

A REVIEW OF THE GANZFELD WORK AT GOTHENBURG UNIVERSITY

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ABSTRACT

The results of five standard ganzfeld studies and one multiple target ganzfeld (the serial ganzfeld) study are reported. The standard ganzfeld studies form a highly significant and consistent data base with an overall hit-rate of 36% (40% in the case of auditory monitored studies) and a mean effect size of .25 (.34 in the case of the monitored studies). This database has been used to study psychological correlates of psi in terms of psychometric tests. The most successful of these tests are the Australian Sheep Goat Scale, the Magical Ideation Scale, and "Feeling" scores on the Myers-Briggs Inventory. Other scales that were used as predictors of psi-scores with varying degrees of success included the Transliminality Scale, the Defence Mechanism Test, and the Tellegen Absorption Scale. A further investigation suggests on the basis of confidence ratings made before and after ganzfeld relaxation, that there may be some awareness of the psi-content of the imagery generated during the ganzfeld state. The report includes a review of current work in developing the ganzfeld into a portable digital technique for process-orientated research.

The publication in a major psychological journal of the Bem & Honorton (1994) review of the psi-ganzfeld work, created considerable optimism that parapsychology had finally been able to provide the much sought after replicable psi-experiment. At that point in time, it seemed that a gauntlet had effectively thrown down to orthodox psychologists, challenging them to take up the autoganzfeld technique and go further with it. Unfortunately, the autoganzfeld technique proved to be not only cumbersome and costly but also required considerable specialist expertise to install. By 1998 there were still only three laboratories in the world with this equipment (in the psychology departments at the Universities of Edinburgh and Amsterdam, and the Rhine Research Center) and an interest from psychologists in acquiring or even borrowing the technique, had apparently not been forthcoming (Bem, 1999).

Despite this, the ganzfeld work has attained something of the status of a flagship in parapsychology, being frequently cited by parapsychologists as a replicable technique. For instance, Dean Radin in his much acclaimed book, *The Conscious Universe*, writes: "We are fully justified in having very high confidence that people sometimes get small amounts of specific information from a distance without the use of the ordinary senses. Psi effects do occur in the ganzfeld". (Radin, 1997 p. 88.) The statistical expert, Jessica Utts, refers in her report (commissioned by the US government to evaluate CIA and Department of defence sponsored research in parapsychology) to the consistency of the ganzfeld work and its compatibility with other areas of parapsychological research. Her conclusion, although not limited to the ganzfeld, is: "I believe that it would be wasteful of valuable resources to continue to look for proof. No one who has examined all of the data across laboratories, taken as a collective whole, has been able to suggest methodological or statistical problems to explain the ever increasing and consistent results to date. Resources should be directed to the pertinent questions about how this ability works". (Utts 1995 p. 311.)

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In conflict with this view, is a meta-analysis of the new generation of studies (Milton and Wiseman, 1999). The authors work did not find an overall significant effect and use this to question the validity of the Bem and Honorton. Inexplicably, they do not mention that a updated version circulated by Milton as a discussion paper on the internet, did in fact find significance although the average effect size of the replications was still much lower than that of the original Bem and Honorton collection. Inspection of the individual studies, which form the basis on which the meta-analysis is built, does also reveal there is an enormous variation in how the ganzfeld technique is defined and used, and this may at least in part explain varying success rate of individual experimenters. Milton and Wiseman include for instance a large unsuccessful large study, which was the only one of its kind that used auditory targets, in this case in the form of music excerpts. Although other variations were included in the Bem and Honorton collection, these were relatively minor ones such as the use of blue light instead of red. A strong argument can be made for defining ganzfeld in terms of stimulation which gives a homogenous visual and auditory field, and the use of dynamic visual targets.

Milton and Wiseman mention that most of these newly published reports failed to address the issue of how the particular studies may have differed from the earlier successful ones in terms of the procedural and participant variables. Indeed, in most cases the researchers did not even report measures of these variables. It is very likely that one source of the replication difficulty concerns important differences in sources from which participants are recruited. A major purpose of our present programme of ganzfeld experiments is to rectify this deficiency and identify some of the predictors of success and failure. In addition to this, we have the long term aim of producing a more efficient and exportable technique, and then in accordance with the Utts' recommendation, to use this technique together with measures which will give us a level of performance that will enable us to achieve a better understanding of the nature of psi.

Beginning in 1995, a three year research project on "Psi and the ganzfeld: a replication-extension study" was established in the Department of Psychology at Göteborg University. The facilities provided by the Psychology Department include two basement experimental rooms with approximately 30-metre separation. One of these rooms is specially dampened for sound leakage, and is used as the receiver room where the ganzfeld relaxation takes places. The second room has the audio-visual equipment and is used as the sender room.

Although some of the studies that we have carried have been previously reported in conference proceedings (Parker and Persson, 1998, Parker and Westerlund, 1998) and journal publications (Parker, Frederiksen, & Johansson, 1997, Parker, Grams, & Pettersson, 1998), this is the first occasion on which all our studies and findings, both published and unpublished, are collectively reported and reviewed.

An outline is given below of the experimental design but for full details of methodology and earlier findings the reader is referred to these papers.

Methodology:

The standard ganzfeld relaxation and evaluation procedures have been followed in this experimentation (with the exception of the last study, series six, in which multiple target clips were used). In the relaxation procedure the receiver undergoes 30 minutes of ganzfeld during which the sender repeatedly views a randomly selected (from a set of 4) video-clip. In approximately two thirds of cases, the receiver brought a partner with whom it was thought a empathic and potentially telepathic contact existed. In the remaining cases, one of the staff members took the role of sender. Assessment of the outcome of each study has been in terms of direct hits (the receiver gives the highest ranking to the target picture). Targets were selected by 5 successive dice throws (recorded) in order to gain an entry point into the random number tables (five throws being required to determine page, row, column, block, and starting

sequence). Duplicate targets were used for viewing and evaluation, and each set was selected from a video-library which finally totalled 26 sets (a target pool of 104 film clips. (During the course of first two studies only half the library had been completed and so in choosing the target series in order to avoid repetitions, we proceeded usually by choosing the target series that seemed to have been least used as the library was built out. For series 4 and 5 and the serial ganzfeld we worked alphabetically through a second complete collection of clips, (totally 4 x 26 clips. In current work, sets are chosen randomly from this collection).

After the departure of the receiver team, the target set was selected and the individual target clip chosen randomly as above by the sender team. No communication or contact occurred between the receiver and sender teams until the receiver had completed the ranking of the possible target clips in their order of proximity to the ganzfeld imagery.

These experiments were designed not only to replicate the earlier findings, but also to find ways of improving the efficiency of the procedure and to increase magnitude of the psi-effect obtained (the so-called effect size). A normal ganzfeld session requires two hours, and studies have an estimated hit-rate in the region of 33-35% (where 25% would be expected by chance). This means that in practice it would require about 90 sessions to reach statistical significance even on a one-tail test.

Improving the efficiency and the success rate of the ganzfeld has also important implications for enabling theory development to proceed. If a success rate approaching 50% can be achieved, then in this situation, further factors relating to performance can be expected to be revealed with relative ease and clarity and the resulting findings should give us a better theoretical understanding of the nature of psi. Previous research findings in parapsychology may well have been confounded by replication difficulties incumbent in trying to relate a weak effect to a series of other potentially weak correlates.

Five studies, each pre-set to 30 trials, have been carried out using this design with the standard ganzfeld. As a first step towards improving the efficiency of the technique we have also experimented with a series of film clip targets per session, a procedure which we called the serial ganzfeld. We have carried out one study with this technique.

Hypotheses:

The initial study was exploratory and we attempted to incorporate what we had learned from this study into the design of the subsequent ones. This was the principle applied to some degree throughout all the six studies. A hypothesis that was basic to all five standard ganzfeld studies was that the overall hit rate would lie around the 33-35 % level (where the use of 4 randomly selected target clips gives a mean chance expectancy of 25%), the level reported by Bem and Honorton.

The first study was run when the department changed premises which necessitated a delay in the installation of a microphone (one-way) link for mentation reports to be heard in the sender room. This delay was used in order to compare the results of this series with the later ones which had auditory feedback of the mentation reports.

During the course of the second study we noticed that the subjects recruited through newspaper advertisements and from New Age centres appeared to score at a higher rate than psychology students did. Although the entry criteria for all participants required them to have reported "paranormal experiences", it became apparent that the groups were referring to different kinds and intensities of experiences: Those recruited from the general population had a diversity of experiences both in type and frequency which they often integrated into their life philosophy while psychology students reported one-off experiences about which they had intellectual curiosity.

Accordingly, analyses were made throughout the first three studies for an effect of subject source on psi-scores. It was thought that psychological tests might help give further precision to these observations and eventually provide a recipe for success in terms of specifying the cut-off points on various personality dimensions for potentially successful participants. On the basis of our own observations and the findings summarised in Bem and Honorton 1994, we expected successful participants to have stronger beliefs in the paranormal, more positive paranormal experiences, and to be more open to and interested in the expression of feelings as a dimension in their lives. Furthermore, since one of the main goals facing research is to find criteria for distinguishing the so-called "psychosis prone personality" from what might be termed "the psi-prone personality", several clinical and sub-clinical tests were also used with the aim of being able to find criteria to distinguish between these groups. The primary focus has been on the receiver in these experiments and it is not until our current studies that we have been able to give attention to the sender role.

Psychological Tests: The aim in using psychological tests is to give precision to a formula for success by eventually specifying cut-off points on various personality dimensions in order to enable researchers to select the most appropriate participants. The strategy was to make maximum use of our ganzfeld studies by applying as wide a range as possible of promising tests. Because of the time and burden involved, it was impractical to give all tests to all participants. Moreover, in some cases in order to achieve sufficient numbers we had to accept that questionnaires were filled in retrospectively after the results of the ganzfeld session were known and for this reason the psychometric findings are to be regarded only as tentative.

In the first three series the tests used included a measure of belief in and experience of psi: the Sheep-Goat test (SGS); an apparent measure of psychosis-proneness: the Magical Ideation Scale (MAS); a Jungian personality test: the Myers-Briggs Type Indicator (MBTI); and a perceptual genesis test: the Defensive Mechanism test (DMT). The rationale behind the use of these tests as well as the results were reported more fully in Parker, Grams, & Pettersson (1999). The results of some further tests which were used at various stages throughout the five standard ganzfeld studies, are reported here for the first time. These include the a measure of openness to inner experiences: the Tellegen Absorption Scale (TAS); a measure of measure of perceptual disturbance relating to psychosis-proneness: the Perceptual Aberration Scale (PAS); a measure of experienced meaningfulness in life: the Sense of Coherence questionnaire (SOC), and finally a test which is intended to tap some of the common features of many of the experiences measured by tests this area: the Transliminality Scale (TLS).

Summary of the Main Findings and Conclusions:

Four of the five standard ganzfeld studies gave an effect size (.33) and a mean hit rate of 40% is somewhat higher than the value reported in the Bem and Honorton review. The exception amongst the five studies is the first study which yielded a hit rate at the 20% level. This was the only study without the feedback procedure that allows auditory monitoring of the receiver's mentation report. Although we cannot draw a firm conclusion that the lack of auditory monitoring caused the absence of an effect, the results from this first study produced a significantly lower hit-rate than those of the auditory monitored studies.

One study (study 4) using of music students and our new entry criteria (paranormal experiences and excluding psychology students) did achieve a 47% level of direct hits falling short of our goal of 50%.

Those participants who returned for a second session also did well. These so-called repeaters formed a part of our third series and a separate analysis for their scores, yielded a 44% hit-rate.

Some of the consistency in the results in particular that the results of the third study also achieved a 37% hit-rate, may be partially due to our need to recruit earlier members to improve the hit-rate in this series (which otherwise would have been 30%).

The database as a whole (table 1) shows a significant statistical effect and this is particularly marked for the 4 monitored studies.

*Table 1. Overall Results from the Gothenburg Ganzfeld Studies**

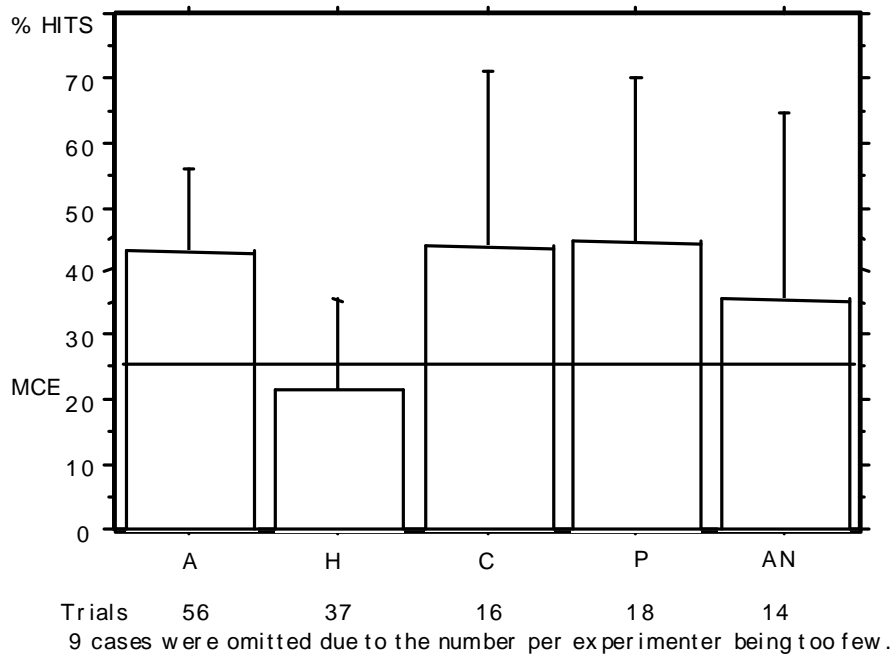
Study	Trials	Hits	Frequency	z score continuity corrected	Effect size
Study I: (non-monitored)	30	6	20%	- 0.84	-.15
Study II (monitored)	30	11	37%	1.26	.23
Study III (monitored)	30	11	37%	1.26	.23
Study IV (monitored)	30	14	47%	2.53	.46
Study V (monitored)	30	12	40%	1.69	.32
Data Base	150	54	36%	3.02	.25
Data Base (Monitored)	120	48	40%	3.69	.34

From this we concluded:

- The results in terms of direct hits are statistically highly significant. For the monitored studies, the p -value is .0001 (one-tailed) and for all studies p is .0012 (one-tailed). A secondary analysis using the sum of ranks (which has the advantage of taking in account partial transfer of information), is also highly significant here (for the database as a whole $z = 3.32$, $p < .0005$, one-tailed).
- The significant results were initially dependent on the success of the main experimenter but the analysis of subject recruitment showed that this could be explained by this experimenter's avoidance of testing psychology students who scored much lower than the two groups recruited from the public (Parker, Frederiksen, & Johansson, 1998).
- Participants who were recruited from New Ages centres and from a newspaper advertisement scored in the auditory monitored studies at about a 40% level of direct hit frequency (where mean chance expectancy is 25%) while the student group scored at a mere 9% direct hit frequency (Parker, Frederiksen, & Johansson, 1998).

* These results differ slightly from those reported earlier since an independent check of our database by Ulla Bøwadt found an extra hit in study V. Two trials in study IV (a hit and a miss) had also been included although the experimenters apparently were not agreed on this prior to the results. Their exclusion would make however virtually no effect on the final figures.

Figure 1 Percentage of direct hits by the main ganzfeld experimenters



- In the latest two studies, a second generation of experimenters have taken over the main role from those involved in the first 3 studies, with a result that the level of hitting has still persisted and is independently significant (Figure 1).
- The success rate of 37-47%, while only in one study coming in the region of our intended goal of 50%, appears to be nevertheless consistent when we recruit participants from our recommended sources (members of the general population who report spontaneous ESP experiences).
- The results show a clear relationship to belief in and personal experience of psi-phenomena. It would seem that success is not related to the kind of personal psi experience that can be described as just a one-off crisis event, but rather to psi-experiences that occur often and are integrated into the person's life or personal philosophy. The analysis of the scores on the Sheep-Goat and Magical Ideation Scales, indicates that hitters are characterised by a factor beyond pure belief in psi, but it is as yet unclear what this factor is. After the items relating to psi belief were eliminated from the MAS, those making hits could still be distinguished from those making misses by their higher scores on this scale (Parker, Grams, & Pettersson 1998). Although it often is thought to relate to a proneness towards psychosis, the MAS consists in fact of a heterogeneous series of questions and further work is planned at identifying the items that are most closely related to psi performance.
- Defensiveness failed at least on the measures analysed here using the DMT, to discriminate between hitters and misses (Parker, Grams, & Pettersson 1998).
- A "Feeling type" may also be more successful, especially with targets than have a strong change in emotional content (Parker, Grams, & Pettersson 1998).

- Target films showing dramatic changes appear to do slightly better (Parker, Grams, & Pettersson, 1998).
- It may be possible to use the presence of repetitive themes as a marker indicating that the psi-information influences the content of the receiver's ganzfeld imagery to return to the theme of the film clip as the film clip is repeatedly shown during the session. (The film clips which are 2-3 minutes in length are shown between on the average about 8 times during the 30-minute session). As yet this is only a suggestive finding based on the evaluations of two judges and our own subjective impressions in linking hits to the number of repetitive themes in the mentation reports. A major difficulty in testing this hypothesis is in establishing clear criteria for objectively agreeing on what constitutes repeated sequences (Parker, Grams, & Pettersson 1998).

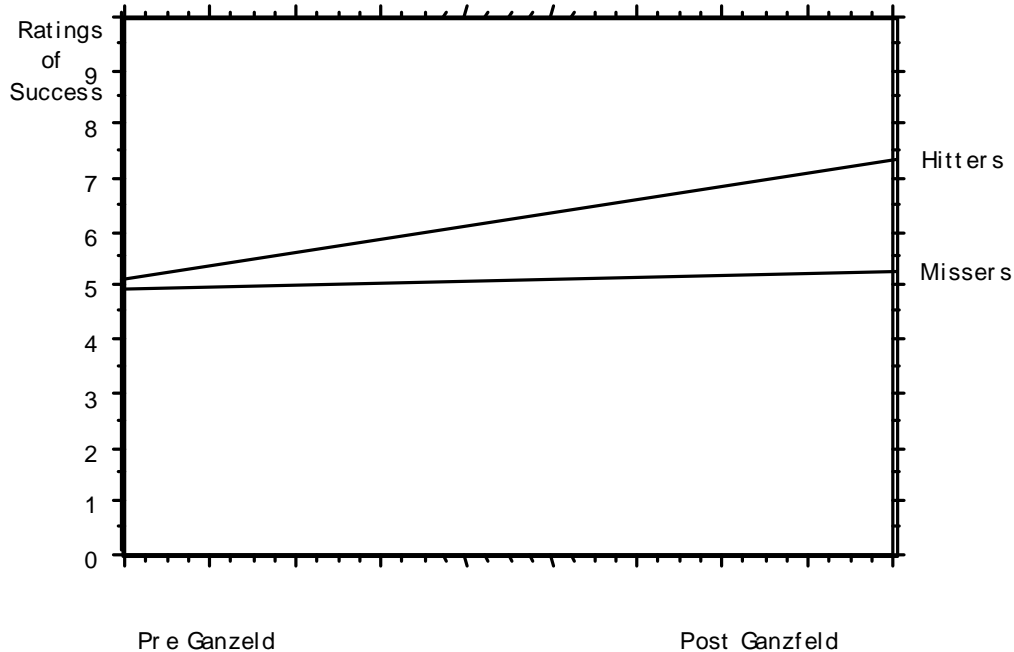
Some Further Findings

The Ganzfeld Experience and Expectancy: One of the experimenters, Charlie Pettersson, who was involved in studies 3 through 5, conducted as part of his Honours in Psychology dissertation, 15 sessions in his home in Falkenberg and 15 sessions in the Gothenburg laboratory environment. (The latter formed parts of studies 3 and 4). Although the extra sessions in the home location were conducted primarily to meet to the submission deadline for the thesis, they were interpolated with the university-based sessions and from this point of view there is no reason to expect different performances. Nevertheless, the home-based sessions involved only one experimenter and could be seen as relatively less controlled so for this reason it was decided in planning the experiment that these sessions would not be counted as part of our overall Gothenburg database. These sessions do however provide some useful comparison data. For the 30 sessions that formed the Pettersson work, the receivers were asked first before the ganzfeld session (pre ganzfeld ratings) and then afterwards - but before they had seen the choice of film clips - (post ganzfeld ratings) to fill in on a nine point *scale of confidence* their rating that the experiment would succeed.

The number of hits were significantly higher in Gothenburg than in Falkenberg (chi-square = 3.97, $df = 1$, $p = .046$; $t = 2.07$, $p < .05$, two-tailed). Although the Gothenburg group did have slightly higher ratings on pre and post ganzfeld ratings of confidence in success, these were at a level far from statistical significance (respectively $t = 0.55$ and $t = 0.73$). The lack of significant differences in expectancies speaks against the difference being due to the different testing environments, so the possibility remains that the different recruitment sources may have been an influence on the results: the Falkenberg group were recruited from personal acquaintances who reported having had paranormal experiences whereas the Gothenburg contacted us in response to a newspaper article about our search for those with paranormal ability.

I will return later to what may have caused this difference, but it does appear clear from this that the experience of going through the Ganzfeld relaxation contributes something important to the success of the experiment. The confidence ratings after the ganzfeld relaxation of those who will then go on to score hits, are significantly higher than those who will go on to score misses ($t =$ corrected for unequal variances = 1.78, $df = 28$, $p = .044$ one-tailed). It should be emphasised that this effect is present *before* the receivers have actually seen the choice of film clips and therefore presumably they have only their ganzfeld experience on which to base their feeling of potential success. The shift in confidence for future hitters is 2.2 points (on the nine point scale) which is more twice that of the future missers (see figure 2).

Figure 2. Shift in confidence for hitters and missers. Post-ganzfeld ratings were given following the Ganzfeld State but prior to the review of possible target film clips.



The Psi-Prone Personality: The initial studies found psi-hitting to relate positively and significantly to belief in and personal experience of paranormal phenomena as measured by the Australian Sheep-Goat Scale as well as to scores on the Magical Ideation Scale (MIS). This was even the case when items that could be interpreted as relating to paranormal type experiences were eliminated from the MIS (Parker, Petterson & Grams 1998). An argument can be made that one of the most important precedents of contemporary research is the setting up of psychometric criteria to distinguish between what may be termed the psychosis-prone personality and the psi-prone personality. In this respect, Michael Thalbourne's work has been seminal by introducing the concept of transliminality. Translinalinity corresponds in many ways to Frederick Myers concept of the subliminal self and can be regarded in very loose terms as an openness to the Unconscious. The Translinalinity Scale (TLS) which has been developed to measure this, includes items from various scales purporting to measure dissociation, schizotypy, magical ideation, mania, fantasy proneness, and hallucination proneness. Factor loading on these scales suggests that translinalinity is the red thread going through these various aspects of inner experience (Thalbourne, Bartemucci, Delin, Fox, & Nofi, 1997).

One definitive step forward is then to investigate the healthy versus disturbed dimensions of paranormal experience. The primary hypothesis is that individuals with genuine psi-experiences would be expected to be less defensive, more open to, and more absorbed in inner experiences, and to show lower scores on schizotypy, dissociation, and perceptual aberrations than those reporting psychotic-like experiences they misinterpreted as psi. A psi-prone personality would see more meaningful connections in life and experience a greater sense of Coherence in life than individuals with a psychosis-prone personality (Williams and Irwin 1991). As well as the MIS and SGS mentioned earlier, we have used the following instruments to examine this hypothesis:

Tellegen Absorption Scale (TAS) (Tellegen & Atkinson, 1974): is a non-clinical scale designed to measure openness to inner experience and has been previously found to relate to hypnotizability, dream recall, creativity and reports of spontaneous paranormal experiences (see Irwin, 1985 for a review). Despite its promising background, the TAS failed in these circumstances to distinguish between those who actually made hits and those who made misses on the ganzfeld ($t = 0.39$, $df = 36$, $p = .70$). Neither did the sum of ranks measure show a significant correlation with TAS scores ($r = .09$, $df = 38$, $p = .61$)

Sense of Coherence (SOC) (Antonovsky, 1987) is a research instrument composed of questions relating to the degree of meaningfulness, understanding, and control that individuals experience in their lives (forming three subscales). The total SOC score is thought to relate to early attachment experiences and have predictive value for vulnerability to illness. Total SOC scores however failed to distinguish hitters from missers ($t = .65$, $df = 50$, $p = .51$) as did a subsequent analysis of the scores on the above three subscales.

Perceptual Aberration Scale (PAS) (Chapman, Chapman, & Raulin 1978): This is sub-clinical scale, closely associated with the Magical Ideation Scale, with which it shows a highly positive correlation, and as such both scales are often used together as a dual indicator of schizotypy or psychosis proneness in individuals otherwise belonging to the normal population. Because many of the questions have an obvious clinical content, it is recommended that the PAS when it is administered, should be embedded in another, non-clinical scale. (In this case it was embedded in TAS.) The difference between the scores of hitters and missers on this scale did not quite reach significance and contrary to our hypothesis, hitters scored higher on this scale than missers did ($t = -1.78$, $df = 35$, $p = .084$, two-tailed).

Transliminality Scale (TLS) (Thalbourne & Delin 1994): Although Thalbourne and co-workers (Thalbourne et al 1997) have recently proposed that transliminality as a whole may be a successful predictor of performance in psi-experiments, it was reasoned that in addition to testing this, it was also important to distinguish between the positive or apparently healthy experiences and the negative or apparently disturbed experiences that are all subsumed under the concept of transliminality. It was accordingly hypothesised that only the positive factors would be successful predictors of genuine psi.

This division into a positive/healthy sub-scale versus a negative/disturbance sub-scale was made according to origins of the TLS items. The positive sub-scale included items relating to: psi-belief, religious and mystical experience, dream interest, creativity, absorption. The negative sub-scale encompassed the items which were related to: schizotypy, hallucination proneness, fantasy proneness, mania, magical ideation, and dissociation.

The results with the TLS were nevertheless for the most part disappointing. The test scores of receivers making direct hits on the film clips were not discriminated from those making misses. This was true for total TLS scores ($t = -.58$, $df = 38$, $p = .56$), and for our division into the positive subscale ($t = -.03$, $df = 38$, $p = .97$) and the negative subscale ($t = -0.92$, $df = 38$, $p = .36$).

Because our previous work suggested that the MIS related positively to psi-scores, this suggested the inclusion of the MIS scores in the negative scale, could confound this subscale. A separate analysis was therefore conducted for the negative subscale without MIS scores. This was the only one of the results that could be considered to be supportive of the hypothesis although not at conventional levels of significance ($t = -1.31$, $df = 38$, $p = .19$). (Two-tailed tests are used throughout here.) Missers had thus more negative transliminality experiences.

In looking further into the previously mentioned differences in scoring between the Falkenberg and Gothenburg groups, we did find a significant difference between the two sources in terms of transliminality experiences, Although it was obviously a post-hoc finding,

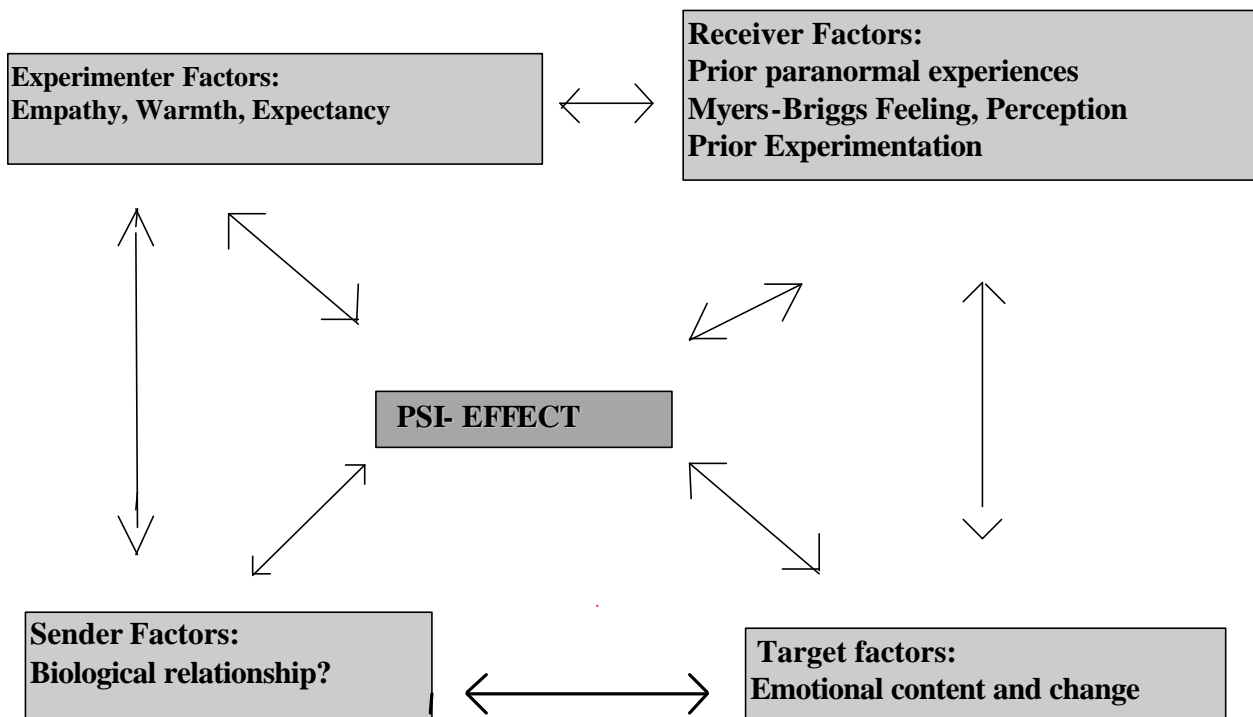
significantly more negative type experiences were reported by the Falkenberg group ($t = 2.21$, $df = 28$, $p = .03$).

The Role of the Sender Of the 150 sessions that formed the data base for standard ganzfeld, 94 of these were carried out with a receiver and a friend of receiver as sender while in the remaining 56 sessions, one of the staff, usually the assistant experimenter functioned as the nominal sender. Somewhat to our surprise, but in line with the results of previous suggestive findings from Edinburgh (Dalton, Delanoy, Radin, Taylor, & Wiseman 1996) whether an accompanying partner or a staff member functions in the role of the sender does not appear in general to make a decisive difference. Indeed the results in terms of direct hits using staff members as the sole sender were actually (non-significantly) higher than when the receivers brought their own senders to the session ($t = -.78$, $df = 148$, $p = .44$). Comparison of the six staff members involved did not reveal any significant differences in their success rates as senders in obtaining these direct hits ($F = .39$, $df = 50$, $p = .95$).

Naturally, this does not necessarily mean that accompanying senders are of no value in ganzfeld designs and that studies will work as well with other senders or even under clairvoyant conditions. Researchers at the Rhine Research Center (Broughton & Alexander 1997) have produced evidence that the biological relationship between sender and receiver is of crucial importance and certainly it is the case that mother-daughter pairs are over represented amongst our successful pairs of participants. It seems probable that some (but far from all) senders may increase the likelihood of success or the quality of the hit. It is worth noting that nearly all our good quality hits were produced by receivers who had brought their own senders.

It may be that we need a more sophisticated view of psi in experiments as being multi-determined. It is possible that experiments produce similar results but with different contributions being made to the psi-process: A gifted experimenter may be able to obtain significant psi-effects from many subjects under a variety of conditions while others may be more dependent on gifted receivers, and/or gifted senders and/or the right target material. A simple model for looking at some of these interactions is reproduced as figure 3.

Figure 3. A systems model of psi in the ganzfeld.



Improving the Efficiency of the Ganzfeld

The first attempt at improving the efficiency of the procedure, involved the use of a so-called *serial ganzfeld study*. This is a procedure in which all four targets are used during one session with each of them being presented in a randomised order. In order to achieve this, the period of ganzfeld stimulation was extended from 30 to 40 minutes thereby giving approximately 10 minutes viewing time per film clip. It was reasoned that even if the task of placing all four films in the correct order of sending was a formidable one, it might work for experienced subjects and, if successful, it would dramatically increase the efficiency of the procedure (the p-value for all four correct placements is .042). The next possibility of 2 correct placements, because of all of the various permutations, would be close to that of a standard ganzfeld ($p = .29$).

Unfortunately during the time schedule for the study, it was possible amongst the 30 subjects who took part to recruit only 7 subjects with a previously successful track record at ganzfeld. The pilot series of 30 trials gave a distribution of placements very close to chance with the exception that there was some indication that the successful subjects might indeed succeed at this task (chi squared = 3.04, $p < .08$, two-tailed).

In considering a means of improving the efficiency of the technique, an important goal of our work concerns the development a ganzfeld method which would make greater use of *qualitative hits*. Qualitative hits are a rich source of material that up to now have not been used as part of the research design and evaluation, but have at best been used as background illustrative material. We estimate from our own data that between one in five and one in six of our successful subjects describe the essential content of the film clip. This remarkable and dramatic

event however becomes only registered in the results as a hit occurring once in four times by chance.

In order to make better use of this material, as studies are being made of real time recordings in which the ongoing mentation reports given by the receivers in ganzfeld are synchronised with recordings made of the film clips as they are being viewed. The result is in some cases a good quality hit in which the receiver describes the action as it happens (Parker, Persson, & Haller, submitted 1999).

The above claim that one in five or six of the receivers make high quality hits is obviously a judgement call and one of the next steps will be to develop definitive criteria for identifying these. Some of these good quality hits have been documented as real time recordings and are currently being evaluated statistically by comparison with control films and studied with the earlier mentioned goal of revealing something new about the way in which the psi-mediated information enters consciousness. For this purpose and for reasons we mentioned in the beginning of this paper, we are in the process of developing a new ganzfeld design.

The digital auto-ganzfeld combines some of the advantages of the standard and serial ganzfeld procedures with some of those of the automated ganzfeld as well as eliminating the disadvantages of the earlier procedures. A vital part of the set-up is that the film clips are recorded *digitally* on to the computer's hard disc thereby allowing the procedure to be partially automated. As in the serial ganzfeld, more than one film per session is shown - in this case we have opted for two film extracts per session. However, rather than selecting each film from the same pool, the film clips are randomly selected from different sets in the entire video pool. This immediately increases the power of the test.

The target film clip is chosen by the computer's random number programme. Each film clip chosen, is shown 7 times during a fourteen-minute period (after an interval of one minute). The second choice is made randomly by the computer from another set and this target is shown during the last fourteen minutes period of ganzfeld relaxation. During the ganzfeld relaxation period, the receiver's voiced mentation report is recorded by the computer so that following the ganzfeld relaxation, he or she can review the mentation and contrast it with each of the films in the series (hearing the voice instead of the film sound track). A successive comparison can be made of two (of the four) film clips at a time by showing these simultaneously on separate halves of the projection screen. A forced choice between these can then lead to the next comparisons, then to be continued to a third (the "semi-final") choice, and then the final comparison.

This procedure allows the receiver to make full use of real time related (synchronised) correspondences between his/her mentation imagery and the target film clip in order to distinguish it from the decoy controls. The use of the above tandem procedure with two sets of targets allows the scores of the individual to almost reach significance in one session (the probability of identifying both films correctly, is 1/16 or $p = .06$).

The recording of the mentation reports on to the control (decoy film) clips as well as the target allows a means of later evaluating some of the qualitative sequences of real time descriptions by comparing how well "meaningful units of expression" in the mentation reports correspond to the real-time sequences in the target clip with those of the appropriate sequences in the control clip.

Theory Development:

This is the most difficult and challenging of our goals: to learn something new about psi. To achieve this, it is a basic tenet of our approach to study variables that might have an influence when the psi-process is observed to be occurring at a high level. It is in this respect that a qualitative analysis study of good quality hits may provide some insights into the way in which psi-mediated imagery enters consciousness. A study of 20 of these hits is to be reported

elsewhere (Parker, Persson, Haller, 1999) and suggests that psi follows a similar pattern of information processing to that which occurs in normal perception under conditions of non-optimal observation. In other words the information is sometimes perceived quite accurately but it is often coloured or misinterpreted by our previous experiences, expectancies, and hypotheses. The information appears also to be processed in a similar way to sensory information by going through various stages: First we perceive the general features and forms of objects and then fill in the details with the help of memory associations that fit these forms and expectancies.

Where psi may differ from other sensory sources of information, is that it appears that psi-mediated information is not limited by the formal constraints of the experiment but may obey psychological and transpersonal principles rather than physical ones. We are however only beginning to research in this area. The point is that the ganzfeld set up allows us to use for instance different target materials and situations which would illuminate these principles.

Conclusions:

The results of our work using the ganzfeld provide evidence that the technique is a useful analogue of real-life experiences and can be used to study these in a laboratory setting. The results have a high degree of consistency and the quality of many of the real time hits indicates that the ganzfeld psi-experiences are sometimes close to real-life spontaneous psi-experiences.

It would be however misguided to suppose that the magic is in the technique and not in the individual seen in the total atmosphere of the setting or "stämning" of the experiment. As yet we have only just begun to identify a few characteristics of these so-called psi-prone individuals and of the setting. It seems probable that as well as an integrated belief in and experiences of the phenomena studied, some form of magical ideation is typical for successful receivers. It is as yet unclear how such magical ideation is distinguishable from ways of thinking which in other individuals merge into psychotic delusions. It may well be that further refinement of scales such as those relating to transliminal experiences may shed light on this.

In terms of functional designs, the further use of the ganzfeld with selected subjects should enable us to study how psi enters consciousness, and provide some parapsychological markers of the psi process in mentation reports. It seems also likely that we can in this way learn something new about the principles involved in psi. The better and more efficient digital ganzfeld technique may aid us in these goals and in the testing of theories.

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