

DOES PRECOGNITION FORESEE THE FUTURE? SERIES 2, A LABORATORY REPLICATION AND SERIES 3, A WORLD WIDE WEB REPLICATION

BY FIONA STEINKAMP¹

Abstract: An earlier postal experiment by Steinkamp (2000) examined whether true precognition was possible by comparing 2 conditions. In the clairvoyance condition, targets were selected by a pseudorandom number generator before participants did the trials at home; in the true precognition condition, targets were selected using an algorithm on prespecified stock market and temperature figures on a prespecified future date. It was thought unlikely that participants could use either psychokinesis or other real-time psi to perform successfully in the true precognition condition. Results were significant in the clairvoyance condition ($p = .04$, one-tailed) and only at chance in the true precognition one. The difference in performance between the 2 conditions was significant ($p = .01$, one-tailed). This article presents 2 replication studies using different settings. The 1st, in the laboratory, gave almost significantly high scores in the precognition condition ($p = .06$, two-tailed) but only chance scores in the clairvoyance condition, with no significant difference between the 2 conditions. The 2nd, conducted over the World Wide Web, produced scores tending toward psi missing in the precognition condition ($p = .08$, two-tailed), chance scores in the clairvoyance condition, and an almost significant difference between the 2 conditions ($p = .07$, two-tailed). Differences are discussed.

The long-standing controversy in parapsychology about whether results from precognition experiments are due to people looking directly into the future or whether they are due instead to real-time psi and/or calculation (see, e.g., Morris, 1983) was addressed in a free-response postal experiment by Steinkamp (2000). This experiment is henceforth referred to as Series 1. Series 1 used two conditions. In the *clairvoyance* condition, the computer had already selected the target using a pseudorandom number generator (PRNG) and had stored the choice directly onto disk by the time that participants made their guess. However, nobody knew until the later time of feedback which target the PRNG had selected. Here, then, participants could either psychically look directly to their future feedback to guess the target correctly or use real-time psi (e.g., by psychically obtaining the information about the target from the computer).

¹ I am very grateful to the Fundação Bial (Porto, Portugal) for funding the research reported in this article. Two anonymous reviewers gave thorough and helpful feedback that has improved the quality of this work considerably.

In the *true precognition* condition, the target was determined by using a prespecified algorithm on prespecified temperature and stock market figures from a prespecified future date. Here it was hoped that participants could gain information about the target only by looking directly into the future. It seems unlikely that they could get the information psychically about which stock would later determine their target and then use their psychokinesis (PK) to affect that stock's performance, because too many other people's livelihoods depend on the performance of those stocks. Even just a 1-point change in the stock market figures can mean a loss of thousands of dollars for some investors. Thus, investors would have far more of an incentive to use PK on the stock market than either the participant or the experimenter. Also, because the closing price of any given stock depends on so many human decisions, it is unlikely that anyone could calculate what all those decisions would be and what precise effect they would have on the closing price or interaction with a possible world temperature figure. It was consequently hoped that successful results in the precognition condition would provide strong evidence in favor of true precognition.

Series 1 obtained statistically significant results in favor of clairvoyance ($ES = .20$, $p = .04$, one-tailed), whereas the ones for precognition were at chance ($ES = -.08$, $p = .25$, one-tailed). There was a statistically significant difference between the two conditions ($p = .01$, one-tailed), indicating that there was a difference in performance between the two conditions. Therefore, this experiment suggested that true precognition may not be possible. An attempt to replicate these results therefore appeared desirable.

Also of interest was the generalizability of the experimental setting. Series 1 had been conducted through the post with participants who had taken part in a survey by Steinkamp (in press) on precognitive experiences. Therefore, all those who took part in Series 1 had already had a number of communications with the experimenter about precognition. Moreover, because the postal experiment followed on from the survey, participants may have felt an ongoing and active involvement in the postal study that may normally be missing from most other studies. Additionally, because all of the participants claimed to have had a precognitive experience, the participants were probably all believers in precognition, although they may not necessarily have believed in the possibility of precognition in an experimental setting. The postal experiment thus used a relatively select population.

It is also arguable that postal experiments may produce different results from experiments conducted in the laboratory or over the World Wide Web. Indeed, Steinkamp (1998) argued that free-response experiments may not be successful over the Web because the Web environment is one in which people want to do things quickly. Milton and Wiseman's (1999) meta-analysis of mass-media tests of extrasensory perception

(ESP) revealed only chance overall results, whereas Milton's (1997) meta-analysis of free-response experiments not using an altered state of consciousness did provide a positive accumulation in favor of psi. That is, the testing environment itself may have implications for what type of experiment is best suited for eliciting psi. Thus the results from Series 1 could be peculiar to postal experiments and not generalizable to other experimental environments.

The experiments reported in this article are two conceptual replications of Series 1. The first was conducted in the laboratory and the second was carried out over the World Wide Web.

SERIES 2: A CONCEPTUAL REPLICATION IN THE LABORATORY

METHOD

General Overview

Each participant came into the Koestler Parapsychology Unit (KPU) at the University of Edinburgh, Edinburgh, Scotland, for a period of 2 hrs. Participants were placed in an environment similar to the ganzfeld (details below). They were asked to look forward to the time when they would receive an envelope through the post from the experimenter and to gain some kind of imagery about the picture they would find inside that envelope. After their mentation period, participants were given a pool of four static pictures, and they rated each picture according to how closely it matched their mentation. The picture they rated the highest was the picture they thought they would later receive through the post. After a tea/coffee break, they were asked to have a new attempt at the experiment with a different target pool. Thus, each participant did two trials.

Participants

The number of participants in this experiment was prespecified as 80, and testing took place between February and May 1999. Participants were selected on their willingness to describe themselves as having had at least one spontaneous psychic experience. No attempt was made to get a description of their experience or to verify in any way whether they were telling the truth. Unlike Series 1, participants did not have to claim that they had had a precognitive experience as such. The participants were drawn from this wider population because Series 2 was more limited in its catchment area (only people living in or near Edinburgh could realistically take part in the experiment) than the postal experiment, which was able to recruit participants from the whole of the United Kingdom. It was thought that this difference in participant population would not be too

problematic because even though all of the participants in Series 1 had reported precognitive experiences, they performed well only in the clairvoyance condition.

The participants were recruited by word of mouth, from those who had taken part in previous studies at the KPU, from those who had taken part in the survey by the author and who had not taken part in the postal experiment, from posters on various noticeboards in and around Edinburgh, and from a request published in a local, free newspaper. Participants were all adults, of a variety of nationalities and of both sexes. The vast majority of them had never taken part in a free-response parapsychology experiment before.

Target Set

The target set used was the same as that in Series 1. That is, the target set comprised 280 static postcard-sized pictures divided into 70 pools of 4. The pictures could either be in black and white or in color, and they varied in theme (e.g., landscapes, abstract art, sculptures, cartoons). All of the pictures had randomly allocated numbers on the reverse for reference. Further details are given in Delanoy, Morris, Watt, and Wiseman (1993).

Conditions

As in Series 1, this experiment had two conditions: one clairvoyance condition and one true precognition one. However, because there was direct participant and experimenter interaction in this experiment, some extra precautions were added.

For the clairvoyance condition, before inviting any participants into the Unit, a helper (not the experimenter) used the computer to randomly select a different target number (1–4) for each of the 80 participants and to store that number directly into each individual participant's file on the hard disk.² As in Series 1, this number referred to the lowest numbered picture in that participant's target pool. For instance, if a participant was given picture numbers 0178, 2139, 0039, and 2009 and the computer had selected target number 3, the target was the third-lowest number of that set (i.e., the target would be picture number 2009). Neither the helper nor the experimenter knew which target number the computer had selected. The target numbers were stored only on the helper's computer (in Series 1, the target numbers had been stored on the experimenter's computer). For this condition, participants could theoretically use real-time ESP and calculation to guess correctly which

² I would like to thank Marleen Nagtegaal for her hard and thorough work in this experiment as the helper.

picture was the target (e.g., by clairvoyantly sensing 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, as in Series 1, although this condition is referred to as the clairvoyance condition, it does not rule out the use of true precognition.

For the precognition condition, before any participants came into the laboratory, the helper used the computer to randomly select two numbers between 1 and 25 for each of the 80 participants, and the computer immediately stored each participant's own numbers in the appropriate file on the hard disk. The first number referred to a temperature figure ($^{\circ}\text{F}$) in *The Times* newspaper on a prespecified future date, and the second number referred to a stock market figure (closing price) in *The Financial Times* on that same prespecified future date. The prespecified future date was 2–5 days after the participant had come to the Unit to take part in the experiment. Because the relevant stock market figures were not available from Saturday to Monday, the prespecified future date for any participants tested on Thursday to Saturday inclusive necessarily had to be Tuesday instead of Saturday to Monday. Similar conditions applied if there was a Bank Holiday (the subsequent day's paper also not having the relevant stock market section).

When the prespecified future date arrived, the helper retrieved the target information (i.e., the two numbers referring to a world city and to a specific stock and the target number for the clairvoyance condition) from the computer. The helper subsequently looked up the relevant temperature and stock market figures. Thus, if the computer had chosen the numbers 4 and 18, the helper noted the fourth world city temperature listed in *The Times* that day and the closing price of the 18th of the top stocks listed in *The Financial Times*. Stock market figures were rounded up or down as appropriate (thus a closing price of 885.5 would be rounded to 886). If a temperature figure was listed as unavailable in the newspaper, the stock market figure alone was taken. The temperature and stock market figures were then multiplied together and divided by 4 until a target between 1 and 4 could be gained. Thus, if the multiplication and division procedure resulted in a number between 1 and 1.99, the target was 1; if it resulted in a number between 2 and 2.99, the target was 2, and so on up to 4.99. The resulting target number determined which picture was the target (the target number again referring to the lowest numbered picture in the participant's target pool).

This procedure was virtually identical to that used in Series 1, except (a) a helper and not the experimenter used the computer to select the world city and stock; (b) the helper retrieved the target information and performed the relevant calculations; (c) all clairvoyance target information or stock and world city numbers to be used for the precognition

condition were selected right at the beginning of the experiment (in the postal experiment, the target information for each participant was not selected until the experimenter posted out their individual test materials); and (d) there was slightly less uncertainty involved in when the target information would be retrieved because participants did their trials on a specific date in the laboratory. In Series 1, participants chose when to mail their responses (which may have been some time after doing their trials). Because the date of target retrieval was predetermined by the postmark on the letters, this additional choice that the participants had could have added to the precognitive time span between the participants' mentation and the time of feedback (i.e., retrieving the target information). Nevertheless, it was hoped that in the laboratory this condition would still provide strong support for true precognition, if successful.

Procedure

Before participants were recruited, the experimenter prepared 70 pools of four pictures and placed each pool in a separate brown envelope. The pictures were chosen so as to be as different from each other as possible. These 70 filled envelopes were the "target pool envelopes." Meanwhile the helper used the computer to select and record the target information (i.e., the clairvoyance target number and the precognition numbers indicating which stock and city figures to use) for all 160 trials. Each participant was to complete two trials—one in each condition—and while asking the computer to select and record the target information for both conditions, the helper counterbalanced them using an ABBA design as in Series 1. Thus the experimenter was blind during the study as to which trial was in which condition.

Before each participant's arrival, the experimenter took two of the target pool envelopes. To one of the envelopes the experimenter appended an empty, similar-sized envelope that had a large, pink fluorescent "A" on both sides. To the other target pool envelope the experimenter appended a similar envelope but with the letter "B" on both sides. The lettered envelopes were the "feedback envelopes."

Also appended to each target pool envelope was a Ratings Form. This form had the participant's code number and spaces for participants to fill in the picture numbers in their target pool and their ratings for each picture. Because the experimenter had prepared all 70 target pools in advance of the experiment, the experimenter was never consciously aware of what target pool any participant had during her or his judging session or even of which target pools were paired together.

When participants came into the Unit, they were taken up to the reception room. They were told that the experiment had two parts with a coffee break in the middle. The experimenter then informed them about the first part of the experiment. The experimenter handed them Envelope A with the fluorescent lettering and told them that the next time they got

that envelope it would be through the post and it would have a picture in it. Their aim in this experiment was to try to gain impression of some kind of imagery about what picture they would find inside. It was stressed that they would be opening that very envelope at home, and they were asked to think of the envelope as their direct connection to the future.

Participants were informed that the picture could be absolutely anything, including abstract art, cartoons, landscapes, cityscapes, pictures of people or animals, sculptures, line drawings, or advertisements. They were told that they should not edit their thoughts in any way and that if their mind started to wander, they should say what their mind was wandering about. However, they were advised that if their mind did wander, they should try to return to thinking about what picture they would find in the envelope. They were asked to say their mentation out loud. Participants were told when the target would be selected (usually in 2 days' time) and that the target would be selected randomly by computer on that date by another person. Nevertheless, they were advised to focus on the picture they would see in the envelope and not on the time of target selection.

The participant was subsequently taken into the sound-attenuated receiver's room used for ganzfeld experiments at the KPU (see Dalton et al., 1996, for details) and was asked to recline in the chair. They attached a small microphone to their clothing and put on adjustable headphones. Participants were asked to keep the feedback envelope in their hands or on their lap. The main light in the room was then dimmed and switched off, leaving on only a red lamp. The double doors were closed, and the experimenter checked that the microphone link between the participant and the experimenter's room was in working order.

The participant then listened to a 7–8-min visualization relaxation tape especially designed for this experiment. Participants were told that the relaxation tape lasted 10 mins. At the beginning of the tape the participants are asked to close their eyes. Toward the end of the tape participants are asked to imagine that they are in a timeless zone, that they are themselves the whole of time, and that they can see themselves opening the envelope at home. It is at this point that they are asked to say aloud what they can see inside the envelope. The relaxation tape was immediately followed by a 10-min period of white noise, during which participants gave their mentation. The mentation was recorded in writing by the experimenter. Additional mentation was requested after the mentation period only if the participant had not said anything at all within the 10 min. This did not happen very often.

Once the mentation period was over, the experimenter turned on the light in the participant's room and gave the participant her or his target pool envelope and the Ratings Form. The participant was told not to look inside the target pool envelope until instructed by the experimenter. The experimenter then closed the doors to the participant's

room again and returned to the experimenter room. The participant was asked to open the envelope and to check that it had four pictures inside and that each picture had a number on the back of it. Participants placed the pictures face down while the experimenter reminded them of their mentation. After this, participants looked at each picture in turn, said whether it had any resemblance to what they had been thinking about, and gave it an appropriate rating from 1 to 99. A rating of 99 meant that the picture was identical to what the participant had been thinking about in the mentation period, and a rating of 1 indicated that there was no resemblance whatsoever. Participants were not allowed to give two or more pictures in their target pool envelope the same rating. If they asked whether they should rate the picture according to their gut feeling or to their mentation, they were advised to rate on the basis of their mentation (because the experimental setting and not the judging procedure was supposed to be the psi-conducive element of the exercise). If they asked whether they should judge in relation to the content of their mentation or to the colors or general shapes of that mentation, they were simply advised to decide how they thought best.

After rating all of the pictures, participants were asked if they wanted to change any of the ratings, and they were allowed to make changes if they desired. Once the participants were satisfied with the way they had rated the four pictures, they wrote down the picture numbers and their relevant ratings on the Ratings Form. When the participants indicated that they had done this, the experimenter stored the ratings on the computer, collected the participants' materials from them, and asked the participants to sign the Ratings Form.³

The participant and the experimenter then shared a coffee break and chatted and relaxed. Once the participant was ready to continue, the experimenter gave the participant the second "B" envelope and told her or him that the second part of the experiment was exactly the same as the first, only this time it was a different envelope and a different set of four pictures. Participants were advised to forget all about the previous session as it had nothing to do with this new one. The procedure, however, was exactly the same, and they were informed that they would receive the second picture through the post on the same day as they would receive the first one. Participants were led to believe that both trials were precognitive. The experimenter, of course, did not know which trial was *not* precognitive.

After participants had completed their second trial and they had left the building, both of the signed Ratings Forms were handed over to

³ I would like to thank Paul Stevens for programming the computer to record and store the data.

another colleague for safe keeping.⁴ These Ratings Forms served as a double-check that the experimenter did not change the participants' ratings on the computer once the targets had been discovered. The experimenter also completed a Target Request Form and handed it over to the helper. The Target Request Form informed the helper which participants' data had to be retrieved on which day. The experimenter subsequently placed the target pool pictures back into the two target pool envelopes and noted on them the participant number and the envelope letter (A or B) to indicate for which trials those particular target pools had been used. The appropriate lettered feedback envelopes were appended to the target pool envelopes too so that the feedback would indeed be returned in the envelope that the participant had held during the trial.

When the prespecified future date arrived (as listed on the Target Request Form), the helper retrieved the target information from the computer, looked up the necessary temperature and stock market figures, and performed the requisite calculations. The calculations were subsequently independently double-checked by another person. The helper then entered the information about the target numbers and the stock and temperature figures onto an Excel database. After this, she wrote down only the target numbers for the participant's two trials (A and B) on a Target Information Form, and she subsequently handed this form over to the experimenter. This set of procedures enabled the experimenter to remain blind as to which condition had been which. It also meant that the target numbers were entered onto the database before anyone knew how the participant had fared.

On receiving the Target Information Form, the experimenter retrieved a printout of the computer file containing the participant's ratings. From this printout the experimenter calculated which picture number was the target and how the participant had ranked the target (the highest rating being a rank of 1, the second highest rating being a rank of 2, etc.). The experimenter subsequently retrieved the participant's two target pool envelopes, took out the appropriate picture, and put it in the relevant feedback envelope. As in Series 1, the experimenter took care to look only at the target picture when taking it out of the target pool envelope. The two feedback envelopes were then sealed and sent to the participant in a larger envelope along with a feedback letter informing the participant whether she or he had correctly guessed the pictures for envelopes A and B. It was hoped that making participants open a sealed envelope would enhance a sense of excitement and would make participants pay more attention to the picture inside that envelope. Moreover, mailing the feedback enabled this

⁴ I would like to thank Caroline Watt for storing the data.

experiment to replicate more closely the way in which participants received their feedback in Series 1. Also enclosed with the feedback letter was a stamped addressed envelope for participants to return the target pictures. Participants were informed that they would be told the overall results once the experiment was completed. The experimenter then gave the printouts of the participant's ratings to the helper, who in turn double-checked both the conversion of the target number to the target picture and the participant's ranking of the target picture. After this, the helper entered the information into the database.

When the whole experiment was over, another person was given a copy of the helper's database, the Ratings Forms, and the Target Information Forms so that the forms could be checked against the database. This ensured that the experimenter had not changed the ratings on the computer once the target was known (because the information in the database was copied from the computer printouts and the Ratings Forms had been stored out of the experimenter's reach by a colleague). It also ensured that the helper could not enter in favorable targets instead of the real ones, because the Target Information Forms were given to the experimenter before the helper knew which ratings the participant had given the various target possibilities.

The preplanned analyses were then performed. Unlike Series 1, all of the analyses in this study were two-tailed. This was due to the difference in experimental setting. It was hoped that the power of the experiment would be high enough to show significance at an alpha of .05 if an effect in this study similar to that in the postal experiment were present. As in Series 1, the preplanned analyses were as follows: (a) direct hits over all 160 trials, (b) sum of ranks (SOR) for clairvoyance condition, (c) sum of ranks for precognition condition, and (d) paired *t* test to compare the individual conditions.

RESULTS

Randomization

After completion of all three series, a reviewer noted that there was a flaw in the randomization procedure for the precognition condition, because the procedure of multiplying two randomly generated numbers and then dividing by 4 does not itself necessarily result in a random number. Indeed, the reviewer even remarks that if the number divided lies anywhere between 48,152 and 65,372 the resultant target number would always be 3.⁵ Post hoc analyses were subsequently performed on the precognitive target numbers for all three experiments. Fortunately, the targets selected for Series 2 were randomly distributed, $\chi^2(3, N = 80) =$

⁵ I am extremely grateful to the reviewer for bringing this to my attention.

2.45, $p = .48$, but those for Series 1 and Series 3 were not; for now, note that it can be shown that the results from Series 1 and 3 are not affected by the target imbalance. A full discussion of the implications of this randomization problem for interpreting the results follow toward the end of this article.

Preplanned Analyses

All effect sizes reported were calculated using z/\sqrt{N} . There were 49 direct hits in 160 trials ($z = 1.55$, $p = .13$, $ES = .12$), yielding chance results as in Series 1. Contrary to Series 1 in this study, the 80 clairvoyance trials also yielded chance results (SOR = 198, $z = 0.15$, $p = .88$, $ES = .02$), whereas the 80 precognition trials gave an almost significant result (SOR = 181, $z = 1.85$, $p = .06$, $ES = .21$). The number of times each rank was given to the target picture in each condition is summarized in Table 1. It can be seen that targets in the precognition condition gained both more ranks of 1 and 2 than in the clairvoyance condition and fewer ranks of 3 and 4 than in the clairvoyance condition.

TABLE 1
TABLE OF RANKS GIVEN TO TARGET FOR EACH CONDITION

Rank to target	1	2	3	4
Clairvoyance	23	14	25	18
Precognition	26	19	23	12
<i>MCE</i>	20	20	20	20

However, the t test to compare the conditions was nonsignificant, $t(79) = 1.16$, $p = .25$, which also differs from Series 1.

Post Hoc Analyses

One concern in this experiment was whether participants fared any better or worse by doing two trials on the same day. A post hoc t test comparing differences in performance between first and second trials did not show any significant effect, $t(79) = 0.89$, $p = .38$ ($2 - t$).

DISCUSSION

It was both disappointing and interesting that the results from this laboratory-based experiment did not replicate those found in Series 1. On the face of it, whereas Series 1 seemed to indicate that true precognition may not be possible in the experimental setting used in that particular study, the results from Series 2 suggest that true precognition might be possible in a laboratory situation under the circumstances described in this article if a greater number of participants were used. A

Bonferroni correction has not been performed as it is clear that these experiments cannot by themselves prove or disprove any particular viewpoint at this stage, particularly in light of the randomization problem that is discussed more fully below. The next attempted replication presented in this article highlights yet further that the experimental setting may be an important factor in precognition experiments.

SERIES 3: A CONCEPTUAL REPLICATION ON THE WORLD WIDE WEB

METHOD

General Overview

Participants were told over electronic mail (e-mail) to gain impressions of some imagery in their own time at home about what picture a computer would select for them to see over the World Wide Web. When they had some idea about what they thought the picture would be, participants went to a Web site that had been randomly selected for each participant. On this site, participants saw four pictures and reported in detail how well each picture fitted the imagery they had had. They ranked each picture accordingly as to its likelihood of being the one to be selected for them to see over the Web. They then had one more go at this experiment with a different set of pictures. Once they had completed their second trial, they were shown which two pictures the computer had chosen.

Participants

The number of participants for this study was prespecified as the first 100 who completed two valid trials. Participants were selected on the basis of their having had a precognitive experience. All of the participants had to e-mail the experimenter in the first instance with an account of their premonition. There was no attempt to assess the experiences submitted as to their likelihood as being specifically precognitive (or even as necessarily psychic).

There were two main reasons for requiring participants to submit an experiential account beforehand. First, the aim was to obtain a participant population as close as possible to that used in Series 1. In the postal experiment, all of the participants had participated in a survey of precognitive experiences, so all of the participants had told the experimenter of an experience they had had. Although the participants for the Web experiment had not filled out a questionnaire about their experiences, it was hoped that divulging a personal experience beforehand might at least replicate something of the flavor of the population in the postal experiment. Second, the experimenter suspected that many people may volunteer for the Web experiment with no real intention of

serious participation. It was hoped that requesting an account of a personal experience would deter those responding purely out of curiosity. Those who merely wrote that they had had an experience without describing it were not allowed to participate.

Participants were recruited from various sources. Some participants had taken part in the experimenter's survey. These were mostly those who lived abroad and could not be included in the postal or laboratory experiments. E-mail messages were repeatedly posted to two mailing lists devoted to parapsychology (*parapsychology research forum* and *paranormal*) to recruit people. Postings were also made to a variety of newsgroups (*alt.dreams*, *alt.paranormal*, *uk.rec.psychic*, *uk.misc*), and a call for participants was listed on the KPU Web site.

Target Set

The target set was the same as that used in the first two series. The materials were scanned in so that they could be shown over the Web.⁶

Conditions

As in both of the other experiments, there were two conditions: one testing for clairvoyance and the other for true precognition. The methods of target selection and of counterbalancing the conditions were identical to the other two experiments except in the following respects:

- The computer was asked to select randomly the appropriate figures for the clairvoyance and precognition trials just before the experimenter sent out the first e-mail describing the experimental procedure to each individual participant. Thus, this part of the procedure was identical to Series 1 but slightly different from the laboratory replication in which all numbers were randomly selected before the experiment began.
- As in Series 1, the experimenter was not blind as to which condition was which. It seemed unnecessary for the experimenter to be blind to the conditions because the information e-mailed to participants was standardized (and thus it was hoped that no sensory cues could occur; also there were in-built checks in the experimental design to guard against experimenter error). Again, the laboratory experiment differed insofar as the experimenter was blind to the conditions in that study.
- The prespecified date for looking up the precognitive stock market and temperature figures was 2 days after receiving the participant's second trial at the experiment (subject to the

⁶ I would like to thank Paul Stevens for his help in scanning the target materials.

provisos of stock market figure availability used in the other two experiments).

- The experimenter—and not a colleague as was the case in the laboratory experiment—was responsible for looking up the stock market and temperature figures and for performing the calculations. This is identical to Series 1.

Procedure

Testing took place between December 1998 and June 1999. Before the experiment began, the target materials that had been returned from the postal experiment were scanned in and prepared for display on the World Wide Web.

On receiving participants' e-mailed accounts of a precognitive experience they had had, the experimenter assigned them a participant number and selected two Web sites for the participants from a list, with each participant getting the next Web site that was available from the list.⁷ This was equivalent to working through a pile of target envelopes in Series 2. Each Web site had four pictures, each picture below the other, and each picture with an input box beside it for the participant to type in any similarities that they perceived between their mentation and that particular picture.

The experimenter then entered the participant's code number into the database with a note of which Web sites had been allocated to them. After this, the experimenter used the computer to select randomly the target information for that participant (i.e., the target number for the clairvoyance condition and the world city and stock figures for the precognition condition). As before, this information was stored immediately onto the hard disk by the computer, and the experimenter did not know which numbers the computer had chosen.

The experimenter subsequently sent a standardized e-mail explaining the experiment to the participants. Participants were asked to spend some time at home to gain impressions about what picture the computer would later select for them to see over the Web. It was suggested that they could get imagery by using dreams, by drawing, or by just sitting quietly and thinking about it. For both trials, participants were informed that the picture had not been selected yet but that the picture would be one of the four pictures they would later see when they went to the allocated Web site (the address of which was enclosed in the e-mail). They were instructed not to go to this Web site until they had some idea in their mind about what the picture that the computer would later select would be like. Participants were advised that they would have to rank each picture as to its likelihood

⁷ I would like to thank Paul Stevens for his assistance with the Web programming.

of being the picture they thought the computer would later choose. They were told that there would be a second experiment after their first attempt. The Web site itself repeated much of this information to ensure that participants would not forget what they were supposed to do.

When participants arrived at the relevant Web site, they had to fill in the input boxes beside each picture with a description of any similarities between their mentation and that particular picture. After they had done this for all four pictures, they were to rank each picture accordingly. To help participants rank the pictures, I reproduced the four picture alternatives in miniature in a row underneath the table of four large pictures and input boxes so that participants did not have to scroll up to remind themselves of the pictures. Underneath each miniature picture, there was a selection box for participants to select which picture they wanted to give which rank (1–4). When participants submitted the information, the program automatically checked that the participant had given each picture a different rank and that the participant had written something beside each picture. If all the required information was present, the participant was automatically informed that they had successfully completed their first trial and that they would receive an e-mail from the experimenter in the next few days with information about their second trial. They were reminded that they would not discover which picture the computer had selected until they had completed both trials. The computer then sent the participant's submission directly to another person (Catherine Derrick [CatD]), not to the experimenter, and left a message in a file on the experimenter's home directory to indicate that this particular participant had successfully completed her or his first trial.⁸ The computer also noted the time and date of the trial.

On receiving notification that the first trial had been completed, the experimenter noted the date that the trial had been completed in the database. After this, the experimenter sent a standardized e-mail thanking the participant and giving the participant information about how to perform the second trial. Participants were told that the second trial was exactly the same as the first but that the Web site would have different pictures from the first trial.

When the computer notified the experimenter that a participant had completed the second trial, this second trial date was also noted in the database. It was from this date that the prespecified date of calculating the precognitive target was assessed (regardless of whether it was the first or second trial that had been precognitive). On the prespecified date, the

⁸ For various reasons, the person to whom the participants' submissions were sent varied throughout the duration of the experiment. I would like to thank Alison Roe, Mary Hutchinson, and Catherine Derrick for agreeing to have the data sent to them in the course of the experiment.

experimenter retrieved the target information for that participant from the computer, looked up the necessary temperature and stock market figures, and performed the necessary calculations on those figures. In this respect, the Web experiment was treated exactly as in the postal experiment, in which the experimenter did not know how long ago the participant had completed their precognition trial. In the postal experiment, participants could theoretically have waited hours or weeks before proceeding to the next trial, although all of the participants in the postal experiment had been told to leave a gap of at least 24 hr between trials. Thus, because the experimenter could not look at the test materials to see when participants had completed their precognition trial in the postal experiment (because the experimenter should not know before calculating the target number what the participant had guessed), the precognitive interval in that experiment had to be decided with respect to when the experimenter received the envelope concealing the participant's two sets of guesses rather than when the participant did the precognitive trial. The Web experiment was treated in exactly the same way, but instead of waiting for a participant's envelope, the experimenter waited for the computer to inform the experimenter that the participant had submitted the second trial.

Once the experimenter had obtained the two target numbers for a participant, the calculations to obtain the precognitive target number were independently double-checked by CatD: Once the calculations had been confirmed, the experimenter handed over the target details to CatD for storage.

Once the experimenter lodged the target details with CatD, CatD e-mailed the participant's responses to the experimenter so that the correct target could be determined. The experimenter subsequently inserted the two target pictures into the standard feedback Web site. The participant was then e-mailed a standard letter telling her or him the address of the feedback Web site. The feedback Web site informed the participant whether the computer had selected the participant's first, second, third, or fourth choice of picture for each trial and showed her or him the two pictures the computer had chosen. Participants were informed of the overall results at the end of the study.

Once the first 100 pairs of trials had been completed, a colleague checked the original target numbers in CatD's possession with those in the experimenter's database, checked the participant's guesses in CatD's home directory with those entered in the official database, and corrected any experimenter error in determining which picture should be the target.⁹

The preplanned analyses were the same as in the laboratory experiment. That is, all analyses were two-tailed. The main preplanned analyses

⁹ I would like to thank Marleen Nagtegaal for all the double-checking.

were (a) the use of direct hits for all 200 trials, (b) sum of ranks for each of the individual conditions, and (c) a paired *t* test for the condition comparison.

RESULTS

Randomization

The targets in the precognition condition for this series were not randomly distributed. I show below that the nonrandom distribution is not responsible for the results in this series.

There were 49 direct hits in 200 trials, yielding results at chance ($z = -0.08$, $p = .9$, $ES = -.01$). The sum of ranks analysis on the clairvoyance trials was also at chance (SOR = 240, $z = .85$, $p = .40$, $ES = .09$), whereas the sum of ranks analysis on the precognition trials approached significance in the psi-missing direction (SOR = 267, $z = -1.74$, $p = .08$, $ES = -.17$). This becomes clearer if one looks at Table 2, which shows the distributions of ranks to the targets. The precognition condition clearly has an excess of targets ranked at 3 and 4 and a corresponding minority of ranks of 1 and 2.

TABLE 2
RANKS ASSIGNED TO THE TARGET IN THE WEB EXPERIMENT

Rank to target	1	2	3	4
Clairvoyance	28	23	30	19
Precognition	21	19	29	31
<i>MCE</i>	25	25	25	25

The paired *t* test comparing the two conditions was almost significant and illustrated a tendency for precognition trials to do worse than clairvoyance trials, $t(99) = 1.83$, $p = .07$.

DISCUSSION

The findings from the Web experiment are inconclusive. *If* the results from the precognition condition are not due to chance, they appear to indicate that participants may in some sense have deliberately avoided guessing the precognition targets correctly. I have already argued elsewhere (Steinkamp, 1998) that Web-based experiments may need to be designed differently from laboratory-based experiments to be successful. The World Wide Web is an environment in which people like to get quick results, and the contemplative nature of free-response experiments may simply not be suitable or may even be psi inhibitory for the Web. Moreover, if people have to pay for their Internet connections, they may not like to spend too long over one trial.

Nevertheless, this experiment was designed as far as possible to enhance the likelihood of success. Participants had to submit a personal experience before they took part in the experiment, and hence they could not rush straight into the experiment. Participants were also selected on the basis of their claim to have had a precognitive experience beforehand and thus they should have been fairly "sheepish" (thereby increasing the likelihood of success, if previous analyses are reliable; see, e.g., Lawrence, 1993). Moreover, participants were included only if they had the patience to complete two trials in the experiment. It would therefore appear that these participants are not individuals who necessarily require instant gratification.

All the same, a number of participants e-mailed me personally to comment on how long it took for the pictures to load up on their screens. One participant also noted that the different pictures took different lengths of time to load up on the screen; hence the participant was able to look at some pictures longer than others. This delay in downloading the pictures and the inequality of loading times could be factors inhibiting success with free-response experiments on the Web. Other participants remarked on the difficulty of the spatial distance between them and the experimenter or computer (many participants were based in the United States and the experimenter and the computers were based in the United Kingdom). This latter observation is somewhat surprising, because if participants are looking forward to the time of feedback—which is what the experimenter had intended—the pictures would be shown on the participant's screen and hence there would be no great distance at all. Indeed, this was one advantage of using the Web.

Indeed, these comments and some others suggest that participants were not necessarily looking forward to the time of feedback but that they were trying to predict what would happen at the time of selection. A couple of participants even wrote in their mentation or in private e-mails to the experimenter that they found it hard to get into the "computer's brain." Another participant described himself as imagining what kind of picture he would pick if he were a computer and deciding that if he were a computer he would probably pick something abstract. These remarks indicate that the experimental task should not have been described as one in which participants should try to guess which picture "the computer will choose for them to see," because this description had obviously confused at least some of the participants. This is itself a valuable lesson.

In addition, 39% (58/200) of all trials required the experimenter to send one or more reminders before the participant finally completed that part of the experiment. This might indicate that a substantial number of participants had lost enthusiasm in the study either at the outset or halfway through. If all of the factors mentioned so far do play a role in the success or nonsuccess of an experiment, then these demotivating aspects in the Web environment may provide an incentive to participants to

perform badly in the arguably more “interesting” condition (i.e., “true precognition”) as a kind of psychic protest. This is nevertheless a post hoc speculation, and further supporting data are needed before it could be offered with any confidence.

Randomization Issues: Series 1–3

The randomization problem in the precognition condition of all three series potentially has two serious consequences for the interpretation of the results. First, if participants had a response bias toward the target number that happened to have occurred most frequently during the course of the experiments (e.g., often preferring to give the highest rating to the target assigned the second-lowest number), then any significant results could be due purely to the response bias. Second, even if no such response bias is evident, if a large consecutive range of numbers obtained from multiplying the stock market and temperature figures will eventually produce the very same target number when divided, then successful results in the precognition condition may not be due to true precognition. Participants could have made a very good estimate by using the stock market and temperature figures at the time they did their trial; the gap of several days would not make any difference to the final target number obtained from those numbers because even volatile stock market and temperature figures would still multiply up to a figure within the large range. This section considers these problems in some detail.

Table 3 provides full details of the target number distributions in the precognition condition for all three series. A randomization problem is indeed evident in the data. Only Series 2 (laboratory experiment) had a random distribution of targets, and in all three series the multiplication and division procedure produced an excess of the target number 2 (pictures with the second-lowest number in a given set) and a paucity of the number 4.

TABLE 3
RESULTANT TARGET NUMBER DISTRIBUTIONS IN THE
PRECOGNITION CONDITION FOR ALL THREE SERIES

Target no.	Postal (Series 1)			Laboratory (Series 2)			Web (Series 3)		
	<i>MCE</i>	Obs	$\chi^2(3)$	<i>MCE</i>	Obs	$\chi^2(3)$	<i>MCE</i>	Obs	$\chi^2(3)$
1	18.75	20	8.79	20	20	3.6	25	20	10.96
2	18.75	27		20	26		25	39	
3	18.75	19	<i>p</i>	20	20	<i>p</i>	25	23	<i>p</i>
4	18.75	9	.03	20	14	.31	25	18	.01
Total trials	75	75		80	80		100	100	

Note. Obs = number of times the target number actually appeared. Bold print indicates a significant difference.

Fortunately, Series 2 was the only series to demonstrate any possibility of significant results in a positive direction in the true precognition condition, and Series 2 also had a suitably random distribution of target numbers. However, Series 3 did indicate a trend toward psi missing in the true precognition condition, and all three series show the same pattern of bias. Thus, to see whether participants did have a bias toward rating significantly more or less favorably the pictures corresponding to the second-lowest target number (i.e., target number 2), I performed observed sum of ranks analyses for all target numbers and compared them with the relevant expected sums of ranks to see if any results obtained could be due to the biased distribution. For completeness, all three series were analyzed. No significant difference between observed and expected sums of ranks for the targets was found in any of the series. It therefore appears that the results obtained in the experiments are not due to the unforeseen randomization bias. Details of the sum of ranks analyses are presented in Table 4.

TABLE 4
EXPECTED AND OBSERVED SUMS OF RANKS FOR EACH TARGET
NUMBER IN EACH SERIES

Target no.	Postal (Series 1)			Laboratory (Series 2)			Web (Series 3)		
	MCE	Obs	$\chi^2(3)$	MCE	Obs	$\chi^2(3)$	MCE	Obs	$\chi^2(3)$
1	50	56	0.759	50	49	3.86	50	47	3.50
2	18.75	69	<i>p</i>	65	57	<i>p</i>	97.5	103	<i>p</i>
3	47.5	47	.86	50	50	.28	57.5	68	.32
4	22.5	22.5		35	25		45	52	

Note. Obs = Observed sum of ranks for the number of times the target number actually appeared.

However, the question remains whether the results obtained in Series 2 and 3 that may possibly favor the true precognition hypothesis really are due to precognition. Perhaps participants could have psychically calculated an accurate guess from the stock market and temperature figures on their day of mentation instead. To test this hypothesis, I performed correlations on all three series between the targets that would have arisen on the day the participants actually made their guess and the precognitive targets that were actually used. Results were significant for both the laboratory experiment ($p < .01$) and the Web experiment ($p < .01$).¹⁰ Details are provided on the left-hand side of Table 5. These findings indicate that in these two experiments the targets obtained using the stock market and temperature figures from the mentation date were

¹⁰I would like to thank Bob Morris for suggesting these analyses and other discussions on this randomization problem.

significantly similar to those obtained on the precognitive date. Thus, it would theoretically have been possible for participants to use real-time psi rather than precognition to procure good results in the precognition condition. Moreover, significant correlations were found only in the two experiments that had results suggestive of true precognition.

To gain further insight into whether participants may have been using real-time psi, I performed a test to see if participants were significantly more likely to give more favorable rankings when the target number on the day of mentation was the same as the precognitive one than when the two target numbers differed. If participants were using real-time psi, they should perform better when the target number at the time of their mentation matches the one that was to be calculated later. However, here the results were clearly at chance for all three series. The right-hand side of Table 5 provides the statistical details. The numbers of trials are lower than in the original experiments because stock market figures (and hence target numbers) could not be gained if participants did their mentation Saturday to Monday inclusive (the relevant stock market figure list was not published on those dates).

TABLE 5
CORRELATIONS BETWEEN REAL-TIME AND FUTURE TARGET NUMBERS
AND MANN-WHITNEY *U* TESTS ON RANKS GIVEN TO SAME VERSUS
DIFFERENT TARGETS FOR ALL THREE SERIES

	Correlation		Mann-Whitney <i>U</i>		
	<i>r</i>	<i>p</i>	<i>N</i>	<i>U</i>	<i>p</i>
Postal (Series 1)	.261	<i>ns</i>	29	92	.679
Laboratory (Series 2)	.524	<.01	55	320	.442
Web (Series 3)	.472	<.01	64	469	.724

Note. *N* = number of trials (same for both analyses). Bold print indicates significant results. All *p* values are two-tailed.

Because of the relatively low power in Series 1, it appears that the randomization problem could have enabled participants to use real-time psi to make their guesses. The results from the Mann-Whitney *U* tests nevertheless seem to indicate that participants did not actually capitalize on this possibility.

CONCLUDING REMARKS

The initial postal experiment suggested that true precognition may not be possible. The subsequent conceptual replication in the laboratory suggested the reverse, and the final Web-based conceptual replication showed, if anything, that participants tended to psi miss in the true precognition condition and, moreover, to perform almost significantly

differently between the two conditions. A post hoc analysis reveals that the difference between the precognition results in all three series differs significantly from each other, $N = 255$, $\chi^2(3) = 6.79$, $p < .05$, one-tailed. The results from all three series are summarized in Table 6 with two-tailed p values for all experiments for ease of comparison (although Series 1 was preplanned as one-tailed).

TABLE 6
SUMMARY OF RESULTS FROM ALL THREE SERIES

	Postal (Series 1)		Laboratory (Series 2)		Web (Series 3)	
	PCG	CLAIR	PCG	CLAIR	PCG	CLAIR
<i>N</i>	75	74	80	80	100	100
<i>Z</i>	-0.67	1.72	1.85	0.15	-1.74	0.85
<i>p</i> (2-t)	.50	.09	.06	.88	.08	.4
<i>ES</i>	-.08	.20	.21	.02	-.17	.09

Note. PCG = precognition condition; CLAIR = clairvoyance condition.

It is possible that the experiments' differences in procedure are largely responsible for the difference in results. There is some support for this in the literature to date. For instance, although Rogo's (1977) precognition ganzfeld experiment produced psi-missing results (and was not designed to rule out the possibility of real-time psi), it did not place much emphasis in putting participants into the frame of mind that precognition was possible. Freeman's (1962) forced-choice experiment explicitly set out to make participants think that precognition was easier than clairvoyance, and it subsequently achieved significantly better results in the precognition condition. Likewise, Sargent and Harley's (1982) precognitive ganzfeld experiment achieved more hits than would be expected by chance, and in this study the experimenters were also participants. Thus, as experimenters, they may not have needed to be persuaded so strongly about the possibility of precognition, because their motivation to succeed would presumably already have been high. A similar pattern can be seen in Schmeidler's (1964) forced-choice experiment in which positive results were found for precognition, but only when the experimenter was aware of which condition was at play. Psi missing occurred once the experimenter was blind to the conditions. A meta-analysis by Steinkamp, Milton, and Morris (1998) similarly indicated that precognition trials fare better when interspersed in clairvoyance trials, thus suggesting that a psychological resistance to precognition may hinder results in precognition experiments. Although this same meta-analysis did not reveal any difference in performance when participants were encouraged or when they were not, it is still possible that participants need not merely to be encouraged, but rather to have the feasibility of precognition somewhat forcibly suggested. It is therefore possible that the laboratory experiment produced relatively successful

results in the precognition condition because a lot more effort was taken in helping participants to accept the notion of precognition. This same emphasis would be hard to get across in more impersonal experiments such as those on the Web or through the post. The emphasis on precognition may even have made the clairvoyance trials psychically less attractive in the laboratory setting.

Nevertheless, the thoughts offered in these concluding remarks are subjective, selective, and post hoc. It could also be argued that these three very different sets of results from the different experiments simply indicate that all results were, in fact, due only to chance. Indeed, using two-tailed *p* values the results are at chance, and deciding whether the results are significant relies purely on which type of test was prespecified. It is for this reason that Series 1 was originally deemed significant, but the two replications were not. Moreover, the number of analyses performed must also be considered. What these two attempted replications have shown is the need for caution in the face of any experimental finding.

The next step in discovering whether true precognition is possible is to perform a direct replication of the laboratory experiment using prespecified stock market figures on a prespecified future date to determine an entry point in a random number table to avoid the randomization problems that arose in this article. If the experiment were directly replicated with the same results, this may indicate that true precognition is possible, at least under certain conditions. The essential and nonessential conditions (e.g., strong suggestion to imagine the plausibility of precognition, period of relaxed mentation in the laboratory, or prior psychic experiences) could then be teased out at a later stage.

Direct replications of the postal and the Web experiments may also serve to show whether it is indeed plausible that experimental results are strongly dependent on the experimental procedures used. Thus, there is still much work left to be done.

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Institut für Grenzgebiete der Psychologie und Psychohygiene (IGPP)
Wilhelmstrasse 3a
D-79078 Freiburg
Germany
Steinkamp@igpp.de