

Comparison of the Sender / No Sender Condition in the Ganzfeld

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Abstract

The role of the sender is not well understood in ganzfeld research, and few past studies have incorporated a systematic comparison of the presence and absence of a sender in the ganzfeld. We report on an automated ganzfeld study with an artistic population having three different conditions: Sender absent, with receiver and experimenter blind as to sender's presence or absence; sender present with receiver and experimenter blind as to sender's presence or absence; and sender present with receiver and experimenter aware of sender's presence. There were 32 pre-specified trials for each condition, with a total of 97 trials due to the random assignment of the first two conditions - the third condition took place every third session. The overall psi result was 32 direct hits out of 97 trials, just statistically significant ($p < .05$, one-tailed, $ES(h) = .18$), providing further evidence for positive ESP results with the automated ganzfeld procedure. Direct hit results were nonsignificantly above chance for all three sending conditions. Stanford's z-scores were used in an ANOVA comparing the three different conditions, and results were nonsignificant for the three conditions, $p = .775$. Correlation between z-scores and extroversion was also nonsignificant at $r = -.111$. Correlations of state and trait measures are also discussed. An unexpected experimenter effect was found, with one experimenter producing strong results and the other two at, or below, chance. Different interpretations of this effect are discussed and evaluated.

Introduction

Within parapsychology, once procedures which appear to work with sufficient strength and consistency are established, it then becomes possible to use them to address process-oriented questions, such as testing some of our tentative models more effectively. The ganzfeld technique increasingly appears to be a realistic contender, based upon its continued success even when procedural conditions are tightened (e.g., Rosenthal, 1986; Honorton et al., 1990). At last year's PA Convention (Dalton et al., 1994), a further refinement of the classical Psychophysical Research Laboratories (PRL) automated ganzfeld procedure was presented, designed to overcome various possible problems of method in the PRL autoganzfeld procedure such as those raised by Morris et al., (1993) and Wiseman et al., (1994). At that time, the preliminary overall results of the study were described briefly. The authors can now offer a more detailed description of that specific study and its outcome.

Three main questions were addressed in our study. First, using a procedure with such new refinements, would we still get overall significant positive results using the standard direct hits measure of success? Second, could we explore more fully the individual differences correlates of success found in previous autoganzfeld research? Third, could we find any evidence that having an active sender/agent conveys any advantage or affects the results in any tangible way?

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Individual Differences in Autoganzfeld Performance

One aspect of developing the autoganzfeld for process-oriented research is to examine whether certain measures of individual differences are predictive of success. If none are found, yet results are strong, this supports the notion of the ganzfeld as a generalisable psi testing instrument, not a measure confined to people with certain characteristics. However, if these correlates are found, this may suggest hypotheses about the nature of psychic functioning in the ganzfeld, especially when compared with the presence or absence of such correlates in studies using other testing procedures. Correlates may also suggest strategies for selecting participants in order to increase the strength and consistency of ganzfeld effects. Any process-oriented results obtained in the ganzfeld may then be explored in more detail to see if they apply only to individuals meeting certain criteria.

Several individual differences have already been suggested by prior research. Schlitz (Schlitz & Honorton, 1992) found that students from the Juilliard School, one of the top-rated conservatories in the world for the performing arts, scored significantly greater in the PRL autoganzfeld than other participants. This finding supports the notion that artistically talented and creative people may do especially well on psi tests. Within this population there was an overall slightly negative correlation between psi success and their scores on the *Torrance Assessment of Creative Thinking*. Two participants had unusually high creativity scores and both scored negatively. When these two outliers were removed, the remaining students showed a significantly positive correlation between psi success and creativity scores. Cunningham (Morris et al., 1993) tested students preselected to have artistic or musical ability, using a preliminary version of the Edinburgh autoganzfeld facility. The overall correlation between self-rated creativity and scoring success was positive but not significant; however, those who rated themselves high on both artistic and musical creativity scored significantly better than those rated average to low on both scales.

Regarding other personality variables, Honorton found a significant overall positive correlation between extroversion and success in a meta-analysis of free response studies, a result confirmed in the PRL autoganzfeld data base (Honorton et al., 1990). Cunningham (Morris et al., 1993) confirmed this finding with her preselected artistic and musical population, using the NEO Revised Personality Inventory as her measure of extroversion, which has six subfactors to allow more detailed exploration of the relationship. She found significant positive correlations between performance and three factors: activity, excitement seeking and positive emotions, but not with three others: warmth, gregariousness and assertiveness. This pattern suggested that the observed correlation was less likely to be produced by social adaptation factors and more due to a tendency for extroverts to enjoy the novel experience of the ganzfeld.

Additional characteristics found to correlate with ganzfeld success in the PRL database included prior personal experiences, practice of a mental discipline, scoring high on the MBTI-F and MBTI-P scales, and having participated in prior non-ganzfeld psi tasks (Honorton, 1992). Kanthamani and Broughton (1994) found a similar pattern in a variety of non-automated ganzfeld series conducted at the Foundation for Research on the Nature of Man (FRNM). Van Kampen et al., (1994) found that ganzfeld success was significantly related to extroversion, agreeableness and openness, as measured by a Dutch version of the NEO-PIR. Cunningham (Morris et al., 1993) found a weak overall positive correlation with openness, with the subfactor of openness to actions being significantly correlated to psi success. Those reporting previous psi experiences did somewhat better than those who did not, but nonsignificantly so. Practitioners of a mental discipline performed significantly better

than those who did not. None of her participants had had prior non-ganzfeld psi testing. Her results thus conformed to the general pattern of the earlier PRL autoganzfeld database, including an overall significant positive scoring rate on direct hits.

The Role of the Sender

One of the most important theoretical issues in parapsychology concerns the role of the sender in GESP procedures. Many of the most impressive spontaneous cases, as well as early demonstrations of ostensible psychic functioning under controlled conditions, seemed to involve 'mind to mind' communication. The whole survival issue was seen by many as turning on the question of whether psi is a purely mental phenomenon, an exchange solely among minds past, present and future, incarnate and discarnate. With the increasing emphasis on clairvoyance results the contrary view emerged as well, that perhaps psi need not involve mind linkages at all; telepathy results could be produced by clairvoyance of the target, of related actions, or even of brain states. Attempts to devise pure telepathy or pure clairvoyance procedures revealed how hard it was to rule out alternative information flow pathways (e.g. Morris, 1975). Attention shifted to attempting to assess whether having a sender actually adds anything to the strength of the results. As Williams et al., (1994) have noted, this topic is surprisingly under-researched. Many researchers shifted away from GESP procedures for various reasons, including problems in excluding collusion between sender and receiver. Comparing studies with and without senders is difficult, due to all of the potential confounding variables in terms of procedure, treatment of participants, etc. There have been few studies that incorporated a no sender comparison condition within the study confines (e.g. Bierman et al., 1984; Braud et al., 1984; Braud & Wood, 1977; Dunne et al., 1977; Kanthamani et al., 1989; Sargent et al., 1982). Surveys of the literature (e.g. Carpenter, 1977; Palmer, 1978) indicate mixed results, but somewhat better when senders are present than absent. Klein (1971) reported that when clairvoyance and GESP procedures were alternated with Harribance, his performance was at his usual high level for GESP but at chance for clairvoyance, under conditions in which he had thought that all were GESP. This was especially striking because he had previously scored equally high under both conditions when aware of the condition. There is thus some evidence from high scoring participants that the presence of a sender may exert an influence upon the results even though it is not necessary for psi to take place. Carpenter (1977) summarises additional evidence that sender variables may affect results.

Regarding the ganzfeld database, Honorton (1995) found from a meta-analysis that ganzfeld studies using senders obtained better results than those without, but that the finding was confined to those experimenters that had used both conditions at one time or another. For those staying with only one sending procedure, results were slightly better in studies not using a sender. Only two ganzfeld studies have compared sender vs no sender conditions within the same study. Raburn and Manning (1977) found their best results when a sender was present and the receivers knew that ESP was being tested. It has been difficult to separate the psychological effects of knowing there is a sender from the actual presence of the sender itself. A study conducted by Williams et al., (1994) compared three different sending conditions in the Edinburgh autoganzfeld facility: no sender; one sender; or two senders. In the "no sender" condition there were no hits at all in 12 trials, in the "one sender only" condition they experienced 3 hits in 13 trials, and in the condition having "two senders" they obtained only 2 hits in 17 trials. The experimenters served as senders and receivers themselves over many sessions, becoming very familiar with the target pools, a departure from the standard autoganzfeld protocols. Therefore no real conclusions can be drawn, especially since all of

the hit ratios for the different trials were well below MCE, resulting in overall significant psi missing. However, this psi missing effect may reflect more the problems in interpersonal dynamics that the authors encountered rather than the result of having, or not having, a sender present, as the authors acknowledge.

It is felt then that there exists a need for a systematic within-study comparison of the impact of one moderator variable (presence or absence of a target observer or sender), and that this study is needed to assess the extent, if any, to which the sender's influence is instrumental (intrinsic to the communication process) or peripheral (based on psychological or motivational factors). The present study attempts to address this issue by making use of three different sender conditions.

Method

The present study was designed to study the role of the sender in the ganzfeld and was carried out by Robert Morris, Kathy Dalton, and Deborah Delanoy who acted as both experimenters and senders throughout the course of the study, and by Caroline Watt, who acted as a sender for the last part of the study.

Design

Main conditions: There were three conditions in this study: sender absent, with receiver and experimenter blind as to sender's presence or absence; sender present, with receiver and experimenter blind as to sender's presence or absence; and sender present, with receiver and experimenter both aware of sender's presence. The first two conditions, conditions 1 and 2, were designed to provide a comparison of the presence and absence of sender, with receiver and experimenter expectation controlled for, and with the treatment of the receiver identical until the session was over, at which time the presence or absence of the sender was revealed, and the blind was broken. In these two conditions, participants are introduced to a lab associate who is described as a helper who may or may not be serving as a sender. The initial preparation of the receiver proceeds as usual and is described below. When the helper arrives at the target room, the computer system randomly selects whether the sender stays to send or is asked to leave, and displays this decision on the monitor screen. If asked to leave, the sender goes elsewhere in the building. In this way receiver and experimenter remain blind as to the sender's presence until the end of the session. The third condition, designated the Honorton replication condition, was included to examine the role of expectation, and to provide a condition which more closely replicated the original PRL autoganzfeld procedures of having a known sender. In this way we hoped to assess the contribution of the physical presence of the sender as well as the psychological effects of knowing there is a sender. Only lab personnel were used as senders in all conditions. Every third session was in condition 3, the Honorton replication condition; the others were randomly assigned by the computer RNG to condition 1 or condition 2, after the session began. The study terminated when 32 receivers had been ran under each condition. Due to the random assignment of two of the conditions, a total of 97 sessions were required to meet the pre-specified number of 32 receivers per condition.

Participants

The present study utilized primarily an artistic population, as this population has produced positive results in experimental research in the past (Schlitz & Honorton, 1992; Morris, et al., 1993). Participants were principally recruited from local Art and Music college, with most

other participants coming from local artistic communities (e.g. writers/actors groups). Each of the three conditions of the study had been pre-specified to have 32 participants, with the sender-no sender conditions being randomly assigned, and every third session pre-specified as a Honorton replication. A total of 97 participants, 52 females and 45 males, contributed one session each to meet this requirement. Each participant in the study was pre-selected as much as possible to match the characteristics of earlier autoganzfeld successes, that is, we looked for persons with artistic or musical talent, a positive attitude toward psi, previous psi experiences, and so on. Participant age range was 17 - 61, and the median age was 23.

Apparatus

The Edinburgh Automated Ganzfeld System

The automated ganzfeld system of the Koestler Chair of Parapsychology at the University of Edinburgh is a computer based system that provides automatic data recording, highly effective shielding against sensory cues, and resistance to both subject and experimenter fraud. The program is run on a 33MHz 80386DX computer, equipped with a 210 MB fixed disk, 8 MB DRAM, four RS 232 serial ports, an 80387 numeric coprocessor, and a super VGA monitor. The target presentation system is a NEC PC/VCR, a frame-accurate NTSC videocassette recorder equipped with an RS 232 serial interface. All VCR functions are controlled by computer software, and video, audio and computer graphics are routed to the appropriate rooms (sender, receiver, or experimenter), through computer control. The target system makes use of dynamic targets, 72 video clips all sixty seconds long, comprised primarily of the more successful dynamic targets from the PRL pool, with new additions to round out the target pools. The experimental rooms are located on the top floor of the University of Edinburgh Psychology Department. Receiver and experimenter rooms were adjacent, and toward the rear of a six room experimental suite, having a central foyer connected by a door to a hallway. The target room was approximately 25 meters away along that hallway and up a small flight of stairs. For additional information on the security measures involved in this study, as well as additional information on laboratory layout, such as degree of acoustical attenuation from sender to receiver rooms, please see Dalton et al., (1994), and Morris et al., (1993).

Individual Differences Measures

Prior to the experiment, participants were given three questionnaires to complete. One was the NEO-PIR (Costa & McCrae, 1992) which measures Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. The NEO-PIR is a widely used measure of these five variables and includes six subscales for each, allowing examination of these correlates in more detail. In addition, it has been used in previous automated ganzfeld studies (Morris, et al., 1993). The second questionnaire was the Participant Information Form (PIF) used regularly by the Koestler Chair, containing 77 items covering many different aspects of the participant's background, prior experiences, interests, characteristics, and so on. The third questionnaire was a subjective creativity questionnaire devised by Kathy Dalton, containing 6 items dealing with artistic/creative abilities and background, competitiveness, problem solving methods and self-confidence levels. In addition, after the impression period and mentation review, but prior to actually viewing any of the target clips, the participant was asked a series of questions regarding their imagery (i.e. surprising, or very vivid images, etc.), and other experiences during the impression period. During this time, the experimenter also

filled out a brief questionnaire regarding the mentation, i.e. was imagery abundant, bizarre or mundane, and so on, for the session. The ratings for this questionnaire were the subjective interpretation of the mentation on the basis of the experimenters' prior experience with ganzfeld mentation.

Procedure

When the participant arrives at the psychology building the researcher who will be acting as the experimenter greets them at the door and escorts them to the ganzfeld suites. There they are introduced to the second researcher, who is introduced as their sender if the session is a Honorton Replication one. Otherwise the co-experimenter is introduced simply as a helper in the upcoming session. Participants are then seated in a lounge area with the two researchers for a period of chat time (approximately 30 minutes to an hour), to discuss the upcoming ganzfeld session and allow everyone to get to know each other better. After this discussion period, the participant is shown the target room and the relevant apparatus (e.g. target display monitor) is described. If there is a known sender for the session, appropriate sending strategies are discussed. If this session is one without a known sender, the participant is told that the helper may or may not be in the room observing the target, but that the target clip would still be shown in the room regardless.

After this, the participant is taken to the receiver room where they are made comfortable in a reclining chair, and any final questions are answered. The receiver then puts on the headphones, and the volume is adjusted to a comfortable level. When the session proper begins, the receiver will hear first a 15 minute progressive relaxation exercise, and then 30 minutes of white noise through the headphones (known as the impression period). After the receiver adjusted their headphones, if there is a known sender for the session they are asked to apply eye shields, otherwise the experimenter or the receiver themselves performs this task. Eye shields are halved ping pong balls in the baseball cut style and are attached with surgical tape. After the eye shields have been adjusted for maximum comfort, the flexipose 60 watt red light is switched on and adjusted in front of the participant to provide an even, comfortable light. The participant is wished a good session by all involved, and then the two doors to the room are securely closed. At this point the possible sender leaves the experimental suite to go to the sender's room and the experimental room door is locked behind them. The experimenter then enters the experimenter's room, closes that door, and conducts an audio check with the participant to ensure that they can hear them through the headphones. Although the receiver and experimenter can hear and converse with each other, and the sender can hear what the receiver says, there is no direct connection which allows communication from the sender to either the receiver or the experimenter. The final audio check allows the possible sender plenty of time to arrive at the target room and lock themselves in. After the audio check, the experimenter begins the automated ganzfeld routine and prepares to take hand-written notes on the receiver's mentation during the impression period.

For the sender-no sender condition, the computer then randomly determines whether this will be a session with, or without, a sender and sends this information to the TV monitor in the sending room only. If asked to leave, the sender quietly departs the sending room, locking the door securely behind them, and retiring to another part of the building. If asked to stay and send, the sender listens to the relaxation tape along with the receiver, then observes the target and hears its sound track when it is shown during the thirty minute impression period, and attempts to silently communicate the target material to the receiver. The target is shown 8 times during this thirty minute period. The sender may draw relevant target material in

between showings of the target if they like. During the impression period, the sender can hear the receiver's mentation and attempts to mentally reinforce correct images.

During the impression period the participants speak out loud any images, thoughts, feelings, or impressions that come into their minds. This mentation is both audio tape recorded and hand noted by the experimenter. At the end of this period, the experimenter comes back onto the receiver's headphones and reviews with the receiver the reported impressions, at which time the receiver may add details or other thoughts. After the mentation review, the receiver removes their eye shields and is shown four possible target choices one at a time, and asked to relate after viewing each one any similarities between the imagery they reported during the ganzfeld session and that particular target clip. The experimenter, who is blind to the target, may point out to the participants any potential correspondences that they may have overlooked. They may view the target as many times as they wish during this period, before proceeding onto the judging phase. After reviewing each of the possible target clips, the receiver then judges each individual clip, by assigning them a rank of 1 - 4 (1 representing the greatest degree of correspondence), and giving each possible clip a rating between 1 - 99 (first choice getting the highest rating). After the judging sequence, the computer stores all experimental data both to disk and to hard drive, and the sender is notified to return to the ganzfeld suite. The computer reveals the identity of the target and the experimenter, receiver and sender may then discuss the session and the ganzfeld experience.

Hypotheses and Planned Analyses

Prior to the beginning of the study three hypotheses were prespecified. That the overall number of direct hits for this study will exceed chance. That there would be no difference in success among the three conditions. That there would be a positive correlation between success and extraversion. All other analyses were to be exploratory.

Direct hits were used as the primary measure of whether this study constituted a conceptual replication of the PRL autoganzfeld. A sum of ranks was calculated for the overall study (Solfvin et al., 1978). Stanford's z-scores (Stanford and Sargent, 1983) based on the target ratings were calculated for each receiver, and these were used to analyse the difference among the three conditions as well as to correlate with the various individual differences scales. All of these analyses were pre-planned, save for the use of z-scores to compare across conditions rather than the sum of ranks as originally planned. Sum of ranks was found to correlate very strongly with z-scores ($r = .96$), which we felt justified the use of z-scores in preference to ranks as z-scores would contain more information.

Exploratory analyses looked for correlations among the questionnaire items and scales, and the main performance measures, both overall and within each experimenter. Further results will be reported in future papers.

Results

Results overall were 32 hits out of 97 trials, just statistically significant ($p < .05$, one-tailed), $ES(h) = .18$ (Cohen, 1977), providing further evidence for positive ESP results with the automated ganzfeld procedure. Results were nonsignificantly above chance for all three sending conditions as shown by Table 1.

The final trial (#33) was removed from the sender condition, with a rank of 1. It had been agreed upon in advance that if more than 32 trials occurred in one of the conditions, the comparison would be done only for the first 32 sessions of that condition.

Table 1
Overall Ganzfeld Results and Results by Condition

	Number of Trials	% Hits	z	ES(h)
Total for Study	97	*33%	1.67	.18
By Condition				
Honorton	32	34%	1.02	.21
Sender	32	28%	.24	.07
No Sender	32	34%	1.02	.21

* Significant at $p < .05$

Sum of ranks analysis for the overall study was nonsignificant at 227, $MCE = 240$, $p = .073$. As stated, Stanford's z-scores were used in an ANOVA comparing the three different conditions, and Table 2 contains the summary information for this ANOVA.

Table 2
Summary Information for ANOVA of Conditions

	Count	Average	Variance
Honorton	32	.174	.747
Sender	32	.118	.697
No Sender	32	.017	.933

The differences between the three conditions results were nonsignificant at $F(2, 93) = .255$, $p = .775$. The source table is presented in Table 3.

Table 3
ANOVA: Source of Variation

	SS	df	MS	F	p value
Between Groups	.404	2	.1202	.255	.775
Within Groups	73.692	93	.792		
Total	74.096	95			

The correlation (Pearsons) between z-scores and extroversion was also nonsignificant at $r = -.111$, ($n = 97$), instead indicating an unexpected reversal of the expected relationship between extroversion and psi hitting.

Table 4 shown below gives the full distribution of ranks for this study, by condition, for completeness.

Table 4
Distribution of Ranks*

Rank	Honorton	Sender	No Sender
1	11	9	11
2	7	9	5
3	8	8	7
4	6	6	9

*Values shown here are for the 96 participants reported in the study. Participant number 94 was the extra one in the Sender condition, with a rank of 1.

Exploratory Analyses

We were interested in a variety of factors concerning both our creative population and the effects of knowing or not knowing whether a sender might be present. Therefore, Pearson correlations were calculated to examine the relationship of psi success as measured by z-scores and items in the PIF, the creativity questionnaire, and the subscales from the NEO-PIR. The results of these, as well as others, are presented below.

The total number of artists in this study was 57, the total number of musicians 39. The artists achieved an overall hit rate of 39%, which is significant at $p = .02$, $ES(h) = .29$. The musicians achieved a nonsignificant hit rate of 26% ($ES(h) = .01$). Although the difference between the scoring rates for our artists and musicians is not significant ($ES(h) = .28$), our results appear to reverse the Juilliard student trend.

As described earlier, Honorton and his colleagues at PRL had developed a four factor model of success which predicted a higher level of success in the ganzfeld for those participants meeting this criteria (Honorton, 1992). At the Edinburgh labs, we focused on a three factor model of success as virtually no one in our study had experienced prior parapsychology lab testing ($n = 2$). This 3 factor model of success included: Prior psi experiences; Practice of mental discipline (i.e. meditation, etc.); and Extroversion. We chose these, taking our cue from the Cunningham study results which used a similar participant population. Of the 37 participants meeting the 3 factor model, 13 produced direct hits with a hit rate of 35% and an $ES(h) = .22$ as compared to the PRL series of participants meeting the 3 factor success model of 43% hit rate (Honorton, 1992). Of these 37 participants, 26 were artists, and 11 were musicians. Of the 26 artists meeting the 3 factor model 10 produced direct hits for a hit rate of 38% ($ES(h) = .29$). Of the 11 musicians meeting the 3 factor model 3 produced direct hits for a hit rate of 27% ($ES(h) = .05$).

Correlations between psi success and items in the PIF, the creativity scale and the NEO subscales yielded various factors of note. Several of these dealt with items from the mentation report that experimenters filled out for each session prior to viewing any of the targets for that session. There was a significantly negative correlation between the experimenter's rating of the amount of mentation reported by participants and the z-scores ($r = -.342$, $p < .01$), indicating that those participants who produced a large amount of mentation also tended to miss the target. Z-scores also correlated significantly negatively with the experimenter's

rating of the amount of judgeable material in the mentation, with those participants producing an abundance of material also producing a low z-score for the actual target, ($r = -.337, p < .01$).

Regarding the NEO subscales, scale six of Extroversion (positive emotions), correlated negatively with z-scores ($r = -.317, p < .01$), indicating that participants with a high level of positive emotions also produced a low z-score for the actual target. This is a significant reversal of the Cunningham finding cited earlier. No other subscale correlations came close to significance.

Although we did not use the MBTI in our study, we can still look for evidence for the correlations of scoring success with MBTI-F and MBTI-P scales found by others, as noted earlier. According to Costa and McCrae (1992), Agreeableness should correlate positively with F (Feeling), and Conscientiousness should correlate negatively with P (Perceptive). Using z-scores, we found nonsignificant positive correlations with both Agreeableness ($r = .053$), and Conscientiousness ($r = .181$), thus lending no additional support to F and P as correlates of ganzfeld success in this study.

We also were able to look for differences among the three sender conditions for the ratings of characteristics of the sessions given before the blind was broken. Significant differences were found for one measure only: mentation abundance, as rated by the experimenter at the end of the mentation period ($r = -.215, p < .05$). Upon closer inspection, mentation abundance was found to be rated much lower when there was known to be a sender (mean on a three point scale = .710) than for the other two conditions (means = 1.125 and 1.212).

An unexpected post hoc finding was that the overall significance was accounted for by just one experimenter. As can be seen by Table 5, KD's receivers had 48% direct hits in 42 sessions, whereas DD's had 24% in 41 sessions, and RM's produced a mere 14% in 14 sessions. It is of some interest to look at KD's patterns of results, to see if any internal effects show up stronger. KD had 19 receivers who fit the three factor profile and scored 10 hits, for a 52% hit rate. Her participants showed no correlation with prior mental disciplines ($r = -.017$), and none with prior telepathy ($r = -.017$), clairvoyance ($r = .206$), or precognition ($r = -.138$) experiences. Her results did correlate significantly negatively with overall amount of mentation ($r = -.328$), as well as judgeable content in the mentation ($r = -.359$). DD's results showed almost exactly the same pattern for amount of mentation ($r = -.331$), and judgeable content ($r = -.383$), thus lending some support to these correlates as genuine and rather than the product of multiple analyses. All were significant at $p < .05$. Regarding the NEO subscales, KD's results on the positive emotions were nonsignificant ($r = -.227$), whereas DD's were significant ($r = -.380$).

Table 5
Results by Experimenters

Experimenter	Trials	Hits	% Hits	z	ES(h)
Dalton	42	20	48%	3.02	.48
Delanoy	41	10	24%	-.24	-.01
Morris	14	2	14%	-1.28	-.27

Other significant correlations for KD were with two items on the PIF form: the tendency to lose track of time when absorbed in a task ($r = -.331$), and the frequency of playing video games ($r = .340$), both at $p < .05$. Other significant correlations for DD were: hours of sleep ($r = -.329$), acceptance that ESP exists ($r = .340$), rated lability of impressions ($r = -.322$), and age ($r = .356$). All were significant at $p < .05$. Three other subscale items were on the verge

of significance, those for gregariousness, excitement seeking, and feelings. Thus, although KD's data showed stronger evidence of psi hitting and DD's was at chance, there was not a tendency for KD's psi results to show more correlations with other variables than DD's. Comparisons for RM's data were not carried out as he had contributed so few trials.

Discussion

The first goal of our study was to see if we could obtain significant positive results using the standard psi measure of direct hits, coupled with an automated ganzfeld procedure (Dalton et al., 1994). In particular, this study was designed to eliminate some of the possible sources of artefact previously suggested for the PRL data base (e.g. Morris et al., 1993; Wiseman et al., 1994). We appear to have succeeded in that our results were significant overall and our effect size was comparable to that of the previous ganzfeld data base. However, one of the features of the PRL autoganzfeld series was that the effects seemed fairly homogeneous from experimenter to experimenter, an important characteristic of any procedure to be used in systematic process-oriented research. Our results showed a strong experimenter effect. Previously, in two exploratory studies described in Morris et al., (1993) one experimenter obtained significantly positive results while the other experimenters results were at flat chance. White (1977) offers an extensive and thorough discussion of different kinds of experimenter effects. In the context of the present study we can offer four kinds of explanations for experimenter effects.

- 1). Psychological: The experimenter's manner and style of interacting may facilitate enthusiasm, comfort, trust and confidence, thus leading to the effective deployment of attention to internal states, rich and labile experience, flowing reportage, good recall and low censorship. During judging, the experimenter may facilitate the noticing of target correspondences, as well as judgements about the importance of some correspondences over others, in addition to confidence in one's own judgements. Some assessment of this will be made by later analyses of the audio tapes of the sessions to explore different styles of interacting with receivers by the three experimenters, and relating these to psi success as well as to the receiver's behavior. This comparison can be done within experimenters as well as between, since the success of the study occurred primarily during the last half.

- 2). Experimenter Psi Effects: Successful experimenters may have some additional psychic capabilities which can somehow facilitate the occurrence of psychic events around them, perhaps by some direct enhancement of receiver psi or by being psychically aware of the target and thus facilitating the judging process. Evidence for the former would be difficult to tease out other than through a systematic study of putatively psi-conducive experimenters in a variety of experimental situations. Evidence of experimenter psychic awareness of the target could be evaluated in part by looking at the judging interactions, but in the present study would be hard to disentangle from the possibility of experimenter knowledge of the target through ordinary means, as described below.

3). **Participant Recruitment** In the present study KD did most of the participant recruitment, both in terms of initial contact with some student groups and in the scheduling of participants by phone. Thus she was already more familiar with them when they first arrived, and vice versa. It could be argued that perhaps consciously or unconsciously she scheduled participants with more potential for herself, and her participants were in fact slightly more conforming to the three factor model described in the results section. However, there was no evidence that this model did in fact predict who would do better, for any of the three experimenters. Although KD had slightly more artists than DD, (with KD having 27 artists and 15 musicians, and DD having 20 artists and 20 musicians), this would not account for experimenter differences as both artists and musicians did better when being run by KD. During the course of the study it was agreed that we would assign younger participants to KD and older ones to DD and RM, out of a sense that this made a better match psychologically. There is some support for this choice, as DD's results were significantly positively correlated with participant age, and KD's results were nonsignificantly negatively correlated with age. A related personnel variable is that Caroline Watt became available to serve as agent just at the time that the results began to pick up, with the 55th session. Her availability took much of the time pressure off the other team members, and she and KD tended to work together. When together as a team, KD and CW had seven hits out of 11 sessions, whereas CW had no hits in the two sessions she did with other experimenters.

4). **Experimenter Fraud:** Although we regard this as most unlikely, we know it is an issue likely to be raised in some quarters and it is appropriate to discuss our safeguards and the level of sophistication needed to circumvent them. As covered in more detail elsewhere (Dalton et al., 1994) there were a variety of safeguards in place to isolate the experimenter from the video equipment and possible cues from it. The involvement of a second experimenter for each session who had to sign off on a hard copy of the data for the experiment, plus the printing off of multiple hard copies of the data from the computer before the end of the session, all prevented a single experimenter from editing or selecting the results. What remains is that an experimenter with technical sophistication could have monitored the cabling to and from the remote VCR such as to gain access to the target identity. Or, an experimenter could have arranged for a substitute program to be placed on the computer, identical to the original save for a few lines of code that would allow the experimenter to identify the target or even to determine it. The program could then have been removed before the end of the study and any telltale tracks covered up. As it is difficult to guard against these possibilities with complete confidence, we did not have safeguards in place sophisticated enough to detect or prevent any such procedure. However, one can look for evidence consistent with their usage. If the experimenter had knowledge of the target, they would still have to influence the receiver to make the correct choice. Such biasing attempts would show up on the taped transcripts. The initial mentation report would not be expected to resemble the correct-targets as much as would the report plus mentation review when the experimenter reads back their notes on the mentation and asks the receiver for elaboration or clarification. We have evaluated this by having KD's tapes transcribed up through the mentation

review by a typist not involved with the study. We have had a student group blind judge the mentation reports alone and the mentation reports with mentation review material added. The students were doing the judging as part of a group project to see whether or not the addition of the mentation review would improve the scoring. If they had any expectation of a difference in results, it would have been in favor of the mentation review. Each of nine students judged four 'mentation only' transcripts and four 'mentation plus' review transcripts, for a total of 36 sessions, all judged once, each way. The remaining six were either sessions used for practice or sessions not used because part of the mentation review was incomplete. There were 39% hits for the 'mentation only' judgements ($z = 1.73, p < .05, 1\text{-tail}$) but only 25% hits for the 'mentation plus' review, right at chance. Thus, not only were the results independently significant prior to the mentation review interaction; they actually were worse following the review interaction. Of interest is that although the review transcripts were judged as less like the actual targets, they were more strongly correlated with the receiver's own ratings in the original study ($\rho = .57, p < .001$) than the mentation only ratings ($\rho = .33, p < .05$). We expect that additional analyses of the session tapes will clarify the role of experimenter interactions even further.

We also looked at whether the computer was more likely, during the latter part of the study, to select target pools that had shown evidence earlier on that one item in the pool was more likely to be rated somewhat higher than the other items. These would be ideal pools to select deliberately if one wanted to maximise the likelihood of successfully biasing the receiver to make a correct choice. Eight such target pools were identified; they were no more likely to be selected as targets later on than the others, and they were selected almost twice as often for DD as for KD.

For the above and other reasons, we feel that there is concrete empirical evidence against any experimenter fraud hypothesis. It should also be noted that we had observed the experimenter effect in our earlier two studies (Morris et al., 1993). We feel the likely interpretations will be found in one or more of the first three options discussed above, that KD was able to interact more effectively with her participants, that her strong enthusiasm for the ganzfeld procedure is readily communicated, and that she has apparently in the course of her involvement with the ganzfeld learned strategies to facilitate participant performance. She has been successful in previous ganzfeld studies at the FRNM (e.g., Dalton, 1994). On the other hand, DD (Delanoy, 1988-1989) has in the past tended to obtain overall chance results as a ganzfeld experimenter, although she has found significant internal effects. RM had never conducted a ganzfeld session before, was quite older than most participants and held a position of prestige that may have seemed intimidating to some participants.

In our attempts to evaluate the role of the sender in the ganzfeld we tried to take several factors into consideration. Past ganzfeld research has often made use of senders for several reasons. Psychologically, to many participants it seems somehow more plausible that someone must first observe the target and send them a signal before they can gain any information about the target. Having someone else there as sender also helps to increase the "teamwork" feeling of the venture, and diffuses responsibility for "getting it right." Additionally, another person as part of a team effort may reduce anxiety about the fear, or appropriateness, of demonstrating psi at all. If in fact psi is mediated by the mind, then this might indicate anomalous communication would take place to a more successful degree when

the information is transferred between two minds. It may also be that the addition of the sender's mentation somehow enriches the psi signal, adding an extra boost to something that may be a normally very weak signal (see Williams et al., 1994, for a description of two such models of sender psi effects). If these factors do play a significant role in the transmission of psi in the ganzfeld then the absence of a sender, (without the receivers knowledge and thereby controlling for any psychological biases on the receivers behalf), may have an effect on the session outcome. It was hoped that such an effect should become apparent in a study such as this one.

This, however, was not the case. We experienced no significant differences between the three conditions, yet still experienced the overall reported ganzfeld effect of significant psi hitting. We compared the three conditions on our other psychological measures as well, and found only one relevant aspect where they appeared to differ significantly, namely in mentation report abundance. Upon closer inspection it was found that this was due to mentation reports being less abundant when receivers knew there was a sender present. This difference could reflect a psychological process or could be a chance result, given the number of nonsignificant comparisons obtained. This general lack of difference among the conditions, even though there could have been receiver expectation effects, may in part be due to the small N's of each of the three conditions (32) involved. It may also reflect that none of the considerations listed above play a large enough role in obtaining psi in the ganzfeld to make a considerable difference, or that the sender's role may not have any sizeable effect on the outcome of the ganzfeld session. A third consideration involves the use of lab personnel only as senders. Honorton and colleagues (1990) noted an improvement in the hit rate of participants who brought in their own senders as opposed to those who had lab personnel assigned as their sender. Unfortunately, it was outside the confines of this study to examine that aspect of sender/receiver relationship, but it is an aspect that bears further examination. We used only lab personnel as senders for security reasons and to hold sender variables more constant across the different sending conditions. One additional point is that, throughout the study, all three experimenters did their best to maintain an expectancy that all sessions would go very well and show evidence of psi, regardless of condition. We were not motivated to find a significant difference and had not predicted one in advance.

Our third area of interest involved looking at a variety of individual differences measures. As described above, our findings were very meagre. The one preplanned analysis, for extroversion, produced overall chance results, with a reversal of the expected finding for positive emotions, factor six of the Extroversion subscales. This effect was present in both main experimenters' data, although more so in DD's. We have no ready explanation for the lack of a positive correlation between extroversion and psi success. Perhaps the experimenters were aware that introverted people might be at a disadvantage and worked hard to compensate in some way, perhaps by being especially attentive and friendly. Once again, analyses of the session tapes may eventually provide some clues to follow up studies. All other individual difference measures taken collectively produced overall chance results, including those linked with F and P of the MBTI. The handful of significant correlations found could easily be the product of pure chance.

The one finding of possible interest was that for both KD and DD, mentation abundance and judgeability of mentation was significantly negatively correlated with success. This raises the possibility that with more judgeable mentation the judging process may have become more difficult, more like an intellectual task, and with more opportunity to see many (perhaps too many) correspondences. Alternatively, perhaps some of our participants were

better at suppressing non-target-related mentation. Once again, analysis of the full session tapes may enable us to separate out these two possibilities.

In summary, we are pleased that we continue to find evidence for ganzfeld effects even under more stringent conditions and controls than before. As hypothesized, we saw no evidence that the presence of a sender mattered much, either psychologically or parapsychologically. The lack of individual differences correlates suggests that our successful experimenter was successful in part because she was good at helping a wide range of people do well. Although the presence of an experimenter effect is disappointing in some respects, it should also enable us to learn more about the operation of this effect in our data, given the richness of the descriptive information we can bring to bear. Several further studies are planned to explore the ganzfeld effect in more detail, and to develop it further as a useful tool in exploring the nature of the psi process.

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