

An Experiment in Ganzfeld and Dreams: A confirmatory study

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Abstract: The present study was carried out as an attempted replication of an earlier study reported by Kanthamani, Khilji, & Rustomji-Kerns at the 1988 Parapsychological Association Convention. The objective of these studies was to compare two psi-conducive states, viz., ganzfeld and dream, in an experimental paradigm. The ganzfeld procedure followed a standard method, with an induction tape and ping-pong ball fixtures for the eyes. In the dream part the subjects brought their nocturnal dreams recorded at home for judging the next day. Using a clairvoyance technique, a common target was selected for the ganzfeld and dream parts of a trial. Both the subject and the experimenter judged the two mentations against a set of four target pictures using ranks and ratings. Ten subjects participated in this study and each completed two sessions under ganzfeld and two with dream. The order of presentation of the two conditions was balanced across the subjects.

Two hypotheses were tested. Hypothesis 1 predicted a significant difference between ganzfeld and dream conditions; while Hypothesis 2 predicted the scoring direction, with ganzfeld psi-missing and dream. psi-hitting. The obtained results tended to support both the hypotheses. Using the pooled scores of the two judges, we found above-chance scores in the dream condition and below-chance in the ganzfeld, although neither of them was independently significant. The difference between the two conditions, however, was significant both by the rating measure ($t(19) = 2.018, p = .029$, one-tailed) and the rank measure ($t(19) = 2.015, p = .029$, one-tailed). Internal differences between the two judges indicate better results with the subjects' judging than with the experimenter's judging.

An Experiment in Ganzfeld and Dreams: A confirmatory study

In an earlier paper (Kanthamani, Khilji, & Rustomji-Kerns, 1989) we presented an experimental paradigm by which we could study the relative effects of any two psi-conducive states on ESP test performance. In that study we chose ganzfeld and dreams as two such conducive states and compared them in a single subject's performance on a free-response task. Let us describe this study in some detail, because the present work is a continuation of it and has been carried out as an attempted replication and possible extension.

PREVIOUS STUDY

In each trial of the previous study, the subject participated in a ganzfeld session at the FRNM laboratory, and brought a report of that night's dreams collected at home for evaluation on the following day. The ganzfeld procedure included the standard technique with ping-pong balls, red lights, and an induction tape with pink noise and relaxation instructions. However, there was no agent because a clairvoyance technique was adopted. Another difference from the standard procedure was, having a delayed judging process, which was carried out on the following day after the ganzfeld session, when the dream report was also available. A common target was used for both ganzfeld and dream parts in each trial. At the judging time, the ganzfeld mentation was judged first against a set of four picture cards and the degree of correspondences noted in terms of ranks (1-4), and also rating (0-99). The dream report was similarly assessed next. Only after both sets of judgments were completed was the identity of the target revealed for any feedback.

Using the above method two series were carried out with one subject in this study, the first as a preliminary with four trials, and the second with ten trials as the pilot. The judging process was rather unusual. In both the series, in addition to the subject judging her mentations, the two experimenters also acted as judges. They judged the ganzfeld mentation first, and then the dream mentation in each trial. In an attempt to control the possible order effect in judging (since all the judges judged ganzfeld mentation first, and dream transcript second), a fourth judge was introduced in the pilot series who judged the two transcripts in the reverse order (dream first and ganzfeld second). Since there were multiple judges it was planned to use the combined scores of all the Judges for the main analyses. For combining the scores, we adopted a method that has been recently used by Carpenter (1988). The preliminary series showed above chance scores in the ganzfeld and below chance in the dream; but with only four trials, no data were significant.

The pilot data were more interesting. Using the sum of ranks method, we found significant missing ($p = .03$) in the ganzfeld and nonsignificant above chance score in the dream, along with a significant difference ($p = .015$) between the two conditions. The same pattern was noted when the rating measure was used except that the results were weaker. The difference between the two conditions was again significant ($p = .053$), though the hitting-missing trend in them was not.

Thus, the results of this previous study suggested that when ganzfeld and dream conditions are compared for their relative influence on a psi task, one might find that the dream scores will be higher than ganzfeld; with psi-missing in the ganzfeld condition. There were two aspects of this study that needed further work. (1) Since this study was done on only one subject, it was difficult to find out whether the obtained ganzfeld-dream difference was due to this individual's idiosyncrasies, or whether there was some inherent difference between them. This could be addressed by increasing the sample size. (2) There was an uncontrolled order effect in the data. In each trial it was so arranged that the ganzfeld condition came first and the dream condition came second. Thus, the results could be confounded by this constant order in which the two conditions were presented. It was felt at that time that counterbalancing was not advisable as the carry over effect of dreams to ganzfeld would be more than in the reverse order, especially for the given subject. This could be changed with more subjects participating in the experiment.

These two points needed to be addressed in another study. The present experiment was undertaken exactly for this purpose; and it is also considered as an attempted replication. As such, the same methodology was used as far as possible, except for counterbalancing the two conditions and extending the study to include more subjects. It was also felt that having multiple judges was not necessary for the outcome. Therefore the present study was planned to have only two judges—Subject and Experimenter 1. In all other respects the two studies are identical.

PRESENT STUDY

Design

It was planned to have a within subject design, with 10 subjects participating in both ganzfeld and dream conditions. They were required to complete two trials, each with two conditions — one for ganzfeld and the other for dream. There were two orders of presenting these two conditions: (1) ganzfeld first and dream second (G-D order), and (2) dream first and ganzfeld second (D-G order). Each subject contributed to both orders by following one order in the first trial and the reverse order in the second trial. The order in which these two occurred was balanced across the individuals. In all, ten ganzfeld sessions occurred first followed by dream condition; and ten others occurred after the dream.

Subjects

The participants were all volunteers, who were selected purely on the basis of their interest. It was necessary to find subjects who showed interest in both ganzfeld and dreams, so that there would be less bias in their expectations of the outcome. The experiment was advertised purely by word-of-mouth, and from those who showed keen interest 10 were taken for participation in the present experiment. There were five males and five females, all students at Duke University except one, who was a member of the FRNM lab. Two of the students were also lab associates. As A.K. is associated with Duke, all the participants happened to be her acquaintances.

All the participants had filled out the PIF (Personality Information Form) and the MBTI (Myers-Briggs Type Indicator) as part of an orientation conducted prior to their actual testing. Results based on these questionnaires will not be included in this paper.

Targets

The target pool consisted of 50 sets of 4 pictures, which represents the standard pool constructed by the authors for ganzfeld and other free-response work at the Institute for Parapsychology since 1986. The majority of the pictures include art prints and some are picture postcards. When the sets were originally put together, care was taken to prevent overlap and to provide sufficient within-set diversity in terms of theme, content, and style. The individual pictures in a set had their own code numbers and were kept in sealed envelopes placed between folded construction sheets. The outside of each envelope was marked with a number from 1 to 4 to identify it. A duplicate set meant for judging purposes was also included in the same set. The target sets, marked with serial numbers from 1-50, were always stored in a locked filing cabinet. During the trial time the required target and the judging packet were retrieved. They were later resealed in new envelopes and replaced in their original order. Necessary precautions were taken, as has been the practice at the Institute, to see that no unauthorized person had any access to the target pool.

Procedure

The essential procedure was identical to the one described in our earlier paper (Kanthamani, Khilji, and Rustomji-Kerns, 1989). It can be described under three main parts: the ganzfeld, dream, and judging tasks. As in the previous study, a clairvoyance technique was used here. In this report we prefer to refer to the participants as "subjects", although in our previous report, we called them "percipients". Similarly, the Percipient Experimenter is labeled as Experimenter 1 (E1) here, and the data-handler as Experimenter 2 (E2).

As mentioned earlier, each participant was involved in two trials comprising two sessions each, to carry out the ganzfeld and dream tasks. The second session was followed by the judging session, in which the two judges (subject and E1) judged the two

transcripts of the trial against a set of four pictures that included a target and three decoys. The ganzfeld and dream sessions took place on two consecutive days; ganzfeld at the lab and dream at home. In one trial they worked with the G-D order and in the other, the D-G order. Thus, each participant contributed two sessions under each condition. The two authors were involved as the experimenters, with their roles identical to the ones in the previous study. A.K. was in the role of Experimenter 1 and was responsible for conducting the ganzfeld, and for instructing the subjects for the dream part of the experiment. She was also involved as a judge along with the subject in judging the two mentations. H.K. acted as Experimenter 2, and was responsible for selecting a target at each trial and for keeping it safe until the end of the trial.

Ganzfeld Procedure. At the beginning of a ganzfeld session, both experimenters met in the ganzfeld suite, along with the subject. After the initial briefing of the subject, the ganzfeld set-up was applied. This included having the subject adjust the reclining chair and the sound level of the induction tape to his or her comfort level, and then having Experimenter 1 affix the ping-pong ball halves firmly on his or her eye sockets by the use of surgical tape. The red lights were then turned on, the normal white lights were extinguished, and the lamps were adjusted so as to directly flood the subject's visual field to his or her comfort. Then the headphones were placed on the subject and the experimenters wished him or her good luck, after which the door between the two rooms was closed. The trial was initiated when Experimenter 1 turned on the induction tape, and simultaneously started the stop watch. At this time Experimenter 2 left the room by closing the door to the ganzfeld suite behind her, and Experimenter 1 remained in the monitoring room getting ready for recording the subject's mentation.

The induction tape was the same one that had been used before in all our standard ganzfeld work at the Institute. It contains pink noise along with a 14-minute sequence of instructions for relaxation which are based on Jacobson's progressive relaxation method. At the end of the relaxation sequence, the tape also contains suggestions for the response set and for verbalizing the mentation process. Following this, pink noise continues for another 25 minutes during which time the subject verbalizes his or her mentation.

Meanwhile, Experimenter 2's task was to select a target using a random number generating program on the Institute's main computer. This custom-written program employs a modified version of the FORTRAN-77 pseudo-random number generator that has been extensively tested and has been in use for many years at the lab. Two numbers were accessed (with replacement); the first to determine a target set (1-50) and the second to identify a target envelope (1-4). She pulled out the target envelope from the set and again sealed it in a larger manila envelope, affixing her signature over the seal and securing it with adhesive tape. Over the front of the envelope she wrote the experiment's

name, trial number, the subject's name, and the date. All this was done as a "help" in focusing for the subject. She kept the sealed target in her office over a book in the bookshelf. The subject was informed of the place where the target would be all through the trial. H.K. left the judging packet in the set itself and took it out only at the time of judging.

During the mentation period, the subject verbalized his or her internal images in an attempt to generate ESP information. All the information that was produced by the subject—imagery, thoughts, feelings, and impressions—were both tape-recorded and also transcribed by the experimenter as completely as possible. At the end of the mentation period, Experimenter 1 entered the ganzfeld room and in a soft voice conducted the association phase. This meant reading her transcription back to the subject to stimulate any further memories or comments, which were then added to the notes. After this, Experimenter 1 assisted the subject in removing the ping-pong ball fixtures and turned off the red lights, after which the normal lights were gradually brought up. When the subject got adjusted to the lighting, he or she was asked to rate his or her reactions to the session on a 9-item scale called the Percipient Questionnaire. (Results based on this questionnaire will not be discussed in this paper.) Also, Experimenter 1 asked a couple of other questions to assess the subject's general feelings, level of relaxation during the session, and whether he or she felt the whole process as a pleasant experience or not. This concluded the ganzfeld session and Experimenter 1 handed over a xerox copy of the documents to Experimenter 2 for safe-keeping.

Dream Procedure. The idea for the method used here for testing dream psi came from an earlier study carried out by Child, Kanthamani, & Sweeny (1977). It was similar to the previous study, in that the nocturnal dreams were recorded for the night scheduled for the trial. Subjects stayed in their own residence and attempted to get the target information through their dreams.

Prior to the scheduled night, Experimenter 1 met with the subject and handed him or her a set of transcription sheets meant for recording the dreams. Subjects were asked to stay in their own homes and were instructed to have a "low-keyed" evening by avoiding late-night partying or working late. We had found from our earlier work that such a set would be favorable for dreaming. Other instructions included their trying to "focus" on the target before going to bed and give suggestions to themselves that the target information would enter in their dream-life. The target stayed in Experimenter 2's office at the lab. The subjects were asked to keep some writing material near their beds and if they should wake up after a dream, to briefly record it. However, they were not required to wake themselves up between dreams through any artificial means like an alarm having somebody else wake them up, etc. In the morning, as soon as they woke up, they were asked to write down a detailed report of their dreams, using notes they might have jotted down in between sleep periods. Even if they did not remember much, they were asked to write down their feelings, impressions, and whatever else they could think of.

There was no other contact with the subjects except for this pre-session briefing.

All the subjects readily agreed to follow the above-mentioned instructions and carry out the suggestions as required. However, as it turned out many of them ended up having late-night activities and other excitement. The next day they brought their dream reports and handed them to Experimenter 1. If anybody brought blank sheets back, indicating that they either did not dream, or were unable to recall, Experimenter 1 encouraged them to try to recollect anything they might remember and to write it down. This occurred only once, and with the experimenter's encouragement, the subject wrote down a brief report. After obtaining the dream report from the subject, Experimenter 1 made a photocopy of it and handed it over to Experimenter 2 for safe-keeping. This completed the dream procedure.

Judging Procedure. The judging session was held following the second session of a trial, when both the ganzfeld and dream parts were completed. As mentioned earlier, it was planned to have two people carry out the judging, the subject and Experimenter 1. At this time, Experimenter 2 retrieved the judging packet from the locked filing cabinet and handed it over to Experimenter 1 for judging purposes. Both the subject and Experimenter 1 met in a room and reviewed the first mentation, judged it against the four pictures of the judging set, then carried out the same with the second mentation. As in the previous study, while there was a free interaction between the two people in finding similarities and correspondences of a given mentation with the target pictures, both the subject and Experimenter 1 did their own judging independently on separate judging forms. Each judge indicated his or her choice of the target, using both the rank measure from 1 to 4, and the ratings measure, on a scale of 0 to 99. Lower ranks and higher ratings meant greater correspondences. Ties were discouraged in the judging.

When both judges completed their task they signed the judging form, which signified the completion of the task. Experimenter 1 handed copies of these documents to Experimenter 2, and in exchange received the sealed target envelope. The envelope was opened in the presence of both the judges to get full feedback at the same time. The feedback session continued for several minutes while both judges attempted to find clues that they either missed or used successfully in picking the target. The whole judging process took about an hour to an hour and a half. Then Experimenter 1 carried out the debriefing and thanked the subject for the participation. This marked the completion of one trial, which really extended over a two-day period. Generally the two trials were scheduled at least a week apart.

HYPOTHESES

Before formulating the hypotheses, it may be worthwhile to check the track record of the FRNM ganzfeld success rate. Unfortunately, it appears to be biased more on the

psi-missing side so far. Our first attempted ganzfeld replication (Munson, Kanthamani, Khilji, & Zingrone, 1988) gave an overall evidence of psi-missing. An earlier study on ganzfeld and dreams (Kanthamani, Khilji, & Rustomji-Kerns, 1989) showed significant missing in the ganzfeld condition. A different paper to be presented at this conference on ganzfeld with subliminal sending (Palmer & Kanthamani, 1990) also reports significant missing. The only exception to this trend is a report that we gave during last year's PA convention (Broughton, Kanthamani, & Khilji, 1989). In this, a small subset of 28 subjects selected from a larger pool on the basis of a "three-factor PRL success model" produced above-chance scores.

While we are aware of the large body of research (Honorton, 1985) in the ganzfeld area indicating a high success rate, for some reason we have not been able to corroborate this at our lab as yet. Only more work should unveil all the factors necessary for such success. In this regard, even those studies which predict a missing trend (like the present work) should be of equal value in understanding the various factors.

Based on our previous work (Kanthamani, Khilji, & Rustomji-Kerns, 1989), two hypotheses were generated relating to the ganzfeld-dream differences for testing in the present experiment. In formulating these hypotheses, we considered only the pilot series results, because they were stronger than the preliminary series and also because they included a larger database. A third hypothesis relating to the order effect was also formulated based on the present methodology, but the details of it are not included here.

Hypothesis 1: There will be a significant difference in the scoring rate between the ganzfeld and dream conditions.

Hypothesis 2: The scoring direction of the two conditions will show:

- (a) significant missing in the ganzfeld data; and
- (b) significant hitting in the dream data.

To test the above hypotheses, the following strategy was followed. Because in our earlier work, a combined score of all the judges was used to test the main effects, it was felt necessary to follow the same procedure here also. Accordingly, it was planned to take the combined scores of the subject and Experimenter 1, who both acted as judges in this study. For doing this, both the rating and the rank measures were used, just as in the earlier work.

Planned Primary Analyses

For testing the ganzfeld-dream differences, two sets of primary analyses were planned using *t* tests. The following two methods describe the way in which the two judges scores were combined for these analyses.

(a) *Rating method:* In this, we combined the ratings of the subject and Experimenter 1 for each picture in a target set and then obtained a standard *z* score (Palmer, 1986) for these pooled ratings separately for each trial. These *z* scores were then used to compare

the ganzfeld and dream conditions by a two-sample t test, meant for correlated data. This provides the test for Hypothesis 1. Similarly, the same z -scores were used to find out the significance of each condition separately (Hypothesis 2) by comparing them to the theoretical mean z of 0, using a single-mean t test. In both cases a t , significant at the .05 level with one-tailed probability, was set as the criterion for accepting the hypothesis.

(b) *Ranking method*: A similar procedure was used to obtain the pooled ranks for each picture. The individual ranks of the subject and Experimenter 1 were combined for each picture in a set, and the rank assigned to the target picture in this fashion in each trial was used to test the ganzfeld-dream differences. As described above, a two-sample t test (meant for correlated data) was applied for the difference between the two conditions; and a single mean t test, compared with a theoretical mean of 5.0, was used for testing each condition separately. The same criterion of a .05 level (one-tailed) was required for accepting a hypothesis.

It may be noted that the two scores (rating and ranking) are not independent measures. However, since no predictions could be made based on previous work, regarding the relative sensitivity of these measures, we continued to use both types of scores in the analyses. To that extent, we have allowed multiple analyses to enter as a problem. Any confirmation of a hypothesis, therefore, should be corrected by the number of analyses made.

Planned Secondary Analyses

Checking ganzfeld-dream differences separately for the subject and Experimenter 1, to see if one is better than the other, formed the main secondary analyses. Our previous data did not give any reason to expect whether the subject judging is better than the experimenter judging, or the reverse. Therefore, a two-tailed probability was required, at the .05 level of significance, to indicate any internal evidence of ψ in the various categories. As before, a single-mean t would determine the significance within each condition, and a t of the difference (correlated data) would compare the two conditions. All these analyses were to be done for both the subject and Experimenter 1 separately, taking ratings and ranks independently.

RESULTS AND DISCUSSION

Table 1 gives the general results of ganzfeld and dream conditions in terms of subject judging, Experimenter 1 judging, and the pooled judging (subject plus Experimenter 1) for the rating and rank measures separately. Considering the results from the pooled rating first, we have the following. The mean z for ganzfeld is $-.116$, and it is $.257$ for the dream. These scores differ significantly from each other with $t = 2.018$, 19 df, $p = .029$ (one tailed). This provides support to the first hypothesis.

To test the second hypothesis by the pooled ratings, the mean z score in ganzfeld and the mean z score in dream were compared to the theoretical z of zero. According to these

analyses, the ganzfeld condition gave psi-missing, while the dream scores were above chance. This pattern is in line with the predicted direction, although neither is independently significant ($t = .552$ for ganzfeld, and $t = 1.584$ for dream). The dream scores, however, are stronger than the ganzfeld compared to the MCE. These results tend to provide only partial support for Hypothesis 2, in that only the directional prediction is observed and not the significance in each condition.

Testing the two hypotheses from the pooled rank scores we get similar results. The mean target rank for the ganzfeld is 5.20, and for the dream it is 4.30, with an MCE of 5.0. Again, this is in line with the predicted direction, with above-chance scores in dream condition and below-chance scores in the ganzfeld condition. Using the single-mean t test, the dream scores reach significance, $t(19) = 1.789$, $p = .045$ (one tailed), but the ganzfeld is not significant ($t = .438$). The difference between the two conditions is also significant, with $t(19) = 2.015$, $p = .029$ (one-tailed). These results again give support to the first hypothesis and only partially support the second hypothesis. It looks as if the ranking method has pulled up the significance in the dream condition. It may be stated that we have not made any allowance for multiple analyses in testing the hypotheses.

To see if the observed ganzfeld-dream differences were uniformly distributed between the two judges, similar analyses were carried out taking subject and experimenter ratings and ranks separately, as planned secondary analyses. As can be seen from Table 1, for ratings, the difference between dream and ganzfeld is independently significant for the subject but not for Experimenter 1, although they are in the same direction. The mean z score for the subject is $-.087$ (n.s.) for the ganzfeld and $.345$ for the dream ($t(19) = 2.068$, $p = .053$, two-tailed). These two means show a significant difference between them, $t(19) = 2.228$, $p = .038$, two-tailed.

Taking the subject ranks into consideration, the results get much better. The mean rank for the dream is 1.95, and for the ganzfeld it is 2.6, with an MCE of 2.5. The two means differ significantly with $t(19) = 2.557$, $p = .019$ (two-tailed). The dream scores are independently significant with $t(19) = 2.604$, $p = .017$ (two-tailed), but the ganzfeld scores are not. Experimenter 1 scores, on the other hand, are much weaker, although following the same trend, and none of the values are independently significant.

In conclusion, it can be said that the results of this experiment tended to support the findings of the previous study. As predicted, there was an overall significant difference between the ganzfeld scores and the dream scores. Secondly, the directionality of these two scores also seems to hold up. In the Present study the dream condition tended to yield significant results above chance, while in the previous study it was the ganzfeld condition that showed significant psi-missing. Thus, both conditions seem to be successful in producing psi, but for some reason it is in the missing direction for ganzfeld, while the dreams appear to enhance it. Although the results would get much

weaker when corrected for multiple analyses, it may be noted, however, that these analyses were done only as preplanned. A full proof of the hypotheses can only be achieved with a much larger database, which we hope to accomplish in the near future.

Questions relating to the possible stacking effect (in having a common target between the two conditions for each trial) have already been addressed in the previous study. Also, the role of differential effect as an alternative explanation for the obtained results has been discussed in the previous study. It may be noted that between the two measures of analysis, the ranking method appears to be superior to the rating method in both the present study and in the previous one. However, we still continue to use both, since each of these methods is robust in itself and it is premature to choose one above the other. Only more work can tell the future applications of these methods.

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TABLE 1

Overall Results by the Two Judges (S and E1)

	S Judging		E1 Judging		Pooled (S+E1)	
	Ganz .	Dream	Ganz .	Dream	Ganz .	Dream
Mean <i>z</i> Score for ratings	-.087	.345	-.092	.207	-.116	.257
Single Mean <i>t</i>	.451	2.068 <i>p</i> = .053*	.420	1.296	.552	1.584
<i>t</i> (19) difference	2.228, <i>p</i> = .038*		1.612, ns		2.018, <i>p</i> = .029**	
Sum target ranks	52	39	52	47	104	86
Mean target rank	2.6	1.95	2.6	2.35	5.20	4.30
MCE for ranks	50	50	50	50	100	100
Single Mean <i>t</i>	.391	2.604 <i>p</i> = .017*	.391	.719	.438	1.789 <i>p</i> = .045**
<i>t</i> (19) difference	2.557, <i>p</i> = .019*		1.000, ns		2.015, <i>p</i> = .029**	

* two-tailed

** one-tailed

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