

EXPLORING THE LINKS: CREATIVITY AND PSI IN THE GANZFELD

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Abstract

This is an initial report on Ph.D. research exploring the relationship between psi and creativity using the automated ganzfeld system at the Koestler Chair of Parapsychology in Edinburgh. Four creative groups were examined: Artists, Musicians, Creative Writers and Actors. Each group had 32 participants for a total of 128 ganzfeld sessions, and all participants completed personality (NEO-FFI) and creativity assessments (Torrance Tests of Creative Thinking) prior to their ganzfeld session. All p values are one tailed unless other wise noted.

Overall study psi results were 60 direct hits out of 128 trials, a direct hit rate of 47% which is statistically significant at $p = 7 \times 10^{-8}$, $ES(h) = .46$. Correlations for the group between z scores and overall results from the verbal form of the Torrance Tests of Creative Thinking, while in the predicted direction, were nonsignificant. Correlation between z scores and extroversion for the group overall was also nonsignificant at $\rho = .021$.

As a subgroup, Musicians obtained 18 direct hits in 32 trials, a direct hit rate of 56%, significant at $p = .0001$, $ES(h) = .65$. Correlation between z scores and the verbal form of the Torrance Tests of Creative Thinking for the Musicians was significant at $\rho = .358$, $p < .02$. Correlation between z scores and extroversion for Musicians was also significant at $\rho = .297$, $p < .05$. The next subgroup, Artists, obtained 16 direct hits in 32 trials, a direct hit rate of 50%, which is also significant at $p = .002$, $ES(h) = .52$. Correlation between z scores and the verbal form for Artists was also nonsignificant. Writers achieved 13 hits in 32 trials, as did the Actors, with each subgroup independently yielding a direct hit rate of 41%, $p = .037$, $ES(h) = .33$. Correlation between z scores and the verbal form for Writers was nonsignificant at $\rho = -.166$, while the correlation between z scores and the verbal form for the Actors was significant at $\rho = -.336$, $p < .02$.

This report comes out of the author's Ph.D. research exploring the links between creativity and psi conducted at the Koestler Chair of Parapsychology in Edinburgh. I would like to thank the Society for Psychical Research, the Institut fuer Grenzgebiete der Psychologie und Psychohygiene and the Parapsychology Foundation for their financial support at various times over the course of this research. I would also like to thank Prof. Robert Morris and Dr. Caroline Watt for thier assistance, helpful suggestions and support of this research.

INTRODUCTION

The ganzfeld technique increasingly appears to be a realistic avenue of approach to explore process oriented questions, based upon its continued success even when procedural conditions are tightened (Honorton, Berger, Varvoglis, Quant, Derr, Schecter, and Ferrari, 1990; Morris, Dalton, Delanoy, and Watt, 1995; Rosenthal, 1986). The automated ganzfeld work conducted at the Psychophysical Research Laboratory (PRL) met with a fair level of success, with 354 participants producing an overall hit rate of 34%. The success of this work led to the exploration of successful characteristics of ganzfeld participants by other researchers world wide.

An automated ganzfeld study by Marilyn Schlitz (Schlitz and Honorton, 1992) exploring the characteristic of creativity and its impact on ganzfeld performance, made use of an exceptional population in the form of students from the Juilliard School of the Performing Arts. Schlitz found a 50% overall hit rate for this population, with the music students alone producing a 75% hit rate, and the drama students alone producing a 40% hit rate.

While not all ganzfeld studies have been this successful, (eg., Delanoy, 1988-89; Kanthamani & Palmer, 1993; Stanford & Frank, 1990), studies exploring participant characteristics thought to be associated with ganzfeld success were able to reproduce the overall success of both the PRL database and the Schlitz study. Broughton and Alexander (1996), at the Rhine Research Center in the United States, in their recent automated ganzfeld series found a 37.3% hit rate for pairs that were emotionally close while reporting a hit rate of only 26.5% for a general population. Bierman (1995) at the University of Amsterdam/Utrecht reported a hit rate of 38% in a ganzfeld study exploring the emotional impact of target material, and Parker (1995) reported a 37% in a ganzfeld series using participants drawn largely from a 'new age' population at Gothenburg University in Sweden.

However, none of these studies quite reached the level of overall success evidenced by the Juilliard students, nor did any one population reach the level of success evidenced by the Juilliard music students (75% hit rate). A study conducted at Edinburgh University by Cunningham (Morris, Cunningham, McAlpine & Taylor, 1993), used a population primarily made up of pairs of musicians, who achieved a 41% hit rate. More recently, a study by Morris, et al., (1995) used a creative population made up primarily of visual artists and musicians, with the overall study significant at 33%. One surprising result from this study was that visual artists performed somewhat better than their musician counterparts, achieving a 39% hit rate.

These results would suggest that there is something about the creative individual that lends itself to the reception and recognition of psi within a ganzfeld setting. Early work with creative populations (Anderson, 1966; Honorton, 1967; Schmeidler, 1962, 1964) used forced choice tests (tasks allowing only a finite number of responses, i.e. circle, star, square, etc.) and while this work yielded mixed results, work using free response material (tasks allowing open ended responses, typically in relation to a visual scene) seemed to produce stronger results with a creative population (Braud and Loewenstern, 1982; Moss, 1969; Moss and Gengerelli, 1968). This may be because this type of material allowed the artists more creative expression and fluidity of thought than forced choice psi tasks. However, past research has not focused on understanding what

the links between psi and creativity are, nor how these links may influence or facilitate psi performance.

CREATIVITY IN PSI RESEARCH

One of the first in psi research to make a connection between exceptional human abilities, such as genius and creativity, and psychic experiences was Frederick Myers (1903). Based on observations made of spontaneous cases, he felt that both psi and creativity provided expressions of the same potential subliminal materials, and the impulse to fulfill them through contacts with the outer world. In both cases he saw mental imagery as the mediating vehicle for the transition of information from the unconscious mind into conscious awareness.

In studies designed to assess the ostensible relationship between psi and creativity researchers have met with varying degrees of success, particularly when using forced choice tasks. Levine and Stowell (1963) correlated the scores of 69 subjects on a clairvoyance task involving two geometric forms, with the results of an adaptation of Guilford's Classes of Uses Test. This test examines fluency and flexibility where subjects were asked to list as many different uses for a brick as they could think of in 8 minutes. Correlation between psi and the creativity measures, while in the predicted direction, was not significant and overall psi results were not significant. Schmeidler (1962, 1964) reported negative correlations with college students between forced choice ESP scores and two measures of creativity, a 'classes-of-use' test and Barron's Independence of Judgement Scale. Honorton (1967) also used ESP cards with high school students and found significant positive correlations between ESP scores and scores on a 'classes-of-uses' test and Torrance's Social-Motivation Inventory. In this study, the more creative students averaged close to chance while the less creative students demonstrated significant psi missing. A card guessing experiment by Jackson, Franzoi, and Schmeidler (1977) used a participant population of half music students and half unselected psychology students. The music students scored higher on the psi task than the unselected students, however, there was no overall evidence of psi and no significant difference between the two groups.

However, studies that have made use of free response material, or psi tasks allowing open ended responses, typically in relation to a visual scene, seemed to produce somewhat stronger responses with a creative population. Moss found that pairs of subjects, of whom at least one was an artist, produced significantly more hits than other pairs in two free response GESP experiments (Moss, 1969; Moss and Gengerelli, 1968). Gelade and Harvie (1975), in a replication of the Moss studies, also found that pairs composed of two artists produced significantly more hits than other pairs. The ganzfeld study by Schlitz and Honorton (1992) made use of the figural form of the Torrance Tests of Creative Thinking. This three part test is largely pictorial in nature, primarily drawing with some writing to label the drawings, and is designed to evaluate fluency, flexibility, originality and elaboration. Overall psi results were impressive, yielding a 50% hit rate, and with the musicians producing the highest scoring rate of 75%. Correlations for creativity measures and psi scores was nonsignificant, primarily due to two significant outliers on the creativity measures. If these two extreme outliers were removed, the correlation between creativity and psi scores would become significant. Morris, et al., (1995) made use of a self rated creative assessment in their ganzfeld study using a creative

population. Overall psi results were significant, however, correlations between psi scores and the creativity measure, while in the expected direction, did not reach significance. Cunningham (Morris, et al., 1993) conducted a ganzfeld study using pairs of musicians, and also made use of a self report as the method of creative assessment. Although overall correlation between self-rated creativity and scoring success for the population as a whole was positive but not significant, Cunningham found a significant difference in scoring rates between high and low creatives, with high creatives producing 50% of the study hits. These studies indicate the use of free response psi tasks as the best method of exploring the links between creativity and psi.

Various authors have noted parallels between psi and creativity and have suggested that both may be facilitated by common personality traits and social conditions. Based on his review of the literature, Krippner (1962-63) has observed that both psi and creativity are more highly associated with academic achievement than they are with intelligence, both operate outside the limits of cultural conditioning, both appear to be facilitated by altered states, such as dreaming, and both characterize persons who are open to the unusual and who are less likely to censor unusual material either from the unconscious or the environment. According to Moriarty & Murphy (1967), both experiences are more likely in people with high self-esteem, empathy, and self-understanding. Further, Moriarty and Murphy felt that both psi and creativity are characterized by a demand for openness to new and unusual experiences and tolerance for the unrealistic.

In attempting to put meaning to the creative state, artists have described it as almost trance like, unconscious, imagery filled, being unaware of physical surroundings and completely absorbed in the creative task, at the same time completely open and yet turned inward. This description of the creative state could also serve as a description of what most researchers would consider a psi facilitate state, such as the ganzfeld. In addition, the creative state, as well as psi, is considered to be elusive, dissociative, intuitive, and facilitated by altered states. Several researchers, most notably Anderson (1962), Sondow (1987), and White (1964), have seen similarities in the process that both psi and creativity seem to go through. Both psi and creativity start out with a need to create or to know, followed by a incubation period, which may involve an unconscious or conscious scanning of the environment; generally followed by a flash of insight or illumination where the information is assimilated. The final stage is then reached, that of verification, or having the material become relevant.

Gardner Murphy (1963) pointed out in his examination of the relationship between psi and creativity, that not only are the steps towards the emergence of a paranormal impression similar to the steps of development or incubation of creative ideas, but that both psi and creativity are facilitated by the effects of positive motivation, relaxation, and dissociation. If visual perception is internally directed, as would seem to be the case on a number of levels, then perhaps too is the perception of psi. Creative people may be better at recognizing the psi signal out of a mass of sensory signals because they are better at focusing on the information that is coming to them internally - information that they tend to censor less, and analyze the origin of less, than do non creative folk.

In his survey on creativity and psychic phenomena, Krippner (1962-63) concluded that the intrapersonal conditions for creativity and psi reveal the phenomena to be

non-verbal and prelogical in nature, largely unconscious in origin, dependent upon need and drive, and closely aligned with emotionality. He also stated that the relationship between creativity and psi seems to represent that portion of the nervous system free from societal conditioning and that the induction of an altered state of consciousness will often bring about an increase in the functioning of both creativeness and psi. The ganzfeld sets an ESP task within the context of an internal state induction technique that is designed to give the participant access to unconscious mental processes. In this respect, the ganzfeld maximizes characteristics identified in descriptions of psi and creativity, including relaxation, dissociation, and the search for new and unusual experiences. The ganzfeld technique, therefore, is likely to have the best chance of success in research designed to explore the links between creativity and psi.

Past psi research involving creative populations indicates that there is something unique about this population. Whether that uniqueness springs from their natural artistic talents or from the less restricted societal expectations and viewpoints remains unclear. A systematic comparison of creative groups, examining both the type and level of their creative talents, as well as exploring the personality characteristics and individual differences of the creative person, was the focus of this research. Here we present an initial report on the results from one creativity measure (which has already been professionally scored and returned) and the participants psi results in the ganzfeld.

INDIVIDUAL DIFFERENCES

One aspect of making use of the autoganzfeld for process-oriented research is to examine whether certain measures of individual differences might be predictive of success. Several individual differences have already been suggested by prior research. The Schlitz study (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 higher in the PRL autoganzfeld than other participants, particularly the musicians who obtained a 75% hit rate. This finding supports previous research with force choice tasks that suggested that artistically talented and creative people may do especially well on psi tests. 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 for this study was positive but not significant. However, those who rated themselves high on both artistic and musical creativity scored significantly better than those who rated themselves low to average on both scales.

Regarding other personality variables, Honorton, et al., (1990), 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. Cunningham (Morris, et al., 1993) confirmed this finding with a preselected artistic and musical population, using the NEO Revised Personality Inventory as a measure of extroversion. The NEO-P-IR includes six subfactors for each factor, allowing a more detailed exploration of the relationship. Cunningham found significant positive correlations between performance and three extroversion subfactors: activity, excitement seeking and positive emotions, but not with three others: warmth, gregariousness and assertiveness. This 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. However, the Morris, et al., (1995) study reported a slight tendency towards introversion and psi hitting in their creative population, showing a reversal of the expected relationship.

Method

DESIGN

This study was designed as a means of exploring the possible links between creativity and psi performance. Four different creative groups were selected to take part in the study, each with 32 participants, for a total of 128 sessions. These four groups were selected primarily on the basis of previous research indicating superior psi or ganzfeld performance (Schlitz and Honorton, 1992; Morris, et al., 1993; Morris, et al., 1995). The study was a telepathy design and all receivers were instructed to bring their own senders for the ganzfeld session.

PARTICIPANTS

The population for the present study was comprised entirely of creative individuals and were principally recruited from local art, writing, theater and music colleges and classes. Each of the four groups of the study had been pre-specified to have 32 participants. A total of 128 participants, 77 females and 51 males, contributed one session each. Each participant in the study was pre-selected as much as possible to match the characteristics of earlier autoganzfeld successes, e.g., positive attitude toward psi, previous psi experiences, etc. Participant age range was 18 - 70, and the average age was 28. Participants had not participated in any previous autoganzfeld studies, and were considered ganzfeld novices.

APPARATUS

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.

Prior to the beginning of this study, two floppy diskettes were made of the experimental program, one was held by the head of the Koestler Chair, Professor Robert Morris, and the other was held in a secured location by the experimenter. Both individuals were instructed to randomly, throughout the study, check and compare the computer program against the diskette program. No discrepancies were found. 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 either contact the author or see Dalton, Morris, Delanoy, Radin, Taylor, & Wiseman, (1994), and Morris, et al., (1993).

INDIVIDUAL DIFFERENCES MEASURES

The NEO-FFI and PIF

Prior to the experiment, participants were given a variety of questionnaires and creativity measures. One was the short form of the NEO-PI-R, known as the NEO-FFI (Costa & McCrae, 1992) which also measures Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness but without the added information of the six subscales for each factor. The NEO-PI-R is a widely used measure of these five variables and has been used in previous automated ganzfeld studies (Broughton & Alexander, 1996; Bierman, 1995a; Morris, et al., 1993), and the NEO-FFI meets the same standards of reliability and validity as its parent form (Costa & McCrae, 1992). The second questionnaire was an adapted form of the Participant Information Form (PIF) used regularly by the Koestler Chair, containing 55 items covering different aspects of the participant's background, prior experiences, interests, characteristics, etc. In keeping with prior ganzfeld work exploring the imagery of the participant (Morris, et al., 1993; Palmer, 1977; Sargent, 1980), 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 imagery, vividness of imagery, abundance or themes, etc., during the impression period. Also, during this time the experimenter filled out a brief questionnaire regarding the participant's mentation (amount of judgeable content, cognitive references, such as to the light or chair or experimenter, etc.) for the session. The ratings for this questionnaire were the subjective interpretation of the participant's mentation, (i.e. was imagery abundant, bizarre or mundane, etc.) on the basis of the experimenter's prior experience with ganzfeld mentation.

Creativity Measures

Creativity assessments were conducted with participants in a separate session prior to their ganzfeld trial. Individual creativity assessments were administered to each group on the basis of their creative backgrounds (i.e., artists completed figural drawings, musicians responded to musical sounds, writers completed story lines, etc.) to allow an assessment of the level of creativity in their respective area. In addition, all four groups also completed the same creativity assessment designed to provide a common base line for analysis and comparison across groups. The results from these one of assessments, which has been professionally scored (Scholastic Testing Service, 1995), will be presented here, with the complete results from all assessments to be presented in the fuller version of the paper when published. This report will use the overall score from the verbal form of the

Torrance Tests of Creative Thinking (1972; 1990), which uses six word based exercises to assess individuals in three creative mental attributes, i.e., originality, fluency, flexibility.

PROCEDURE

All interested parties first completed the PIF and returned it to the Koestler Chair, after which they were contacted by the author to either take part in the ganzfeld study or to offer them the opportunity to participate in other research if their PIF responses did not match the study criteria. Participants then visited the ganzfeld suites to complete creativity assessments and receive a tour of the laboratory. This period lasted approximately two to three hours, during which time participants were offered cookies and drinks, and encouraged to chat and ask questions.

When the participant and their sender arrived at the psychology building for their ganzfeld session the researcher met them at the door and escorted them to the ganzfeld suites. Participants and senders were then seated in a lounge area 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 and sender were shown the target room and the relevant apparatus (e.g. target display monitor, etc.) was described and all questions were answered about the upcoming session and the role each of us would play.

After this, the participant and sender were taken to the receiver's room where the receiver was made comfortable in a reclining chair, and any final questions answered. When the session proper began, the receiver would hear first a 15 minute progressive relaxation exercise, and then 30 minutes of white noise through the headphones (known as the impression period), so prior to the session proper, the receiver is instructed to put on the headphones and adjust the volume to a comfortable level. After adjustment of the headphones, the microphone is attached, the reclining chair adjusted and the receiver is then given the option of whom they would like to apply the eyeshields, the sender, the experimenter or themselves. Eye shields are halved ping pong balls in the baseball style cut and are attached with surgical tape. After the eye shields have been adjusted for maximum comfort, the overhead lights are dimmed and the flexipose 60 watt red light is switched on and adjusted in front of the participant for an even, comfortable light. The participant is wished good luck by all involved, and then the two doors to the room are securely closed. The sender is then escorted back to the sender's room, settled in, and the door into the sender's room is locked from the inside. The experimenter returns to the experimental suite door, locking that door behind them. They then enter the experimenter's room, close that door, and conduct 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. 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.

During the ganzfeld session, 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 nine times during this 30 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. They have been instructed verbally and via monitor screen not to verbalize or speak out loud during this period, and have been asked during the judging sequence to mentally (but silently) reinforce their receiver's correct choice of the target.

During the impression period the participants report aloud any images, thoughts, feelings, or impressions that come into their minds. This mentation is 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 fills out a brief change in state report. They are then shown four possible target choices one at a time, and asked to relate after viewing each one any similarities between the imagery reported during the ganzfeld session and that particular target clip. The experimenter, who is blind to the target, may point out any potential correspondences that participants may have overlooked, but tries to keep this to a minimum. Participants may view the target clips as many times as they wish before proceeding to 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. The experimenter, receiver and sender then discuss the session and the ganzfeld experience.

HYPOTHESES

Prior to the beginning of the Ph.D. research, several hypotheses were specified. Due to the limited space allowed, the first three will be presented in this paper with future papers to deal with the others. 1) That the overall number of direct hits for this study would exceed chance. 2) That there would be a positive correlation between creativity scores and success. 3) That there would be a positive correlation between success and extroversion as measured by the NEO-FFI.

PLANNED ANALYSES

Direct hits were used as the primary measure to allow the results from this study to be more easily compared to other similar work, and Stanfords z-scores (Stanford and Sargent, 1983) based on the target ratings were calculated for each receiver, and correlated with the creativity measures and the individual differences scales.

RESULTS*Randomness Checks*

Prior to the beginning of this study a global randomness certification test was conducted on the target generating system. This consisted of extracting the target generating instructions from the controlling program and embedding them in a program that generated a large number of autoganzfeld targets in the range of 1-100. In the pre-series test 63,000 trials were generated, and chi-square tests revealed no consistent departures from the expected uniform distribution. Periodic randomness checks also took place at irregular intervals, and there was no evidence of consistent departures from expectation. The interpretation of the selected target output by the program was checked by running a series of mini-trials, using the program to generate requests for targets and verifying these as above. Thus, both randomness checks and program interpretation were found to be within specified parameters. The program itself places a new call for the target information during each session (after the participant is in the ganzfeld stimulation), which is generated fresh at that time, and not stored.

Direct Hit Results

Overall study results, shown in Table 1, yielded 60 hits in 128 trials, a 47% hit rate ($p = 7 \times 10^{-8}$, $ES(h) = .46$) which is comparable to the Schlitz study overall hit rate of 50% ($p = .014$, $ES(h) = .52$). Musicians clearly had the best overall hit rate at 56% ($p = .0001$, $ES(h) = .65$), which is consistent with both the Schlitz (Schlitz and Honorton, 1992) and Cunningham studies (Morris, et al., 1993). Artists were the next high scorers, with a 50% hit rate, ($p = .002$, $ES(h) = .52$), and both Writers and Actors obtained an overall hit rate of 41%, ($p = .037$, $ES(h) = .33$).

Table 1: Overall Ganzfeld Results and Results by Group

	N- Trials	N- Hits	% Hits	ES(h)
Total for Study	128	60	47%	.46***
By Group				
Musician	32	18	56%	.65***
Artist	32	16	50%	.52**
Creative Writer	32	13	41%	.33*
Actor	32	13	41%	.33*

*Significant at $p < .05$.

**Significant at $p < .002$.

***Significant at $p < .0001$.

For completeness, Table 2 shows the full distribution of ranks for this study, by group.

Table 2: Distribution of Ranks by Group

	Musician	Artist	Creative Writer	Actor
Rank				
1	18	16	13	13
2	9	9	6	3
3	4	4	9	9
4	1	3	4	7

CREATIVITY AND PERSONALITY DATA

Overall Results

The verbal form of the Torrance Tests of Creative Thinking (TTCT) was used as a measure of creativity across all four groups. Correlation between z scores and this creativity measure for the study population as a whole was nonsignificant at $\rho = -.068$. Correlation between z scores and extroversion for the study population overall was also nonsignificant at $\rho = .021$. Refer to Table 3.

Table 3: Creativity and Extroversion Results

	Verbal TTCT	Extroversion
Total for Study	-.068	.021
By Group		
Musician	.358**	.297*
Artist	.188	-.341**
Creative Writer	-.166	.211
Actor	-.336**	.175

*Significant at $p < .05$.

**Significant at $p < .02$.

Individual Group Results

Correlation between z scores and the verbal form for Musicians was significant at $\rho = .358$, $p < .02$, as is shown in Table 3. Correlation between z scores and extroversion for Musicians was also significant at $\rho = .297$, $p < .05$. For the next group, Artists, correlation between z scores and the verbal creativity measure was nonsignificant (verbal $\rho = .188$). However, for this group the correlation between z scores and extroversion for Artists yielded a significant finding in the direction opposite to that predicted, at $r = -.341$, $p < .01$. This would seem to indicate that introverted artists performed better on the psi task than did extroverted artists.

Correlation between z scores and the verbal form for Writers, shown in Table 3, was nonsignificant at $\rho = -.166$, as well as the correlation between z scores and the

verbal creativity measure. The extroversion measure for this group was also nonsignificant, $\rho = .211$. For the Actors, correlation between z scores and the verbal form was significant at $\rho = -.336$, $p < .02$. The extroversion measure was nonsignificant for Actors at $\rho = .175$. Means for each of the groups on the verbal form of the TTCT was: Musicians, 98.56; Artists, 101.28; Writers, 102.9, 103.68.

DISCUSSION

This study successfully replicates both the PRL data as well as the past research indicating that creative populations perform well on psi tasks. The musicians in particular performed well above expectations, coming close to the 75% hit rate produced by the Juilliard musicians of the Schlitz and Honorton (1992) study. This result also ties in with the previous finding by Cunningham (Morris, et al., 1993) in which pairs of musicians produced a 41% hit rate, but fails to shed light on why a subsequent ganzfeld study at Edinburgh using musicians as part of their creative population reported a close to chance result for the musicians (Morris, et al., 1995). One interesting and unexpected result is the significant relationship between introversion and psi hitting for the artists. A previous automated ganzfeld study conducted at Edinburgh had reported a trend towards introversion for psi hitters in their study examining the role of the sender in the ganzfeld, and this study with a somewhat similar, if more specialized, population seems to reinforce that finding for a predominantly European population. Of the four groups, only the Musicians showed a strong tendency towards extroversion, while both Writers and Actors displayed only a trend in that direction.

The relationship between creativity and the psi response of this population is also somewhat ambiguous at this stage, as this paper is able to report on only three of the various creativity assessments that were given to each group, that of the verbal form of the Torrance Tests of Creative Thinking, the Possible Jobs test developed by Guilford, and a self report of perceived creative level. Analyses on other creative measures are underway and will be reported on in due course. In respect to the verbal form of the Torrance Tests, the Musicians scored quite well on this ($\rho = .358$, $p < .02$), which may in part be due to reading music and having to put words to their thoughts in terms of their artistic endeavors. Whereas the Artists, who are far more used to a visual medium and not having to express themselves through the written word, did not do as well on the verbal form ($\rho = .188$), yet performed quite well in the ganzfeld, which is a (mentally) visual medium of expression. Actors produced a significantly negative correlation with the verbal form ($\rho = -.336$), possibly again indicating that those who perform in what could be considered more a visual or mental medium found the more analytical task of the written response to be less creative for them. The Writers also obtained a negative correlation with the verbal form, although not significantly so, and this may indicate more of a dissatisfaction with responses being timed, and allowing them little time to build a story line, than with any indication that they lacked creative writing skills.

One other interesting finding that will be explored further in future reports was that of the relationship between senders and receivers and its impact on psi scoring. Following on the report by Broughton and Alexander (1996), and an expressed interest by other researchers at the 1996 PA, an exploratory analysis of the biologically related pairings in

this study produced 15 pairs yielding 10 direct hits, which is a direct hit rate of 66% ($p = .0007$, $ES(h) = .86$), and very similar to the hit rate of 62% reported by the Broughton study, and the reported 60% hit rate of the PRL biologically related group, also reported on by Broughton and Alexander (1995).

Creative populations are under utilized in psi research. As indicated from this study, and by previous research, creative populations have a lot to contribute to psi research. Currently, even anonymous participants in Web experiments who report that they are creative produce higher psi scores than those that do not (Bierman, 1995b; Rebman, Radin & Stevens, 1996). Although very little experimental research has examined this participant characteristic thoroughly, the simple inclusion of a self report creativity question on standard laboratory or psi questionnaires may be enough to give us greater insight into this question, and perhaps contribute to a deeper understanding of the psi process.