prior communications with the experimenter, participants would feel some sort of connection to the experimenter that may normally be missing in other postal experiments. Moreover, because the experiment followed the questionnaire research, it was hoped that participants would feel more of an active and ongoing involvement in this experiment.

The Target Pool

The targets were postcard-sized pictures mounted on gray cardboard and had been used successfully in previous experiments (e.g., Delanoy, Morris, Watt, & Wiseman, 1993). The postcards varied in theme and included pictures of people, cartoons, pictures of animals, landscapes, cityscapes, sculptures, advertisements, and postcards of abstract or realistic art. They could either be in color or black and white. The target pool comprised 304 such pictures divided into 76 sets of four pictures each. The pictures were reused as necessary.

Each picture had a random number between 0001 and 4999 on the back for reference.

The Experimental Conditions

The experiment had two conditions. For ease of reference I shall call one the "clairvoyance" condition and the other the "precognition" condition. The difference between the two conditions lay in their method of target selection.

Clairvoyance Condition. Before sending out the pictures to participants, a target number (1-4) was randomly selected by computer and directly stored in a file on the hard disk by the computer. This number referred to the lowest numbered picture in that participant's target pool. For instance, if a participant had picture numbers 0178, 2139, 0039 and 2009 and the

computer had selected the number 3, the target would be the third-lowest number of that set—i.e., the target would be picture number 2009. The experimenter did not know which number the computer had selected. For this condition the participant could theoretically use real-time ESP and calculation to guess correctly which picture was the target (e.g., by clairvoyantly seeing which number the computer had selected, knowing through telepathy the method of using that number to determine the target and then making the appropriate deduction). Alternatively, the participant could make a correct guess by foreseeing their future feedback. That is, although this condition is referred to as the “clairvoyance” condition, it does not rule out the use of true precognition.

Precognition Condition. Prior to sending the pictures to the participant, the computer randomly selected two numbers between 1-25 and immediately stored them on the hard disk. The first number referred to a world city in the list of world city temperatures in *The Times* on a prespecified future date, and the second number referred to a specific stock in the list of the top performing stocks in *The Financial Times* on that same prespecified future date. The date was prespecified as being a minimum of two days after the postmark on the envelope containing the participant's ratings. If the envelope arrived sooner than two days from the participant's posting of it, the envelope was retained, unopened, until those two days had passed. If the envelope arrived more than two days after the participant posted it, the prespecified date was the date of the envelope's arrival. Because stock market figures were not available on Mondays, any envelopes arriving at the weekend or on Mondays necessarily had to be retained until Tuesday and Tuesday was understood to be the prespecified future date.

When the prespecified future date arrived, the experimenter looked up the relevant temperature and stock market figures. Thus, if the experimenter found that the computer had chosen the numbers 4 and 18, the experimenter looked up the fourth world city temperature (°F) listed in *The Times* that day and the closing price of the eighteenth of the top stocks listed in *The Financial Times*. It was prespecified that stock market figures would be rounded up or down as appropriate (thus, a closing price of 885.5 would be taken to be 886). If a temperature figure was listed as unavailable in the newspaper, only the stock market figure was taken. The temperature and stock market figures were then multiplied together and divided by four until a target between 1-4 could be gained. Thus, if the multiplication and division procedure resulted in a number between 1-1.99, the target was 1; if it resulted in a number between 2-2.99, the target was 2, and so on up to 4.99. The resulting target number determined which picture the target was.

It was thought that any positive results from this condition would have to be by precognition. The participant would not be able to use real-time psi and/or calculation because of the difficulties in influencing

and/or predicting stock market figures noted above. The experimenter would have more of an opportunity to use real-time psi than the participant would, but even here it is extremely unlikely. The participant was given the freedom to do the trial when he or she liked, so the experimenter did not know when the participant had sent back the test materials. Moreover, two different newspapers were used to make the possibility of a PK influence on the figures printed more difficult (because two sets of data would have to be influenced by PK). Moreover, if two participants had the same temperature or stock market figure, it would be difficult for the experimenter to exercise any PK influence on the printed data in the newspapers, because each participant may have needed a different temperature/stock market figure.

Additionally, all test materials were deliberately returned by second-class post—unless the participant upgraded it voluntarily to first-class post without the experimenter's knowledge (as some did). First-class post in the UK gets postal priority and generally arrives the next working day. Second-class post has a lower priority, costs slightly less, and mail arrives within 2-4 working days. Thus, even in the unlikely event that the experimenter could influence the whole range of postal systems to ensure that the materials arrived on a beneficial date, it is doubtful how profitable such a strategy would be if recourse to precognition is not possible. By psychically delaying the arrival of the material by a day or (at most) two days, the outcome of the trial may in fact still be no better. If the experimenter used PK on the printed figures and on the postal systems throughout the UK, one would have to wonder why such a dramatic influence would be possible in an experiment testing for precognition and not in any known PK experiment to date. Moreover, the problems above regarding the use of PK on the published temperature and stock market figures would be relevant here too.

Consequently, it was thought that for this condition of the experiment any positive results would yield strong evidence in favor of the possibility of true precognition.

PROCEDURE

The number of participants prespecified for the experiment was the number of questionnaire participants who had previously expressed an interest in taking part in a postal experiment. All these people were asked to return a form indicating whether they had any preference as to when they would like to receive the test materials (they had eight two-week periods between July-December 1998 from which to choose). All participants were sent such a form only once and only those who returned this form were allowed to take part in the experiment. If participants failed to

return their test materials they were standardly sent two reminder letters. After two reminder letters, participants were simply asked to return the materials and not to take part in the experiment. Participants were told the experiment would end on December 6th; formally the experimental procedure was such that if participants returned trials postmarked no later than December 13th, they were included.

Participants were asked to do two trials. They were sent the test materials for both trials at the same time. It was hoped that this would prevent the results being biased by participants making a decision about whether to proceed to the second trial depending on their results from the first one. The test materials included two sets of four target pictures. Each set of pictures was in a separate opaque, sealed brown envelope; one set was marked A and the other B in large, fluorescent pink lettering on the outside of the envelope. Unknown to the participants, each set of pictures belonged to a different condition—one was a set for the clairvoyance condition and the other set was for the precognition condition. The envelopes (and hence conditions) were counterbalanced across participants using an ABBA design, and participants were instructed always to do envelope A first. The pictures were not placed in any particular order in the envelopes, as the experimenter did not know which one would be the target and would not know the order in which the participant would see the pictures anyway. As a further experimental precaution, the room in which the computer that held the target number (clairvoyance condition) and stock market and temperature entry points (precognition condition) resided was locked whenever the experimenter was away to prevent anyone getting the information at other times. Again, the experimenter did not know what these numbers/entry points were for any given trial.

Along with the two sealed envelopes, A and B, was a letter explaining to participants how they should do the experiment. Participants were told that their aim was to gain some impressions about a picture that the experimenter would send them through the post the following week. They were informed that the picture the experimenter would send them would be one of the four pictures in envelope A but that they should not open envelope A until they had first got some idea of what picture the experimenter would later send them.

Participants gained impressions by whatever method they liked. The letter suggested they could either sit quietly in a corner and let thoughts come to them, they could draw pictures about the impressions they had, or they could try to dream about what the picture would be.

Once they had received some ideas about what picture the experimenter would send them, participants opened envelope A and compared the impressions they had to each picture in that envelope. They then wrote down how their impressions corresponded to each of the four pictures on the first side of the Experiment Information Form included in their test

materials. On the reverse side of the form, they rated each picture in envelope A from 1-99 as to how much it corresponded to what they thought the picture would be like that the experimenter would send to them. A rating of 1 meant that there was no correspondence between their impressions and the picture, and a rating of 99 indicated a perfect correspondence between their impressions and the picture. They were asked to note the day and time of the trial and to indicate how they had gained their impressions (by dreams, waking impressions, drawings, etc.).

The procedure was exactly the same for envelope B, but participants were asked to leave at least a day between doing envelope A and envelope B. Although participants could have opened the envelopes before doing their mentation, this would not have helped them to guess correctly which picture would be the target.

Once participants had rated both sets of pictures, they sent all eight pictures back along with their two completed Experiment Information Forms in the prepaid addressed envelope enclosed with their test materials for this purpose. The participant identification number was on the outside of this prepaid envelope. Thus, when the experimenter received the participant's response, it was possible to tell whose trials were enclosed without looking at the Experiment Information Forms inside.

When the experimenter received the materials, the participant number was noted and the experimenter retrieved the target numbers from the computer (i.e., the target number for the clairvoyance trial and the stock and city numbers for the precognition trial) for that participant. The experimenter printed out these numbers and handed over the participant's sealed envelope to a colleague.² If the participant had chosen to send the materials in a different envelope or if the experimenter had forgotten to put the participant number on the envelope, the experimenter asked a colleague to open the envelope out of the experimenter's sight. The colleague then informed the experimenter of the participant number and resealed the envelope. These safeguards ensured that the experimenter would not know what guesses the participant had made when the experimenter recorded and/or calculated the target numbers.

Next, the experimenter looked up the appropriate temperature and stock market figures in the specified newspapers. The experimenter noted these figures on the printout of the target numbers and then performed the relevant calculations. The resultant target number was also

² I would like to thank Alison Roe (AR) and Claire Brady (CB) for their help with storing the data and double-checking the target calculations.

written on the printout. All of this information was then entered onto a database.

The experimenter subsequently returned to the colleague, who was asked to check the calculations of the temperature and stock market figures independently. Once the calculations had been confirmed, the experimenter handed over the printout containing the target numbers in exchange for the sealed envelope containing the participant's guesses. The colleague was asked to confirm that the envelope was sealed and that the number on the outside of the envelope corresponded to the participant number whose target numbers had been retrieved. The colleague stored all target printouts in a place unknown to the experimenter.

On obtaining the sealed envelope, the experimenter opened the test materials and entered the participant's ratings of the four pictures for each of the two trials onto the database. The experimenter then worked out which picture was the target and calculated the rank that the participant had given to the target picture (the highest rating being a rank of 1, the second highest rating being a rank of 2, etc.). This information was also recorded on the database, as was information about the day and time of the mentation and the form of mentation that the participant had used. Both for interest and for post-hoc analyses on time lapse between trial and feedback, the experimenter also noted the number of days between the date the trial took place and the day on which the experimenter had found out which picture was the target. The experimenter had similarly recorded the day's change in the closing price of the stock figure, so that post-hoc analyses on variability could be performed.

The experimenter retrieved the target pictures from the two pools of target possibilities and the experimenter made a conscious effort to look only at the target picture when so doing. Each of the two target pictures was then placed in a sealed opaque envelope. These two envelopes were marked A and B accordingly, in fluorescent pink as before. These envelopes were the feedback envelopes. The experimenter subsequently sent participants letters informing them whether they had correctly guessed either of the pictures and enclosed the feedback envelopes so that participants could see the correct pictures themselves. Participants returned target materials in prepaid addressed envelopes given for their return. It was hoped that if feedback envelopes looked very similar to test envelopes and if participants had an interaction with the feedback (by opening an envelope to see it) participants would have had an enhanced sense of contact with the materials. Participants were informed of the overall results of the experiment once it had been completed.

Once the closing date for the experiment had passed, another colleague checked that: (a) target numbers on the printouts stored by the

other colleagues matched those on the database; (b) ratings on the Experiment Information Forms matched those entered on the database and that there were no obvious signs that the Experiment Information Forms had been tampered with; and (c) ranks to the targets had been worked out correctly by the experimenter.³ Two participants' data were rectified in the light of this.

Preplanned analyses were then performed. The preplanned analyses—which were regarded as the experiment's main interest—were: (a) to use direct hits as a measure for psi for the overall database (i.e., both conditions together); (b) to use sum of ranks to assess each condition (clairvoyance and precognition) separately; and (c) a paired *t*-test to compare the two conditions. All *p* values were to be one-tailed with an alpha of .05; it was expected that the *t*-test would favor the clairvoyance condition. The effect size [*ES*] used throughout is z/\sqrt{N} .⁴

RESULTS

It was prespecified that only trials that were postmarked by December 13, 1998, would be included in the final analyses.

In total, participants completed 74 usable trials in the clairvoyance condition and 75 in the precognition one, giving an overall total of 149 trials (out of the 216 trial materials that had actually been sent out). Slightly fewer people returned two usable trials (one from each condition), and thus, there were only 71 usable pairs for comparison between the conditions.

An analysis using direct hits had been preplanned for the overall results, as the statistical power would be greater when all trials were used. Sum of ranks analyses were preplanned for the individual conditions, which had lower statistical power, in the hope that a sum of ranks analysis may be more sensitive to determining any possible effects. It was also thought that by including both a direct hits analysis overall and a sum of ranks analysis for the individual conditions, more information would be available to future researchers.

Overall, there were 33 hits in 149 trials, thus yielding chance results $z = -0.76$, $p = .22$, $ES = -0.06$. In the clairvoyance condition, there were 17 direct hits and in the precognition condition, there were 16.

³ I would like to thank Paul Stevens for double checking my data for me.

⁴ This is not equivalent to *r* when testing against a theoretical value such as chance (see Rosenthal, 1991, p. 123). Rosenthal's π cannot be used in the current data set because of the use of sum of ranks as the primary analysis for the two conditions. Thus, although strictly incorrect, z/\sqrt{N} is used throughout as the effect size measure.

When the conditions were considered separately, using sum of ranks analyses and using mean ranks where appropriate, the clairvoyance condition yielded significant results in the appropriate direction, indicating that in this condition participants were more likely to rank the target picture as being relatively similar to their mentation than would be expected by chance, SOR 168, $z = 1.72$, $p = .04$, $ES = 0.20$. There was no such effect evident in the precognition condition, where the sum of ranks analysis yielded only chance results, SOR 194.5, $z = -0.67$, $p = .25$, $ES = -0.08$. The paired t -test between the two conditions also revealed a significant difference, with the clairvoyance trials performing more successfully than the precognition ones $t(70) = -2.03$, $p = .03$, $ES = 0.24$.⁵

POST-HOC ANALYSES

One reason for conducting this experiment was to see whether a population that had reported precognitive experiences would also perform well in an experiment aiming to test this ability. It was also hoped that any findings from the survey (Steinkamp, *submitted*) would follow through into the experimental situation. This experiment seems to indicate that the people in this survey were able to get information about the target picture in a way that was not due to chance, although the information was not, strictly speaking, information that was gained precognitively. The survey revealed that neither locus of control (LOC), ambiguity tolerance (AT) nor neuroticism (Neu) related to whether people would act on their precognitive experience or to whether the experience was one on which they could act. Analyses of these personality characteristics in the current experiment likewise revealed that none of these personality types correlated with better scoring in either the clairvoyance or the precognition condition. See Table 1 for the results.

⁵ As reported in the *Proceedings of the Parapsychological Association's 42nd Annual Convention*, it had been preplanned to omit any materials that contained tied ratings. As this procedure is nonstandard, these analyses were replaced in this paper by those using mean ranks. When only those materials were used in which there were no tied ratings, the results were similar; overall results using direct hits were at chance, $z = 0.16$, $ES = 0.04$; clairvoyance trials using sum of ranks were significant, $z = 2.60$, $ES = 0.34$ and precognition trials were at chance, $z = 0.00$, $ES = 0$. The paired t -test also showed a significant difference, $t(53) = 2.3$, $p = .01$.

TABLE 1
CORRELATIONS FOR EACH CONDITION BETWEEN RANKS GIVEN TO
TARGETS AND SCORES ON EACH OF THREE PERSONALITY TESTS

	LOC	AT	NEU	
Clairvoyance	$N=63$	$N=69$	$N=68$	All nonsignificant
	$r_s = -.04$	$r_s = -.11$	$r_s = -.11$	
Precognition	$N=63$	$N=67$	$N=69$	All nonsignificant
	$r_s = -.06$	$r_s = 0.13$	$r_s = .07$	

A surprising finding from the author's survey (Steinkamp, *submitted*) had been that women over 45 who reported having had their first precognitive experience at an early age were likely to have more children than those women over 45 who had their first precognitive experience later on in life. This result replicated Hearne's work (Hearne, 1984, 1989). Hearne postulated that women who had precognitions early in life were "Group Breeders," whose role in life was to furnish society with offspring. "Group Breeders" had premonitions early on in life to safeguard their fertility, whereas those who did not have premonitions until later in life were "Group Depleters." He hypothesized that perhaps the role of "Group Depleters" was to act as Seers in society. If his hypothesis holds, one would expect women over 45 with fewer children to score better in the experiment, because this would be the group who, according to Hearne, would naturally act as Seers. This hypothesis, however, was not confirmed in either the clairvoyance condition, $N=30$, $r_s = .23$, n.s., or the precognition condition, $N=32$, $r_s = .27$, n.s. However, both sets of results approach significance. Therefore, they may indicate that Hearne's hypothesis does not hold and that there is some other reason why women over 45 who report having had their first precognitive experience relatively late in life are those who have fewer children. Alternatively, it might be argued that there was not enough power in this experiment to make the effect significantly evident. Only future research can address this issue further.

Another point of interest in this experiment is whether participants (presumably unconsciously) made an attempt at inference in the precognition condition, but that overall, the complexity made this inference too difficult. If this is the case, one might expect participants in the precognition condition to be able to make better guesses when they had their feedback more quickly than average, and when their assigned stock was less volatile than the mean, than when they had a longer than average time to wait for feedback and a stock that fluctuated more than the mean. An analysis examining the difference in scoring between these two

groups yielded no significant difference, $N = 38$, $U = 73$, $p = .34$. However, the average day's fluctuation (in either direction) of the stock market figures was 14 points (median = 8 points), and the average number of days from the time the participant did the trial to when the experimenter discovered the correct target was 7 (median = 6). It is possible, therefore, that even when figures below these means are taken, the conditions are still too volatile to make any attempt at inference from real-time ESP information possible.

It is arguable that the issue of delay in feedback is best examined in the clairvoyance condition where there were at least significant overall results and in which the stock market figures do not add an extra analytical complication. If participants were to look forward to their future feedback even in the clairvoyance condition, it is possible that the longer they had to wait for feedback, the harder it would be for them to foresee what it would be (see e.g., Honorton and Ferrari, 1989). Consequently, an analysis was performed to see whether the more days a participant had to wait for feedback correlated with correspondingly worse performance. This analysis did not provide any significant correlation, $N = 54$, $r_s = -.01$, n.s. It therefore appears that feedback did not play any significant role in this experiment.

DISCUSSION

The findings from this study appear to indicate that true precognition does not work; there was no evidence that people could predict the target when the target was determined by performing calculations on randomly selected stock market and temperature figures from a prespecified future date. Those same participants, however, did seem to be able to rate the target pictures more highly than expected by chance when the information about the future target already existed. It is interesting to note that even in the clairvoyance condition no one knew what the target was prior to the moment of feedback. The target number was immediately stored in the computer. It is therefore unlikely that participants looked forward to their future feedback alone, because otherwise the true precognition condition should also have obtained extra-chance results.

If the results from this experiment truly represent something about the nature of psi and are not a mere statistical aberration, they have a number of consequences for psi research. First, they suggest that theoretical worries about backward causation in relation to precognition are unfounded because the future is not directly perceived. It would seem that what occurs instead in experiments which appear to be demonstrative of precognition is some form of real-time psi (telepathy, clairvoyance, PK or a mixture), perhaps along with some calculation. As a consequence, in

experimental psi at least, the future does not really have a direct impact on our present perceptions. Second, the findings imply that psi might have some limits. This may be very important for the design of future experiments. For instance, if PK experiments were designed so that future stock market figures determined the seed point for any future session, any success in that experiment would have to be by PK and not by precognition. It would also prevent experimenters from being able psychically to select an entry point that is to their (and the participants') advantage. Last, as suggested above, the results suggest that feedback may not be the crucial issue that some people believe it to be. If feedback had played a role in this experiment, one would have expected both conditions to fare equally well. This may pose some problems for observational theorists, unless one attributes the results from this experiment purely to experimenter psi and one makes the bold assumption that at least unconsciously the experimenter did not want the precognition condition to succeed. This way of looking at the results, however, involves making a lot more assumptions (e.g., an unconscious desire on the part of the experimenter and the participants' cooperation in making their ratings and mentation fit the experimenter's unconscious desire, as the participants, and not the experimenter, were the first observers of their own mentation). Thus, it is currently more parsimonious to think that the results between the two conditions differed because of the difference between the modes of target selection; in this case, then, the moment of feedback does not appear to be the determining element of success or otherwise in psi experiments.

In conclusion, if these results do hold, they have important implications. Nevertheless, this is only one experiment performed with a very select group of participants. A lot of work remains to be done before the conclusions from this study can be asserted with any authority. This work needs to be replicated. Moreover, if the results from this study can be replicated, it will be crucial to determine at what point it is no longer possible psychically to infer future events. For example, temperature figures are less variable than stock market figures, so would an experiment using an algorithm on temperature figures alone yield successful results? Thus this experiment must be viewed as just the beginning of a line of research.

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