

AN EXPERIMENT IN GANZFELD AND DREAMS:  
A FURTHER CONFIRMATION

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**Abstract:** The present experiment is a third study in the series, carried out comparing ganzfeld and dream conditions, in a free-response ESP test. The earlier two studies (Kanthamani, Khilji, & Rustumji-Kerns, 1989; Kanthamani & Khilji, 1990) had showed a significant difference between ganzfeld and dream scores, with higher scoring rate in the latter. While the first experiment was with a single subject, the second included 10 subjects; but the findings needed to be replicated on a larger sample size. The present study was conducted for this purpose.

Twenty volunteers participated in the experiment. They completed two trials, each with a ganzfeld condition and a dream condition. The order in which the two conditions were presented was kept deliberately constant for all subjects. The ganzfeld followed by dream (G-D) sequence was presented in the first trial, and the reverse, dream followed by ganzfeld (D-G) sequence was presented in the second trial. Using a clairvoyance technique, a common target was set-up for both conditions. The standard procedure for ganzfeld was used. The dream part consisted of subjects bringing a report of their nocturnal dreams collected at home, for judging, the following day. Both the subject and the experimenter acted as judges in evaluating the two protocols against a set of four target pictures. The degree of correspondences were noted both in terms of ranks (1-4) and ratings (0-99).

The results were analyzed by a 2-way ANOVA, using the z-scores derived from the pooled ratings of the judges. The main hypothesis, derived from the previous work, predicted a significant difference between the two conditions in favor of the dream. The obtained results confirmed this hypothesis. The ganzfeld-dream differences were significant, with  $F = 3.699$ , (1, 19df),  $p = .035$  (1-tailed). While the scoring rates of both conditions were above chance, it is independently significant in the dream condition ( $Mz = .331$ ,  $t = 3.521$ , 19df,  $p = .0023$ ), but not in the ganzfeld ( $Mz = .089$ ). An order effect and the interaction were non-significant. The superiority of dreaming as a better psi-conducive state than ganzfeld held up for the third time in the series of these experiments. The present study, thus, served as a successful replication of the previous work.

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Further analyses showed that the ganzfeld-dream differences were significant both in subject's judging ( $p < .05$ ), as well as in experimenter's judging ( $p < .05$ ). The order effect, however, was significant ( $p < .018$ ) only for the experimenter. It showed that the second presented condition was better than the first presented condition; and further the difference between the two was significant in the first trial where G-D order presentation was followed. The present experimental design does not permit a clear distinction between competing interpretations of the order effect, which will require a more elaborate experimental design.

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The origins of ganzfeld research can be traced to the dream-psi research of the 1960's and 1970's. The all night monitoring of the REM-dream method for obtaining psi information, as practiced at the Maimonides Medical Center, was obviously a time-consuming, and expensive technique. In spite of these difficulties, the dream-psi research continued for more than a decade, eventually being replaced by simpler methods of creating psi-conducive states. The sensory deprivation technique was probably the first offshoot of REM-dream method, which soon led to the development of ganzfeld-psi research.

There is extensive literature on both ganzfeld and dreams as altered states, and their inherent conduciveness for psi enhancement. The ganzfeld research has gained a substantial boost from the Honorton-Hyman debate (Hyman, 1985; Honorton, 1985) and their joint recommendations for further research (Hyman & Honorton, 1986). The recent surge of corroborative evidence provided by the auto-ganzfeld studies and the meta-analysis of the PRL (Psychophysical Research Laboratories) studies (Honorton et al., 1990) strengthen the early claims.

For the dream-psi work, Maimonides research (Ullman, Krippner, & Vaughan, 1989) still stands as the most significant line of work, in establishing laboratory evidence of psi in nocturnal dreams. Although the dream research was not without its failed replications, it remains a promising area. After carefully reviewing decades of dream-ESP work. Child (1985), notes that small-scale studies done without the use of expensive sleep laboratories do in fact support the more convincing Maimonides work (Braud, 1977; Child, Kanthamani, and Sweeney, 1977).

Apart from ganzfeld technique being the offspring of dream research, certain similar features between the two could be isolated. They are: physical relaxation, sensory isolation, and inwardly directed attention. While these features are naturally present in sleep, they are experimentally induced in the case of ganzfeld. Honorton (1977) notes that the "reduction of noise from sensory systems" and "internalization of attention" are the key factors in the altered states studies, which formed the theoretical rationale for the development of ganzfeld technique. In addition to these, in almost all cases a set of relaxation instructions are included for the ganzfeld induction. Another similarity involves the type of ESP test used, which is mostly the free response type with complex target material.

In spite of the obvious similarities between ganzfeld and dream techniques noted above, no one has tried to study their relative merits in any experimental set-up. As a matter of fact, few systematic comparisons of various forms of

altered states have been made, except for one study (Wood, Kirk, & Braud, 1977) that compared ganzfeld with relaxation, which showed only chance results throughout. Altered states research has been of long standing interest to parapsychology; yet, the exact-role of "altered states" in such research remains unclear. It is necessary to focus our attention on, among other things, finding out if any "special states" exist in contrast to the "normal waking state" that are more psi-conducive; and to compare these states for their relative merit in producing psi information. Such studies would do well to also address questions concerning subjects' expectancies in experiments, as pointed out by Casler (1987). We hope the present investigation would be a step in this direction.

In the present investigation we have used an experimental paradigm that could be adapted for studying the relative effects of any two psi-conducive states on ESP test performance. We have chosen ganzfeld and dreams as two such states and compared them on subjects' performance on a free-response ESP task. It is an ongoing project at the Institute for Parapsychology, and we have already reported the first two studies (Kanthamani, et al. 1989; and Kanthamani & Khilji, 1990). The present paper deals with the third study carried out as an extension and further confirmation of the previous findings. The main purpose in these experiments is to study the ganzfeld-psi and dream-psi factors, to determine if one is better than the other, or both equally good. More specifically, the objective is to compare the relative success of ganzfeld and dream protocols of an individual in identifying the target.

#### Previous Studies

The first experiment was a single subject study (Kanthamani, et. al, 1989), which included a short preliminary series, and a pilot test. The second experiment involved ten subjects, each completing two trials. A within-subject design was used in both experiments, in which AK and HK were the two experimenters. Each trial included a ganzfeld condition and a dream condition, with a common target between the two. This method was preferred to having separate targets, as one of our long range objectives is to see if something similar to Poetzl effect, which is commonly observed in subliminal literature (Dixon, 1971), would occur in ESP tests also. Any form of psi-information that is likely to be enhanced from one condition to the other is obviously better when the ESP target remains the same, than having separate targets between them.

In each trial the subject participated in a ganzfeld session at the Institute for Parapsychology 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, it was different from the standard procedure in the following respects: (1) Instead of the usual GESP method, a clairvoyance technique was used, because this was more convenient. (2) The judging process was conducted only when both conditions were completed in a given trial. (3) In addition to the subject, there were other judges. In Experiment 1, the two experimenters and an external judge participated in the judging; while in Experiment 2, only the main experimenter acted as an additional judge.

For the dream portion, the target remained at the Institute, and the subjects attempted to get the target information through their nocturnal dreams. They were told to focus on it before going to bed and to give a suggestion to themselves that target information would enter in to their dreams. They were also instructed to keep some writing material nearby when they went to bed, so as to jot down their dreams briefly if they woke up in the middle of their sleep. As soon as they got up in the morning, they were required to write down a full report of their dreams, which they brought to the lab for evaluation.

As noted above, the judging of the protocols took place when both parts of the trial—ganzfeld & dream conditions—were completed. This was done by comparing each mentation against the four pictures from the judging pool, and recording the correspondences in terms of ranks (1-4) and ratings (0-99) separately by each judge. The judging procedure adopted here is similar to that in the Carpenter group studies (1987), where different judges<sup>1</sup> together reviewed the mentation reports one at a time, in the order they were carried out, and freely associated to the possible correspondences of each picture with the mentation, although writing down their choices was done independently on separate judging forms. After depositing the copies of judging sheets with the data handler, the target envelope was opened to reveal the target and to have the feedback discussion.

Thus, each trial was stretched over a period of two days with three long sessions. The order of presenting the two conditions remained constant in study-1, where the single subject did ganzfeld part first and dream part second in each trial. In study-2, the two orders; G-D (ganzfeld first & dream second) and D-G (dream first & ganzfeld second) were counter-balanced across the subjects. Thus, while half of them had G-D order in the first trial, and D-G in the second trial, the remaining subjects had the reverse sequence.

For analyzing the results the pooled scores of different judges were used to test the main hypotheses and individual judges' scores for any internal analyses. Therefore, in each trial the various judges' ratings for each picture were pooled and a z-score was obtained from the pooled ratings using the Stanford 1974 method (Stanford & Sargent, 1983). The z-scores of the different trials were tested by a single mean t-test for the overall significance in ganzfeld condition and dream condition separately, and a correlated two-sample t-test for testing their difference. Similarly the ranks of different judges were pooled in each trial to obtain the sum of ranks for the targets, which were then tested by a single-mean t and two-sample t-test as described above.

Considering the pilot series in study-1, the mean z-score of the ten trials under ganzfeld is -0.534, which compared to the theoretical mean gives a  $t = 2.094$ , (9 df),  $p = .0658$  (2-tailed). This value indicates psi missing, although to a marginal degree. The mean z for the dreams is 0.261, which is not significant. The same pattern is noticed taking the ranks measure into consideration, probably slightly better. The missing under ganzfeld is

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<sup>1</sup> The external judge in Study 1, was not present during this group discussion for the judging task. She carried out her judging independently.

independently significant with a  $t = 2.75$ , ( $df=9$ ),  $p = 0.0225$  (2-tailed); while the above-chance scores of the dreams are not. The difference between the two conditions is, however, significant with a  $t = 3.015$  ( $df=9$ ),  $p = 0.015$  (2-tailed). No significant differences were observed between judges.

Thus, the results of the first study were highly encouraging. Since this was a single subject study, the obtained pattern of results could be attributed to the "idiosyncrasies" of the subject, and therefore, it needed to be tested on more subjects before drawing conclusions.

Two hypotheses were tested in study 2. 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 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 indicated better results with the subjects' judging than with the experimenter's judging.

#### Present Study:

The results of study 1 and study 2 suggest that when ganzfeld and dream conditions are compared for their relative influence on a psi task, we are likely to get higher scores in dreams than in ganzfeld. Although in Study 1, there was a significant psi missing in ganzfeld, it could be attributed to some factor unique to the single subject in it. In study 2 the dream condition showed higher magnitude; and it was independently significant if we take subjects' judging alone. While these findings are fairly encouraging, one more experiment with a larger sample size was felt necessary to carry out at this stage. Study 3 was carried out for this purpose. The main objective, once again, was to see if dream condition would continue to be better than ganzfeld in producing psi-information. From this standpoint, this series serves as another replication attempt, along with certain extensions.

#### Design

As in the previous experiments, a within-subject design, with 20 subjects participating in both ganzfeld and dream conditions was planned. 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), and (2) dream first and ganzfeld second (D-G). While each subject contributed to both orders, the two orders were not counterbalanced, but, deliberately kept constant for all the subjects. In the first trial they had G-D sequence, and in the second trial D-G sequence. The reason for following this pattern is, in study 2, in which the two sequences were administered in a counter-balanced manner, better results were obtained by those who underwent G-D sequence in the first trial and D-G sequence in the next. The reverse pattern did not produce as effective results. Therefore, in the present experiment, we felt that we should create the optimum situation by keeping the favorable order of presenting the two conditions instead of

counter-balancing them. The favorable order to follow was the G-D sequence in the first trial and D-G sequence in the second trial for all subjects. In all there were 40 ganzfeld sessions, 20 followed by dream and 20 preceded by dream. Likewise, there were 40 dream sessions, between the two presentations, equally contributed by the 20 subjects.

### Subjects

Participants were all volunteers who were selected purely on the basis of their expressed interest. It was necessary to find only those who showed equal interest in both ganzfeld and dream parts of the study, so that there would be less bias in their expectations of the outcome. The experiment was announced by word-of-mouth, and only those who showed sufficient interest, and commitment for the time required to complete the two trials, were invited to participate in the experiment. As it happened, six subjects dropped out<sup>2</sup> after completing only one trial. Therefore, additional subjects were taken until we had the required 20 trials. Of these there were 9 males, and 11 females. Four of them were university students, seven connected with the lab, and the remaining nine belonged to different professions. All of them were first time participants in this project, 12 were novice, and the remaining eight had participated in earlier ganzfeld experiments. All the novice participants had filled out the PIF (Personality Information Form) and the MBTI (Myers-Briggs Type Indicator) as part of an orientation conducted prior to actual testing. The experienced participants had taken these tests during their earlier ganzfeld testing. This paper, however, will not include any analyses based on PIF and MBTI, which are reserved for a later time.

### Targets

The target pool consisted of 50 sets of 4 pictures, which represents the standard pool constructed by Kanthamani & Khilji in 1986 that has been in use for ganzfeld and other free-response work at the Institute. The majority of the pictures are art prints, while some are also picture postcards. These sets were originally constructed taking care to see that there was little overlap and sufficient within-set diversity in terms of theme, content, and style. In each set, the individual pictures had their own code numbers and were kept in sealed envelopes between folded construction sheets. Outside the envelopes were marked numbers between 1-4. A duplicate set of four pictures with identical codes, were sealed in another envelope, meant for judging purposes was also included in the same set. The targets sets, with serial numbers on them, remained always in a locked filing cabinet, retrieved only by the responsible person during the trial, after which they were resealed in new envelopes and placed back 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

When this experiment was started in the Summer of 1990, it was planned to be carried out by AK and HK as the two experimenters. However, AK left FRNM

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<sup>2</sup>The reason for dropping out of these six subjects, was not the outcome of the first trial, but due to other circumstances.

a few months later, by which time only one subject had completed the required two trials, and three others had done one trial. At this time RSB joined the team, and took the role of a datahandler (DH), while HK assumed the percipient experimenter's (PE) role for the remaining subjects. HK was responsible for recruiting the subjects and carrying out the testing with them. RSB was in charge of the target selection, its safe keeping throughout the two-day period of a trial, and storing the copies of the documents. In some trials, there was an assistant experimenter (AE) with HK during the testing. Four such people (AK, KJ, CH, and KD) were present in a total of 18 trials, who also acted as an additional judge in those trials.

The essential procedure was identical to the previous studies. It can be described under three main parts—covering the ganzfeld, dream, and judging tasks. Each participant had two trials, consisting of two conditions each, representing ganzfeld, and dream. Dream part, of course, took place in subjects own residence. As mentioned above, the order of the two conditions was kept constant for all the subjects. They did ganzfeld first and dream next in the first trial, and the reverse order in the second trial. The two trials were set at least a week apart, and in many cases it was much longer.

### Ganzfeld

All the ganzfeld sessions<sup>3</sup> were conducted in the new "ganzfeld suite" at the Institute. It consists of two small rooms on the second floor of the building. The equipment room opens to the side hall-way, and holds all the recording and monitoring instruments. The interior smaller room is situated directly behind it, and the only entrance is through another room which houses the Institute's manuscript, and foreign language library. This part of the building is closed to unauthorized personnel during the ganzfeld session. The interior room is away from traffic, and reasonably quiet without additional sound-proofing. The room is equipped with a reclining chair for the subject, a small chair for the experimenter, a lamp, and a side chest which contains the necessary material for the ganzfeld fixture. The only window of this room was permanently shut and covered with drapes. Two 100-watt red flood lights are fixed high on the wall, about 2.4m from the subject's head, and are operated by a dimmer switch in the monitoring room. Initially, there was a video set-up between the two rooms, so that the experimenter from the monitoring room could watch the percipient on a T.V. screen. However, this was removed after a few trials. There is an intercom between the two rooms, which is used during the session between P and PE.

During the session after the initial briefing, PE applies the ganzfeld set-up. This included having P adjust the reclining chair to his or her comfort level; setting the sound level of the induction tape to the P's comfort; and then affixing the Ping-pong ball halves firmly on the P's eye sockets using surgical tape. The headphones are placed on the P's ears, and then PE leaves the room wishing him or her good luck. The door between the two rooms will be closed as PE exits, and also the door leading to the hallway will be kept shut. PE then turns on the red lights, extinguishing the normal white lights and

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<sup>3</sup> Three subjects from the incomplete list, with AK-HK team were tested in the old ganzfeld suite.

adjusts its intensity to P's satisfaction. She starts the induction tape now, which marks the beginning of a trial.

The induction tape is the same one used in all our ganzfeld work at the Institute. It contains ocean wave sounds 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 to verbalize the mentation process. Following this, pink noise begins and continues for another 25-minutes during which time the P verbalizes his or her mentation.

All the information reported by P—imagery, thoughts, feelings, and impressions—are tape-recorded and also transcribed by HK as completely as possible. At the end of the mentation period, PE conducts the association phase through the intercom. She reads aloud her transcription back to P, to stimulate any further memories or comments, which were also added to the notes. After this, PE instructs P to remove the Ping-pong ball fixtures, and when P is ready, she turns off the red lights gradually, and brings the normal lights up. Now PE enters the ganzfeld room and requests P to rate his or her reactions to the session on a 9-item scale called the Percipient Questionnaire (Results of this will not be included here). This concludes the session and PE prepares P for the next session.

#### Dream Procedure

The procedure here was identical to the previous studies in that nocturnal dreams were taken for the night scheduled for the trial. Subjects stayed in their own residence and attempted to get the target information through their dreams. The target stayed at the lab in RSB's office. The idea for this method of testing dream-psi came from an earlier study carried out by Child, Kanthamani, and Sweeney (1977).

Prior to the scheduled night, HK instructed P to have a normal "low-keyed" evening and just think about the target before going to bed and give a suggestion to themselves that the target information would enter in their dream-life. They were asked to keep some writing material near their bed and if they wake up after a dream, to briefly record it on the paper. However, they were not required to wake up in between through any artificial means like an alarm or somebody else waking them up, etc. In the morning as soon as they woke up, they should write down a detailed report of their dreams, using any notes they had jotted down in between sleep periods. Even if they did not remember much, they had been 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 carried out the suggestions as required. The next day they would bring their dream reports and hand them to HK. If anybody said that they did not dream, or could not recall anything, HK encouraged them to try to recollect again, and to write down whatever they could remember then, even if only the feelings and impressions. Thus, in each case, some report was prepared to use in the judging task. This completed the dream procedure.



## Target Selection

RSB's task was to select the target and store it, at the specified place prior to the onset of a trial. HK provided him with a manilla envelope, on which she had written the subject's name, trial number, and the two dates during which the trial is scheduled to take place. In the "personalized" envelope RSB inserted the selected target which was also in a sealed envelope, and placed it at the selected place on his book-shelf. All envelopes were sealed in such a way as to detect tampering. Since the target stayed there overnight, he followed his own measures of security checks to make sure that no tampering occurred at any time.

Targets were generated via a custom program based on the Xenix™ implementation of the drand48 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). After retrieving the target set from the locked file, RSB pulled out the target envelope from the set and sealed it in the personalized envelope provided by HK. When the trial started with a ganzfeld condition, HK alerted RSB to generate the target soon after she prepared the subject for the ganzfeld session, so that the target would be ready before the relaxation tape ended. When the trial started with a dream condition, RSB prepared the target prior to leaving lab on the dreaming night.

## 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 before, it was planned to carry out the judging by both P and PE. In addition to these two, the assistant experimenter (AE) was also included as a judge during those trials in which she was present. At this time, PE handed a copy of the two protocols to DH and in return received the judging packet from him. Both P and PE met in a room and together reviewed the first mentation, and then judged it against the four pictures of the judging set. Then they carried out the same with the second mentation. As in the previous studies, while there was a free interaction between the two people in finding similarities and correspondences of a given mentation with the target pictures, both P and PE did their own ratings independently on separate judging forms. Each judge indicated his or her choice of the target using both rank measure from 1-4, and ratings on a scale of 0-99. Lower ranks meant greater correspondences, while higher ratings indicated the same. Ties were generally discouraged, but if present, the judging was not penalized. When both judges completed their task they signed the judging form, which signified the completion of the task. HK handed copies of these documents to RSB, and in exchange received the sealed target envelope. The envelope was opened in the presence of both the judges to get a full feedback at the same time. The feedback session continued for a while, when the judges attempted to find clues that they either missed or used successfully in picking the target. The whole judging process was a prolonged session, which took about an hour to an hour and a half for the entire task. Then PE carried out the debriefing and thanked P for the participation. This marked the completion of one trial, which really extended over a two-day period.

## Hypotheses

Based on our earlier work, one hypothesis related to the differences between psi effects in the ganzfeld and dreaming conditions was formulated.

H1: A significant difference in the scoring rate will be observed between the ganzfeld and dreaming conditions in favor of dreaming.

Since the previous work upon which the hypothesis is based employed a combined score of all judges to test the main effects, the same procedure was used here also. Accordingly, we planned to take the combined scores of P, PE, and a third judge (assistant experimenter) when present. Target ratings were chosen as the primary measure, since we felt they should be more sensitive than rankings, in the present experimental context. Currently ratings are the primary measure used in most of the free-response work at the Institute, though rankings are available for additional analyses and comparisons.

In addition to the main hypothesis, a second factor was of interest in this study. Earlier research had suggested that the order of presentation may influence the ganzfeld and dreaming scores, and possibly the difference between the two. While the suggestions themselves did not warrant the complex experimental design that would permit thorough examination of these possible effects, we did regard the possibility of an order effect as specifically of interest, primarily to guide future research. However, no specific hypothesis was advanced at this time.

### Planned Primary Analyses:

The experimental design with two conditions (ganzfeld and dreaming) and two orders of presentations (first or second) permitted testing the main hypothesis while taking into account a possible order effect by means of a 2-way ANOVA. This would be followed by *t*-tests to determine the significance of individual comparisons.

Since the pooled scores of the different judges formed the main measure, this was derived by combining their respective ratings on different targets in a set, and transforming them into z-scores using Stanford 1974 method (Stanford & Sargent 1983). The z-scores were obtained separately for each condition in a trial. This produced 80 z-scores, between the two conditions and the two orders of presentation. The scores were analyzed by an ANOVA, with the main hypothesis, the ganzfeld-dream difference, being tested by the first main effect "condition"; and any possible order effects to be revealed in the second main effect. For the main hypothesis, a one-tailed *p* at .05 level was set as the criterion, whereas a two-tailed *p* was required for all other analyses.

### Planned Secondary Analyses:

The principal secondary analyses was an examination of the ganzfeld-dream differences separately for each judge. The previous study had indicated that P's judging was better than PE's judging, although no significant

differences were observed between them. Here also we were not expecting any significant differences between them, but were interested to see if the above analyses would hold within each judge. Since hypothesis 1 has predicted condition differences, the same is expected here also. Accordingly, a 2-way ANOVA, as described above, with condition and order as two factors, was planned to be performed separately for P and PE, using their individual z-scores. This was not planned for AE, as the number of trials were too few. As before, the main effect relating to the condition was set for one-tailed probability at .05 level significance.

### Results:

Table 1 gives the summary of ANOVA results. It can be seen that the main effect relating to the conditions yielded an  $F = 3.699$ , (1, 19df),  $p = .035$  (one-tailed). This confirms our first hypothesis and suggests that there is a significant difference between ganzfeld and dream conditions. The mean z-scores are .089 for the ganzfeld, and .331 for the dream. As predicted, the scoring difference is in favor of the dream condition, which is also strongly significant ( $t = 3.521$ , 19df,  $p = .0023$ ). The ganzfeld scores are also above chance, but not significant, ( $t = .607$ ).

The second main effect, that related to the presentation order, yielded an  $F = 2.065$  (1,19df),  $p = .167$  (two-tailed). Although this falls short of significance, it is not negligible and may suggest a weak order effect. The suggestion of a presentation-order effect arises from the fact that the test condition (ganzfeld or dream) that was presented second tended to produce higher scores ( $Mz = .290$ ) than the condition presented first ( $Mz = .130$ ). There was no evidence of an interaction ( $F = 0.031$ ), indicating that ganzfeld and dream differences did not interact with the presentation order. Since presentation order was fixed within trial order, this indicated no significant difference between trial 1 ( $Mz = .236$ ) and trial 2 ( $Mz = .184$ ).

Secondary analyses for judges considered separately revealed interesting points. The ANOVA for the percipients' judging alone revealed a main effect of condition ( $F = 3.135$ , 1, 19df,  $p = .047$  one-tailed) favoring dreams ( $Mz = .353$ ) over ganzfeld ( $Mz = .081$ ). There was no presentation-order effect ( $F = 0.053$ ) nor interaction ( $F = 0.000$ ). Combined ganzfeld-dream scores for trial 1 ( $Mz = .215$ ) were almost identical to those of trial 2 ( $Mz = .219$ ).

With the experimenter's judging, the ANOVA revealed the main condition effect ( $F = 3.022$ , 1, 19df,  $p = .049$  one-tailed) favoring dreams ( $Mz = .234$ ) over ganzfeld ( $Mz = .043$ ). A strong presentation-order effect emerged ( $F = 6.648$ , 1,19df,  $p = .018$ , two-tailed) indicating that the condition that was presented and judged second ( $Mz = .280$ ) produced substantially higher results than the condition presented first ( $Mz = -.004$ ). There was no evidence of an interaction ( $F = 0.251$ ). Looking at the results in terms of trial order revealed higher scores in trial 1 ( $Mz = .207$ ) than in trial 2 ( $Mz = .070$ ), although their difference was not significant, nor were they significantly different from the chance expectation.

## Discussion

The following observations can be made from the results presented above. First of all, it is clear that there is a condition effect, indicating a significant difference between ganzfeld and dreaming. Secondly, the difference is in favor of dreaming, which is independently significant. These results fully confirm hypothesis 1, and serve as a successful replication of the previous experiment.

The findings that the dreaming is more successful than ganzfeld is interesting. Our past track record (Broughton, Kanthamani, & Khilji, 1989) for ganzfeld at the FRNM is modest with a 26% direct hit rate, which is comparable to the direct hit rate on static targets at PRL (26%). In fact, in this experiment, the direct hit rate for the subjects in ganzfeld was 33%; however, in the dreaming condition it was still higher at 38%. A full assessment of the ganzfeld-dream project in the context of FRNM's overall ganzfeld program is beyond the scope of this paper, but is in preparation. In any event, in the present project, dreams continue to be more successful in all three experiments. Perhaps the naturally occurring altered state functions more efficiently in gaining psi-information, than during the laboratory induced altered state condition. Further, one can assume that the sleep-dream state does involve a "distinct altered state", while such an assumption is hard to make for the ganzfeld stimulation.

The second observation relates to the presentation-order effect. In the primary analyses this was found to be suggestive in the combined data from all judges. When the percipient and experimenter judging was examined separately, however, we found no presentation-order effect for the percipient but a strong presentation-order effect for the experimenter. It can be recalled that the judges judged the condition protocols in the order that the conditions were presented to the subject. While, in theory, all judges were expected to treat the two judgments independently, it is obvious that the second judgment cannot be separate from the first. It is entirely possible that certain "target clues" are carried over from the first to the second judging. There is some evidence in the literature that such "carry over" could occur in repeated judging (Maher, 1986). Furthermore, it is possible that an experienced judge might be more successful in tracking the target clues from one protocol to the next. Thus the experimenter as an experienced judge might make better use of such carry-over than the naive subject, as seems to have happened in this experiment. It is worth noting that the limited number of judgments (17) produced by an assistant experimenter followed a pattern similar to the experimenter's.

The two factors observed in these data, the superiority of dreams over ganzfeld and the tendency for the condition judged second to be better, combined to make order 1, (where ganzfeld came first and dream second) the more successful in highlighting the ganzfeld-dream difference, thereby following the pattern of the previous experiment. Initially, this was interpreted as something like a Poetzl effect wherein the "psi stimulus" of the ganzfeld was incorporated into later dreams, however, the results of this experiment suggest other factors may be involved. It remains for future research to determine whether the effect is a result of stimulus carry-over or judging carry-over.

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Table 1  
Mean Z-Scores by Condition and Order

	G1	G2	D1	D2	Ganzfeld vs. Dream
Combined Judges	.034	.143	.437*	.225	F = 3.699, (1,19) <i>p</i> = .035 (1T)
Percipient Judging	.092	.070	.338	.368*	F = 3.135, (1,19) <i>p</i> = .047 (1T)
Experimenter Judging	-.031	.116	.444**	.024	F = 3,022, (1,19) <i>p</i> = .049 (1T)
Ass't. Experimenter Judging <sup>a</sup>	.236	.116	-.153	.556*	

<sup>a</sup>Anova was not performed for AE results due to fewer number of trials.

\* *p* .05

\*\* *p* .01

G1 represents ganzfeld in order 1

G2 represents ganzfeld in order 2

D1 represents dreams in order 1

D2 represents dreams in order 2

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